



The Way toward Wisdom

An Interdisciplinary and Intercultural
Introduction to Metaphysics

Benedict M. Ashley, O.P.

The Way toward Wisdom

THOMISTIC STUDIES

John Deely, General Editor

Sponsored by the Center for Thomistic Studies

Houston, Texas

The Way toward Wisdom

*An Interdisciplinary
and Intercultural
Introduction
to Metaphysics*

BENEDICT M. ASHLEY, O.P.

University of Notre Dame Press

Notre Dame, Indiana

University of Notre Dame Press
Notre Dame, Indiana 46556
www.undpress.nd.edu
All Rights Reserved

Published in the United States of America

copyright © 2006 by University of Notre Dame
Reprinted in 2009

Library of Congress Cataloging-in-Publication Data

Ashley, Benedict M.

The way toward wisdom : an interdisciplinary and intercultural
introduction to metaphysics / Benedict M. Ashley.

p. cm. — (Thomistic studies)

Includes bibliographical references and index.

ISBN-13: 978-0-268-02028-6 (hardcover : alk. paper)

ISBN-10: 0-268-02028-0 (hardcover : alk. paper)

ISBN-13: 978-0-268-02035-4 (pbk. : alk. paper)

ISBN-10: 0-268-02035-3 (pbk. : alk. paper)

ISBN-13: 978-0-268-04565-4 (ePub)

1. Metaphysics. I. Title. II. Series.

BD131.A84 2006

110—dc22

2006013083

meets the guidelines for permanence and durability
on Guidelines for Book Longevity of the Council
Library Resources.

This e-Book was converted from the original source file by a third-party vendor. Readers who notice any formatting, textual, or readability issues are encouraged to contact the publisher at ebooks@nd.edu

To

Mary, Throne of Divine Wisdom

and to

Mortimer J. Adler, Yves Simon, and William H. Kane, O.P.,
great guides in the search for human wisdom

Contents at a Glance

Contents in Detail
List of Diagrams
Preface
Acknowledgments

Part 1 METAPHYSICS: NONSENSE OR WISDOM?

- Chapter 1* The Problem of the Unification of Knowledge
Chapter 2 The Historical Varieties of “Metaphysics” in
 Western Culture
Chapter 3 Natural Science Is Epistemologically First
Chapter 4 The Culminating Foundational Theorem of Natural
 Science
Chapter 5 The Existence and Essence of Metascience

Part 2 THE PROPERTIES OF ALL REALITY

- Chapter 6* Unity, Plurality, and Efficient Causality
Chapter 7 Unity and Plurality in Other Sciences
Chapter 8 Truth and Formal Causality
Chapter 9 Truth in the Special Sciences

- Chapter 10* Goodness and Final Causality
Chapter 11 Finality in the Special Sciences

Part 3 THE FIRST CAUSE OR ABSOLUTE PRINCIPLE OF BEING

- Chapter 12* The Absolute and/or Nature
Chapter 13 The One Creating First Cause

Part 4 WISDOM, HUMAN AND DIVINE

- Chapter 14* The Way toward Wisdom

- Appendix 1* Outline of Aristotle's Metaphysics
Appendix 2 Natural Substances and Their Properties
Notes
Bibliography
Index

Contents in Detail

List of Diagrams
Preface
Acknowledgments

PART 1 METAPHYSICS: NONSENSE OR WISDOM?

- Chapter 1* The Problem of the Unification of Knowledge
- A. The Information Explosion and Interdisciplinarity
 - 1. The Fragmentation of Knowledge Today
 - 2. Interculturality and Contextualization
 - B. The Common Human Search for Meaning
 - 1. Older Worldviews
 - 2. The Global Expansion of Science and Technology
 - C. The Conditions of Effective Intercultural Dialogue
 - D. The Modern University as Wisdom's Home
- Chapter 2* The Historical Varieties of "Metaphysics" in Western

Culture

- A. The Unification of Knowledge by One Material or Spiritual Principle
- B. The Unification of Knowledge by Coordinating Autonomous Disciplines
- C. Medieval and Renaissance “Metaphysics”
- D. Modernity and Metaphysics
 - 1. Cartesian and Idealist Metaphysics
 - 2. British Empiricism
 - 3. Kant and the Post-Kantian Critique
 - 4. The Varieties of Thomistic Metaphysics
 - a. Essentialist Thomism
 - b. Platonizing Thomism
 - c. Transcendental Thomism
 - d. Existential Thomism
 - e. Phenomenological Thomism
 - f. Analytic Thomism
 - g. Semiotic Thomism
 - h. Aristotelian Thomism
- E. Postmodernism and Metaphysics

Chapter 3 Natural Science Is Epistemologically First

- A. The Logical Structure of Any Discipline
 - 1. Every Science Has a Foundational Treatise
 - 2. Question 1 about Existence
 - 3. Questions 2 and 3 about Substantial Essence Known through Properties
- B. The First Principles of Natural Science

1. Principle of Non-contradiction
2. Principle of Causality
3. The Fundamental Theorem of Natural Science
- c. Questions 3 and 4 about the Causes of Properties
 1. The Nine Categories of Properties of All Changeable Beings
 2. Why All Changeable Substances Have These Nine Properties
 - a. The Intrinsic Properties
 1. *Quantity*
 2. *Quality*
 - b. Relation and the Relational Properties
 3. *Relation*
 - 4 and 5. *Action and Receptivity*
 - 6, 7, and 8. *Place, Position, and Environment*
 9. *Time*
 - c. Summary
- D. Are the Aristotelian Foundations of Natural Science Obsolete?
 1. The Natural Senses vs. Instruments and Experiments
 2. Scientific Universality and Individuation
 3. The Scientific Revolution and the Foundations of Natural Science

Chapter 4 The Culminating Foundational Theorem of Natural Science

- A. The Prime Movers of Systems

1. All Systems of Interacting Bodies Have Prime Movers
 2. Proof that a First Immaterial Cause Exists
- B. The Special Case of the Human Soul
- C. A Universe of Both Material and Spiritual Substances
1. The Existence of Contingent Pure Spirits
 2. Does Modern Science Exclude Spiritual Substances?
- D. Natural Science Validates First Philosophy
1. First Philosophy Presupposes All the Special Sciences
 2. Natural Science Is Not First Philosophy but Establishes Its Ground
- E. Dialogue with Other Views of Nature

Chapter 5 The Existence and Essence of Metascience

- A. The Existence and Validity of an Autonomous Metascience
- B. What Is the Proper Subject of Metascience?
1. The “Analogy” of Being
 2. The Descriptive Definition of the Generic Subject of Metascience
- C. Are Other Worldviews Metascientific?
- D. Objections to the Natural Science Approach to Metascience
1. Thomist Objections
 2. Objections from Modern Science

PART 2 THE PROPERTIES OF ALL REALITY

Chapter 6 Unity, Plurality, and Efficient Causality

- A. The Transcendentals
- B. The Demonstration that Being as such Is One
 - 1. Transcendental “Unity” and Its Contrary “Plurality”
 - 2. The Demonstration of Unity as Intrinsic to Every Being
- C. Unity and Plurality of Contingent Material Beings
 - 1. Substantial Unity and the Plurality of Properties
 - 2. The Unity of a Species and the Individuation of Its Members
- D. The Unity of Contingent Spiritual Substances
 - 1. The Embodied Human Spirit
 - 2. The Hierarchy of Contingent Pure Spirits
 - a. The Community of Spirits
 - b. The Unity of the Spiritual and Material Realms
- E. Unity, Plurality, and Efficient Causality

Chapter 7 Unity and Plurality in Other Sciences

- A. Unity and Plurality in Mathematics
 - 1. Natural Science and Mathematics
 - 2. Ancient Mathematics
 - 3. Modern Mathematics
- B. Mathematical Physics and Cosmic Unity and Diversity
- C. Unity and Plurality in Ethics and Politics
 - 1. The Unity of the Virtues

2. Persons in Community

D. Unity and Plurality in Technologies and Fine Arts

Chapter 8 Truth and Formal Causality

A. The Varieties of Truth

1. Logical and Ontological Truth

2. The Sources of Truth

a. Styles of Human Reasoning

b. Faith and Revelation

c. Mystical Experience

B. Epistemology

1. Skepticism and Sophism

2. Idealism's Answer to Skepticism

3. Empiricism's Answer to Skepticism

4. Aristotelian Thomism's Answer to Skepticism

5. Personalism and Thomism

C. Formal Causality and Participation

Chapter 9 Truth in the Special Sciences

A. Scientific Logic

1. Aristotelian Logic

a. The Kinds of Logic

b. The Scientific Syllogism

c. Premises, Their Terms, and Definitions

d. Univocal, Equivocal, Metaphorical, and Analogical Terms

e. Judgment, Dialectics, and Scientific Demonstration

f. The Distinction of Metascience from Logic

- g. Semiotics
- 2. Logic in Indian and Chinese Cultures
- 3. Modern Logic
- B. Informal Logic
- C. Truth in Natural Science and Mathematics
- D. Truth in the Practical Sciences
- E. Truth in History

Chapter 10 Goodness and Final Causality

- A. Finality, the Causes of Causes
 - 1. Finality and the Other Causes
 - 2. Intrinsic and Extrinsic Finality
- B. Beauty as a Transcendental
 - 1. The Concept of Beauty
 - 2. Physical Beauty
 - 3. Spiritual Beauty
- C. Dialogue with the Aesthetics of Other Cultures
- D. The Problem of Evil
- E. Love

Chapter 11 Finality in the Special Sciences

- A. Teleology in Natural Science
- B. Teleology in Mathematics
- C. Means and Ends in the Practical Sciences
 - 1. Deontology and Teleology in Individual Ethics
 - 2. Revisions of Thomistic Ethics
 - 3. Teleology in Social Ethics
 - 4. Teleology in Technology and Ecology

- D. Teleology in the Fine Arts
- E. Dialogue with the Ethics of Other Cultures
- F. Final Causality and the Coordination of Knowledge

PART 3 THE FIRST CAUSE OR ABSOLUTE PRINCIPLE OF BEING

Chapter 12 The Absolute and/or Nature

- A. The Monistic View of the Supreme Principle
 - 1. Monism and Monotheism
 - 2. Materialistic or Nature Monism
 - 3. Process Philosophy Monism
 - 4. Spiritual Monism
 - a. Monism in the Traditional religions and Occultism
 - b. Neoplatonism
 - c. Indian, Chinese, and Japanese Monism
- B. Critique of Monism

Chapter 13 The One Creating First Cause

- A. Monotheism
 - 1. The Existence of a Creator
 - 2. The Divine Essence
- B. The Divine Attributes
 - 1. The Plenitude of the First Cause
 - 2. The First Cause Is Personal
- C. God and Creation
 - 1. The Triple Causality of God as First Cause
 - 2. The Extrinsic Formal Causality that Is Exemplarity

3. The Hierarchy of Creatures

PART 4 WISDOM, HUMAN AND DIVINE

Chapter 14 The Way toward Wisdom

A. Unified and Open Education

1. Education in the Family
2. Liberal Arts Education
3. Higher General Education
4. Professional Education
5. Continuing Education

B. Summary: Dialogue in the Search for Wisdom

Appendix 1 Outline of Aristotle's Metaphysics

Appendix 2 Natural Substances and Their Properties

Notes

Bibliography

Index

Preface

At the beginning of this twenty-first century, the validity of the ancient and noble discipline traditionally called “metaphysics,” which claimed to be “First Philosophy”—that is, philosophy par excellence, or Human Wisdom—is generally questioned. Thus, academic “philosophy” takes on other, lesser tasks. It seems presumptuous, therefore, to present an introduction to a subject whose very existence is in question. Yet that is what in this book I have rashly attempted. From chapter 5 on, I find it useful to more or less drop the term “metaphysics” altogether and replace it with what I will show is the more appropriate term, “metascience,”¹ more appropriate because “physics” in Aristotle’s day, without envisioning thematically the difference between ideoscopic and cenoscopic knowledge,² included virtually the whole of what since the seventeenth century has come to be called simply “science” in the modern sense. Let me stress from the start that this is not a work on the history of metaphysics (or “metascience”). Nor, in spite of its frequent references to the metaphysical writings of Aristotle and St. Thomas Aquinas, is it an extended exegesis of their works. Others have written this history and provided commentaries on the works of these two great metaphysicians.

Nor is this a work in comparative religion, in spite of numerous references to various worldviews. It is presented instead as an

introduction for students of various levels of preparation. Yet it is also intended for the general reader as a sustained critical argument to show why metaphysics is still a valid intellectual endeavor, and what kind of metaphysics can justifiably claim to be true and useful today.

In attempting to situate such a metaphysics in a chronologically and geographically global context, I realize how sketchy this story must be. Yet I believe that without such a context the reader cannot appreciate the problem I am addressing. In referring to other authors and the problems they raise, I also realize that I cannot do them anything like full justice. My treatment of them can only be typological, using them to suggest alternative positions between which dialogue can be initiated without conclusive and exclusive prejudgments. Nevertheless, I have chosen to commit these sins against scholarly nuance rather than to introduce readers to a metaphysics standing in isolation from its implications and applications. Dialogue with the wisdom of other cultures must begin somewhere, and initial confrontations in dialogue are inevitably fraught with misunderstandings. I hope what I sketch here will open, not close, the doors on such dialogue. I trust my readers, therefore, to give their critical attention to the arguments for my conclusions in this book, rather than to any irritating shortcomings in erudition.

In view of the fragmentation of knowledge that prevails in our modern colleges and universities (the very problem I am dealing with here), it is not possible to presuppose that the student readers for whom this introduction is first of all intended will bring to it a uniform fund of information. Hence, especially in chapter 1, a background is provided that for more advanced readers may seem elementary. I ask their patience. The rest of part 1 argues for the possibility of a valid metaphysics. It is only with part 2 that an actual treatise in metaphysics is presented. Part 3 treats of our knowledge of God as the principle of all reality to which metaphysics contributes, and by which it earns the title of a “natural theology” in distinction from a theology based on God’s self-revelation accessible only to the gift of faith. Finally, since metaphysics classifies and orders the other disciplines, part 4

deals with the application of these findings about metaphysics to education.

Acknowledgments

I wish especially to thank Daniel McInerny, former Director, and Sister Mary Catherine Sommers, present Director of the Center for Thomistic Studies of the University of St. Thomas, Houston, and the Center itself for sponsoring the publication of this work. I would also like to thank John Deely of that center for his expert and generous work in editing it, Matthew Dowd of the Notre Dame University Press for patiently giving it its final form, Mark Johnson of Marquette University and William A. Wallace, O.P., for reading the draft and making valuable suggestions for its revision, and my Dominican brethren of St. Louis Bertrand Priory, St. Louis; St. Dominic Priory, St. Louis; and the Immaculate Conception Priory, Washington D.C., for their support.

Very especially I want to thank Fr. Augustine DiNoia, O.P., formerly Director of the John Paul II Cultural Forum, and now of the Congregation of the Doctrine of the Faith; and Fr. G. Michael Bugarin, Executive Director, and Ms. Penelope Fletcher, Deputy Director, of the Pope John Paul II Cultural Center of Washington, D.C., for their gracious hospitality and support during the time I was revising the work. Ms. Karen King, secretary of the Cultural Forum, has assisted my work in many ways with great efficiency, generosity, and patience, for which I thank her from my heart. I also warmly thank Dr. Gladys Sweeney, Dean of the Institute for Psychological Sciences, Arlington, VA, and its faculty and staff,

for their gracious hospitality during that same year.

Part 1

**Metaphysics:
Nonsense or Wisdom?**

The Problem of the Unification of Knowledge

A. THE INFORMATION EXPLOSION AND INTERDISCIPLINARITY

1. The Fragmentation of Knowledge Today

Today students at the college or university level are faced with the serious difficulties of a knowledge explosion. This explosion has resulted in an extreme fragmentation of knowledge. It is increasingly difficult to use all this information to obtain a consistent worldview or, as J. Ian H. McDonald calls it, a “cosmic vision.”¹ Yet how can we make even ordinary decisions without some sense of what is and is not important? We cannot make decisions in a consistent and informed way without a freely chosen value system. Without some ranking of values, choice would be blind. During a lifetime each person’s value system gets modified as a result of experiences and influences. Yet without a stable commitment to some definite value system, life becomes a series of contradictory choices that gets nowhere.

A value system also implies a worldview. We cannot decide

what is important for our lives except in terms of what we truly think are the choices realistically open to us, what our world, our own potentialities, and our situation in the world make possible. We know we must distinguish between dreams and reality, or our decisions are made in vain. Because a value system must be grounded in a worldview, I will in this book use the single term “worldview” to include the value system it grounds.

Therefore, a worldview, since it includes a value system, also implies that we live in a community or expanding circles of communities from local to global, each with its own history and traditions. We are, as Aristotle said, “political animals”²—we need others who share our views to help us make and carry out decisions, but we also need others with whom we can share our gifts and achievements. The Desert Fathers of Egypt, seeing the halfheartedness of so many Christians, became hermits to live the Christian worldview without compromise. Yet the hermits soon gathered into communities of other committed persons to strengthen each others’ resolve. So did the Buddhist monks. Recently in the United States, the Unabomber became a hermit to perfect his ecological fanaticism, but then sent letter bombs to get his extremist views socially disseminated in the *New York Times*. Thus, because we are human, we cannot arrive at a satisfactory worldview except by participating in a community and its culture. The notion of lone, “creative” genius can only be a half-truth, since geniuses always long for immortality in the public regard for their work.

Therefore, however original we may be, we all need some kind of wisdom, our own and that derived from others wiser than we are, that takes account of all the information accessible to us and unifies it in a useable way. This process of achieving a synthesizing wisdom has recently been given the name of interdisciplinarity and defined as follows:

Approaches vary and disputes over terminology continue. Broadly speaking though, interdisciplinary studies may be defined as a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to

be dealt with adequately by a single discipline or profession.³

Thus, interdisciplinarity concerns how different fields and resources of knowledge, each with its own language and mentality, communicate with one another.

2. Interculturality and Contextualization

A second kind of difficulty for students today is another type of fragmentation that affects not only kinds of knowledge but also total ways of life. It is the fragmentation of the multiculturalism or pluralism of an emerging global civilization. Students today work side-by-side with students from every continent. Yet as J. Ian H. McDonald writes concerning the situation of early Christianity: “Pluralism is by no means the prerogative of the modern or postmodern age. Many ancient cultures were acutely aware of pluralism in some form or other and adopted attitudes to it—whether positive, tolerant and inclusive or hostile, intolerant and exclusive.”⁴

But this is now intensified because our universities have become centers where Americans, Europeans, Africans, and Asiatics study together, yet often have difficulty in communicating with each other. If there is to be dialogue and meeting of minds in such a multicultural milieu, we must recognize the contextuality of the truth embodied in any worldview. By this term “contextuality” I mean that no element of the thought or speech or behavior of a person can really be understood unless serious account is taken of its cultural context.⁵ If one is really to understand Native American ideas and attitudes, they must not be interpreted apart from the context of the culture and worldview in which Native Americans are reared and in which they live. Likewise if I do not recognize the cultural context of my own worldview, I will misunderstand myself and those of other cultures with whom I wish to communicate.

Recognition of the contextuality of our thinking does not necessarily imply that we are forever imprisoned in our own

culture and worldview. Rather, by the very act of recognizing this contextuality we find the possibility of liberation from its limitations. Such emancipation from ethnocentrism is especially urgent today when so many cultures confront each other inescapably. If it is difficult for one modern discipline to communicate with another in interdisciplinarity, how much more difficult it is for diverse cultures, some with very long histories and built on very different foundations, to find common ground!

The modern university has always been troubled by such problems of fragmentation into competing worldviews.⁶ Thus the great German thinker Immanuel Kant wrote an important essay, *The Conflict of the Faculties*, as did Johann Fichte,⁷ and F. W. J. von Schelling;⁸ from a quite different perspective, Cardinal John Henry Newman wrote *The Idea of a University*; more recently, Robert Maynard Hutchins of the University of Chicago wrote *The Higher Learning in America*; and later Alan D. Bloom wrote *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students*. Now, at the beginning of this twenty-first century, we must face these same problems that have become ever more urgent.

B. THE COMMON HUMAN SEARCH FOR MEANING

1. Older Worldviews

A starting point for meeting these challenges of interdisciplinarity and interculturalism is the recognition that all cultures share at least a yearning for “wisdom.” They seek a unified worldview that can guide their individual and communal lives and give them meaning or purpose, a goal or goals worth living for. Hence, because we must live with others, we must seek some common ground, some meaning that we all share, even if incompletely. I

do not claim that everyone feels this need for meaning constantly or with equal intensity, but only that at times this fundamental human desire for meaning and understanding inevitably emerges. We experience this when we explore world literature and find in it people and life situations that are, in spite of differences, those of our own times and place. When I read in the *Iliad*⁹ how the aged Trojan men sunning on the walls murmur to each other as Helen walks by, “Such a woman is worth this awful war!” I might be viewing a scene in a modern movie about life today.

From these considerations it is evident why every culture from the simplest to the most complex includes a notion of “wisdom” as the summit of human knowledge about how to live well. A denial of the possibility of such wisdom is really a claim that cynicism is the true wisdom that alone can make life bearable, since by having no illusions it can prevent the disastrous pain of disillusionment. Yet wisdom about life not only guides judgment about how to live but flows from a deep understanding of the world and our place in it. It is what Socrates meant in his famous saying reported in Plato’s *Apology*: “The unexamined life is not worth living.”¹⁰ To examine life and find it meaningful is to be wise. In every culture the paradigm of this wisdom is located in certain persons: the elders, the shamans, the priests, the gurus, the philosophers, the scientists, the media pundits. These leaders are supposed to embody the wisdom of the people of their culture and its traditions and to exemplify and lead its creative progress.

The wisdom of prehistoric humanity seems lost to us and is only hinted at by such few relics as archaeologists have uncovered. Yet prehistoric wisdom is no doubt preserved somehow in the traditions of the preliterate, tribal, and indigenous cultures of the world. These survive today mainly in sub-Saharan Africa and in largely marginalized situations in Asia, Japan, Australia, the Pacific Islands, and among the indigenous peoples of North, Central, and South America.

In his famous and controversial work, *A Study in History*, Arnold J. Toynbee (1889–1975) identified some twenty-one civilizations, exclusive of less advanced cultures. He listed: (1) Sumerian, (2) Egyptian, (3) Minoan, (4) Hittite, (5) Babylonian, (6)

Hellenic, i.e., Greek-Roman, (7) Syriac, (8) Orthodox-Byzantine, (9) Islamic-Arabian, (10) Islamic-Iranian, (11) Western, (12) Orthodox-Russian, (13) Ottoman, (14) Indian, (15) Chinese, (16) Korean, (17) Japanese, (18) Mayan, (19), Andean, (20) Yucatec, and (21) Mexican civilizations. In a more recent work, *World Philosophies*, Ninian Smart discusses fourteen worldviews, including the traditional philosophies of (1) South Asia, (2) China, (3) Japan, (4) Korea, (5) Greece-Rome–Near East, (6) Islam, (7) Judaism, (8) European, (9) North American, (10) Latin American, (11) African, and the considerably changed cultures of (12) Modern Islam, (13) Modern South and Southeast Asian, and (14) Modern China-Korea-Japan. These classifications are of course somewhat arbitrary, but they give some idea of the historical richness of human culture. A visit to any large art museum will illustrate the rich variety of this precious heritage.

In his brilliant *The Rise of the West: A History of the Human Community*, William H. McNeill uses the term “ecumene,” from the Greek for a “household,” now more familiar as a religious term, to designate the major portion of the human race that, at any point in history, enjoys a community of important cultural interchanges. Of course very broad classifications, such as those of Toynbee and Smart, or the discussion of ecumenical interchange provided by McNeill, give no more than a general notion of the complex web of human culture. First, a distinction must be made between these great cultures centered in cities and many more older or marginal cultures that were not “civilized,” that is, citified, some of which survive but only marginally today.

According to recent DNA studies, our human race, *Homo sapiens sapiens*, originated probably in east Africa about 150,000 years ago. It probably numbered only a few thousand when it began to spread into the Near East and thence into Asia 73,000 years ago, and into Europe 51,000 years ago. It was, however, so needy and so adventurous that it soon began to occupy the whole globe. It reached Australia and the Pacific Islands in several waves, beginning about 40,000 to 33,000 years ago, Japan perhaps only 30,000 to 10,000 years ago, and Hawaii perhaps not until 300 CE. It spread through the Americas beginning

perhaps 30,000 years ago.¹¹ Humankind was then still so widely scattered that each tribe, probably originally of a few thousand at most, quickly became isolated. They survived on a simple economy of hunting and food gathering. Yet, as the famous paintings of the cave of Chauvet-Pont-D'Arc from 31,000 years ago and other sites demonstrate,¹² these scattered people already had remarkable cultures, as do many of the marginal people at this same level of economy today, such as the natives of Australia.

The transition to economies of food production through agriculture and the domestication of animals made possible the rise of villages, then of cities and of the invention of writing, which enabled humanity to pass from its prehistory to its history. This process began in the Near East around 6000 BCE and resulted, about 3000 BCE, in the great civilizations of Mesopotamia (Sumeria, Akkadia, Assyria, etc.) and Egypt. It then spread west into Europe and east into India. In Europe, it produced the civilizations of Crete and Greece and Rome. The influences of the Magi of Iran are evident in the first Greek philosophers.¹³ Thus McNeill argues that Toynbee's Sumeric, Babylonian, Egyptian, Hellenic, Orthodox, and Western civilizations eventually mixed and are preserved as the true Western Ecumene.¹⁴ This is plausible, as is evident from the fact that even today the achievements of Mesopotamia and Egypt are included in the living memory in the West through their monumental remains and through the Bible.

On the other hand, major cultures were not a part of this Western Ecumene. The culture of India, though it was in contact with Hellenistic Greece in the 300s BCE and with Rome between 100 BCE and 200 CE, was gradually cut off from the Western Ecumene. China had, from about 1500 BCE, developed its own independent culture that influenced Korea, Japan, and Southeast Asia, though it was perhaps stimulated to do so by influences from the distant Near East.¹⁵ Like the civilizations of Mesopotamia, Egypt, and India, Chinese culture was centered on the valley of a great watercourse, the Yellow River, where irrigation made necessary major social cooperation. It favored a

hoe-cultivated garden agriculture, rather than one of plowed fields prepared for cereals (as in Egypt and Mesopotamia), and it developed its own system of writing. Humans entered the Americas, probably through the Bering Straits land bridge, in about either 36,000 or 17,000 BCE and eventually reached the tip of South America by about 11,000 BCE. They reached the level of city dwelling in Central America with the Olmecs between 1300–400 BCE. A prime example can be found in Mexico with the city of Teotihuacan, which by 350 BCE was probably larger than any other city in the world. Other peoples, such as the Toltecs, Zapotecs, Mixtecs, and especially the Mayas, enjoyed what is called their Classic Period, 250 BCE–900 CE. In 1325 CE the Aztecs, invading from the north, founded Mexico City, which finally fell in turn to European invaders in 1521. The other American civilization was in Peru with the first kingdom of Chavín from about 950–450 BCE, succeeded by other cultures until the rise of the Incas in the 1200s CE, who reigned until invaded by Europeans in 1531. Whether these cultures were influenced at any time by Eurasian culture before the sixteenth-century European invasions remains controversial. Yet they created remarkable art and architectural works and, some of them, forms of hieroglyphic writing. Some also invented a very precise calendar and devices for simple arithmetical calculations. They did not, however, as far as we know, achieve the level of Greek science. Thus the civilizations of India, China, and the Americas developed in ways largely independent of the Western Ecumene.

The rise of Islam in the seventh century CE had the remarkable effect of joining the Western Ecumene with northern India (Pakistan) and eventually sub-Saharan Africa and, in the sixteenth century, with the East Indies. The invasion from inner Asia of nomadic Turks into Islamic territory produced the great Ottoman Empire, which lasted from the thirteenth century CE to World War I. Other great invasions by the Mongols from Inner Asia into both China and the West complicated this picture of the Western Ecumene, but did not essentially change it. Yet after the Middle Ages, the Islamic regions grew more isolated from the Western Ecumene. The Muslims (adherents of Islam), through the Christian Byzantine Empire that they conquered, acquired

much of the ancient Greek heritage and, by also conquering Latin Christian North Africa, opened a way to eventual influence in sub-Saharan Africa. Yet Islam also moved east into India (Pakistan) and stood in stark opposition to the Christian domination of the West.

To understand any of these world cultures it is necessary to become acquainted with the artistic, oral, and written forms of expression in which they were preserved and through which they were transmitted, and hence with the thought forms these media were developed to record. In the earliest known cultures, the wisdom or worldviews of the people were generally expressed orally in mythologies. A “myth” as a literary form can be defined as a story of events that took place “once upon a time,” in which the forces of nature and human experience are personified as spirits, gods, or heroes thus expressing the worldview and value system of a particular culture. Although prehistoric in origin, these traditional stories shaped both Old and New World cultures and were elaborated into systems of ritual and worship in a complex pantheon characterizing the type of religion called “polytheism.”¹⁶

In the first millennium BCE, however, Zoroaster in Persia, the biblical prophets in Israel, Buddha in India, Confucius in China, and Socrates in Greece subjected these ancient worldviews to profound criticism.¹⁷ They placed greater emphasis on higher ethical values and a corresponding lesser emphasis on an anthropomorphic view of the divine. In the Hebrew Bible, this shift took the form of a strict monotheism, in which the origin of the world and of humanity was attributed to a personal and free Creator. Christianity and Islam then adopted this Judaic monotheism. In India, however, and the cultures under its influence, religious reform intensified a monism in which the visible world and its invisible gods are all viewed as purely phenomenal manifestations of an ineffable Absolute. This Absolute is accessible to human seekers only through mystical meditation, in which the human self rediscovers its identity with that Absolute. In China and Japan a similar monism was common, especially in Taoism and in the Buddhism imported from India; but, under the predominant influence of Chinese

Confucianism, the emphasis was shifted from the mystical and speculative to a this-worldly pragmatism.¹⁸

Today these ancient cultures are now much affected by what is often called “modernity,” either in the radically materialistic form of Marxism, as formerly in Russia and now still in China, or, as in the United States and other capitalist countries, in its agnostic form of moral relativism. This modernity differs from older worldviews by its almost unlimited faith in the power of modern science and scientific technology to reveal and control natural forces.¹⁹ While the older cultures all had some knowledge of practical mathematics and a practical, common sense view of nature (for example in astronomy, agriculture, and engineering), none of them achieved the kind of knowledge that now characterizes modern science and the advanced technology it fosters. The earlier worldviews were not elaborated and transmitted in abstract scientific treatises. Instead they took on a variety of literary forms: myths, legendary or historical narratives, rhetorical sermons, ethical proverbs and parables, and poetry, such as survive for us today in the JudeoChristian Bible.

The cultures associated with the great family of Indo-European languages (not to be thought of in racial terms) probably spread from the steppes around the Black and Caspian seas beginning in the 4000s BCE.²⁰ The branch of that family that moved into Iran and India about 2000 BCE called themselves “the Aryans” (noble people). The Iranians attained the great Persian Empire under the Achaemenid dynasty in 549 BCE; this empire dominated the whole Near East and Greece. The sage Zoroaster, traditionally dated about 600 BCE,²¹ but today dated as early as 1000 BCE,²² undertook the religious reform of these peoples. He held that the world is governed by two principles, a good god of light and fire, Ahuramazda (hence the religion is called Mazdaism), and a bad spirit of darkness, Ahriman. The Zoroastrian priestly caste was called the Magi. They forbade blood sacrifices but worshiped fire along with other rather abstract deities and the countless angels who formed Ahuramazda’s court. They promoted an ethics of justice and anticipated a final judgment with heaven and hell to follow. Human bodies were not

interred or burnt, lest they pollute the earth; instead, corpses were exposed on towers. Zoroastrian dualism probably had an influence on Jewish thought during the period when the Holy Land was subject to the Persian Empire. Zoroastrianism survives today, however, only as the small sect of the Parsis in India; yet recently, in Washington, DC, I met a Zoroastrian!

Another branch of the Aryan peoples spread into India, where they were much influenced by the native civilization that had been flourishing there since 2500 BCE. The sacred literature of that native civilization consisted primarily in the hymns of the Vedas, the Rig Veda dating from as early as 1500 BCE. These compositions were orally transmitted for hundreds of years and were elaborated both by the commentaries of the Brahmana and Aranyakas, which dealt mainly with ritual matters, and also by the more speculative Upanishads (from about 800 BCE).²³ These works display a rich polytheistic mythology, but with a marked tendency to treat the many gods as manifestations of some one mysterious Absolute of which the universe is a monistic manifestation. The human self (*atman*) is separable from the body, and undergoes transmigration from inferior to superior bodies or the reverse, according to the preponderance of good or bad deeds in each life (*karma*). The goal of life is salvation (*mukti*) by emancipation (*moksha*) from transmigration and all suffering. The Vedas support the three-caste social system of priests, warriors, and manual workers, a system that probably goes back to the early Indo-Europeans, but was afterwards supplemented by a fourth class of “out-castes.”

The Aryan Vedic religion was opposed by two other religions that did not accept the Vedas or the caste system, Jainism and Buddhism, each with its own extensive sacred literature. The great leader of Jainism, Mahavira (c. 599–527 BCE) was of the warrior not the priestly caste. His teaching flourished in India until about 1100 CE, but, as our twenty-first century opens, the influence of Jainism is much diminished, and is largely confined to India. Jainism teaches a very rigorous asceticism marked by belief in an infinity of spiritual souls, yet is atheistic.

The Buddha (Enlightened One), Gautama Siddhartha, known also as Shakyamuni (c. 563–c. 483 BCE), came from the warrior

caste. He taught that release from transmigration can only be achieved by recognizing that the whole phenomenal world, including individual human souls and the gods, exists only momentarily. This teaching differs radically both from Jainism, which holds for the reality of matter, and from Hinduism, which tolerates a spectrum of views on this question. Buddhism flourished in India until about 900 CE. Then, probably because of its opposition to the caste system, Buddhism became almost extinct in its native India, yet continued to thrive in Sri Lanka, Tibet, China, Southeast Asia, and Japan, and now has global influence.²⁴

With the rise of Buddhism and its radical denial of the phenomenal world, Hinduism was forced to define its cosmology more exactly, with the result that it developed systems (*darshana*) of quasi-philosophy,²⁵ usually given as six in number. These *darshana* all had ancient roots but were systematized only after 500 BCE. Hence they are contemporaneous with the great age of Greek philosophy and developed concurrently with that philosophy as it continued into the Middle Ages.²⁶ To these six systems must be added that of the Cavarka School, which flourished from c. 600 BCE to c. 1300 CE. Members of this last school were total materialists. But their influence faded in India, and their literature is lost to us.

In China there were also traditionally six schools of quasi-philosophy, also not clearly distinguished from religious systems; and only one, the Yin Yang School, was much concerned with cosmological problems.²⁷ The other five schools—of Confucianism, Mohism, Taoism, the School of Names, and the Legalists—were chiefly ethical in character. Mohism believed in “living according to nature,” in opposition to the Confucian emphasis on “education in virtue.” Taoism agreed with Mohism on naturalism, but also developed a strongly mystical character in opposition to Confucian worldliness. The Legalists, for their part, put more trust in government coercion than in education. Confucianism, however, became the dominant school, while the Taoists remained its severest critics. When Buddhism entered from India, it colored the thinking of both these dominant schools

and was colored by them.

Thus, in both India and China, some study was made of formal logic to be employed in highly speculative and sophisticated debates. Yet the worldviews of these two great cultures did not make a shift to systematic reasoning and analysis of empirical evidence, but continued to rest on age-old traditions or on intuitive knowledge of a mystical type accessible only through ascetic meditation. Even so, both in India and China, some serious attention was given to many of the problems of natural science with which the Greeks were so concerned.²⁸

2. The Global Expansion of Science and Technology

We are now witnessing the ever more rapid advance of modern science and technology, an advance that would be impossible without the kind of systematic, logically deductive reasoning found in mathematics. Rapid population growth, also largely a consequence of modern medical technology and the overcoming of famine by scientific methods of food production, is forcing emigration and cultural mixing. The cinema, television, and now the Internet provide a worldview that is communicated around the globe.²⁹ Thus, although there are still distinct centers of culture in the world surrounded by marginal peoples, all cultures are being drawn into a Global Ecumene that is, in effect, an expansion of the Western Ecumene in its present state of secularizing scientific and technological advance. Therefore all these centers look for education in the modern sciences on which progressive technology is based, and such education is mainly available in universities of the western type.

What then was the origin of this special feature of modern global culture, namely, the cultivation of the sciences of nature that have spawned modern technology? It seems that China, isolated as it was up until about 1600 CE, at that time had technologies equal or even superior to those of the contemporary Western Ecumene; yet China afterwards rapidly fell behind.³⁰ Most historians of science agree that the roots of modern science

go back in a unique way to that remarkable culture that came to dominate intellectually the Western Ecumene, namely, that of the Greeks. Only in that culture did the concept of “science”—in the sense of a strict system (such as pure mathematics) based on a limited set of intuitively known first principles (axioms) and proceeding by logical deduction—enter into human history. This notion of science incorporated a view of reason as having an autonomy respecting social authority, including religious authority and belief; this view characterized and distinguished Greek philosophy in the ancient world, as also Latin philosophy in the medieval world. This view of human reason gradually, after many setbacks, came to dominate the Western Ecumene that, by its scientific and technological power, is now creating the Global Ecumene. The steps by which this came about will be outlined in the next chapter.

For a long time this concept of an empirical yet logical science of nature remained relatively ineffective, the pursuit of a few curious investigators. Yet its tradition was preserved and somewhat advanced by Islamic thinkers and then by the medieval Christian universities, until finally, around the seventeenth century, with Copernicus, Galileo, and Harvey, it found more effective and technologically fruitful applications in the so-called “scientific revolution.” Only then did the extensive use of special instruments of observation, such as the clock, the thermometer, the telescope, and the microscope, along with the techniques of controlled experimentation, come into play and make possible the gathering of precisely measured data.³¹

In subsequent years, especially after the work of Isaac Newton (1642–1727), this revolution produced the rapidly advancing modern science of nature that has given humanity today its unprecedented technological control of the forces of nature. Although the first modern scientists, such as Galileo and Newton, were strongly Christian in their worldview and saw science as a support for their faith, the religious wars in Europe occasioned by the Protestant Reformation tended to disillusion the intellectual elites with worldviews based on revelation.³² It eventually led many to join the movement called the

Enlightenment, which placed its hopes for the solution of human problems not in divine, superhuman powers and prayer but in the purely rational power of modern science and the technological advances it makes possible.

Yet because this new version of natural science was more and more conceived as strictly impersonal, non-teleological, and “value free,” the Enlightenment also gave rise to the Romantic movement.³³ The leaders of this movement looked to the more subjective, intuitive, and creative fine arts to provide a value system that was counter yet complementary to the “value neutrality” of modern, mathematicized natural science. It has often been observed that the fine arts, especially as they are popularized in music, film, theater, and television, together with the competitive excitement of sports, are the religion of “modern” humanity. This is perhaps an exaggeration, yet “modern people” do seek to “create” their ethical values by “social construction” and a kind of competitive “game playing,” much as they create their works of art and their sports contests. For both kinds of values, styles constantly change, often overnight.

Since it is necessary to give a name to this modern worldview, granted that, like other worldviews, it exists with many variations, I will call it “Secular Humanism,” because I believe this indicates both its refusal to be classed with the other world “religions” and its focus on human rather than superhuman powers.³⁴ These two features oppose it to Christian or other types of religious humanism that regard human dignity as derived from its imaging of God or the Absolute. Born of the Enlightenment, Secular Humanism places its trust in the kind of wisdom best found in modern science and its technology, but complemented by the social construction of values. It is this shift to “beings” with a “forgetfulness of Being” that the most influential philosopher of the twentieth century, Martin Heidegger, saw as the destined end of Western culture. By this he meant that modern western man no longer has a vision of the whole of reality (Being) but is lost in a fragmented concentration on the concrete things accessible to technological control.³⁵

Clearly this Secular Humanist worldview ought to be subject to

dialogue and criticism on a “level playing field” with other worldviews. In order to be free of ethnocentrism, sociologists of religion and culture generally prefer a functional rather than a substantive definition of religions and other worldviews. Thus Secular Humanism in its varieties is comparable to the other world religions, because it has replaced these religions by providing society with a functionally equivalent worldview. Of course, by this very rejection of the world religions it invites comparison with them.³⁶

Today, Secular Humanists, confident in their current global hegemony, prefer to think of their own worldview as the only truly “modern” one. They take for granted that it has inevitably replaced older worldviews discredited by progressive modern science. But is this not also a form of ethnocentrism? By no means is it self-evident that an advanced science and technology is necessarily dependent on the Secular Humanist worldview. Modern science had its roots in the older religions of the Greeks, the Islamic Arabs, and the Christian medieval universities, and was “revolutionized” by devout Christians like Copernicus and Galileo. Today, the question of the valid foundations of science has again been opened by “postmodern” controversies in the philosophy of science. Postmodernism, while it is sometimes nothing more than a recrudescence of ancient skepticism, has taught us not to take for granted any worldview, including modern Secular Humanism, without critical reexamination and revision.

In particular, Secular Humanism tends to make too sharp a distinction between the philosophies based on reason, which it favors, and the theologies based on faith in revelation, which it rejects. Actually, if one attempts to apply to most cultures this distinction between a wisdom based on reason and a wisdom based on revelation, a host of difficulties are encountered. The wisdom of preliterate cultures blends elements of reason with other elements attributed to guidance by superhuman spirits. Because these worldviews did not adopt the critical methods of Greek thought, they were not inclined to distinguish sharply between reason and revelation, science and faith.

In Chinese thought also it is not easy to decide if Confucianism is a religious “theology” or a rational “philosophy.”

Even in India, the sacred texts of Hinduism and of Buddhism are not understood as “revealed” in the same way that a Jew or Christian understands the Bible, or a Muslim the Qur’an, as “the Word of God.” Rather, the Hindu and Buddhist texts are generally regarded as paradigmatic expressions of experiences open to all truth seekers who practice the required disciplines of asceticism and meditation. In these religions, as in Greek Platonism, ultimate truth is thought to be immanent in the human spirit, and often no essential distinction is recognized between the human spirit and the Absolute Spirit. This does not mean, of course, that in these cultures there has been no development of rational, critical thought parallel to Western philosophy and “science,” but only that it is not so sharply distinguished from religious thought as it came to be in the West under the influence of the Greek conception of philosophy as a relatively autonomous exercise of reason.

Secular Humanism in the nineteenth and twentieth centuries has experimented with totalitarian Marxist Communism and National Socialism, as well as with capitalist democratic political regimes. Today, after World War II, state-moderated democratic capitalism is seeking to establish itself globally, but finds it must still seek a *modus vivendi* with some totalitarian regimes, such as those of China, Iraq, Iran, and so forth. The older worldviews of Judaism, Christianity, Islam, Hinduism, Buddhism, and Confucianism are also under intense pressure to accommodate themselves as minority cultures to the dominance of Secular Humanism in its many versions. In Islam, these pressures have recently generated a violent reaction to the United States as a secularist superpower threatening all religion. Even more culturally threatened are the marginal, indigenous peoples of the world, especially in sub-Saharan Africa, India, Australia, the Pacific Islands, and the Americas, who are still in transition from worldviews based on ancient tradition to some *modus vivendi* with modern science and technology.³⁷

C. THE CONDITIONS OF EFFECTIVE INTERCULTURAL DIALOGUE

The fragmentation of knowledge and the absence of the wisdom to “get it all together” are especially dangerous today, a time when there is a global confrontation and intermingling of different cultures. These culture wars could end in a tyrannical global uniformity of the utmost mediocrity. We would much rather like to preserve our rich cultural diversity. Yet we also know that communication and reconciliation at both the level of interdisciplinarity and interculturality is one of the pressing intellectual and social problems of our times. To feel it, one has only to walk the streets of urban America. Hence people today are becoming more keenly aware of the contextuality of thought. When any of us evaluates what is true and false, what “reality” is and what it is not, what is right and what is wrong, we do so within the context of the culture in which we were born and educated to think and speak in some particular social role.

Among linguists and semanticists there is a long-standing controversy between what is called the Sapir-Whorf Hypothesis and the Cartesian innate “deep structures” claimed to be uncovered by Noam Chomsky.³⁸ Sapir and Whorf held for a “mould” theory, according to which the features of a culture are shaped by its predominant language. If this is true, can it really be possible to translate the worldview and value system of one culture into another? Chomsky, on the contrary, argues for a “cloak” theory of culture. He believes that the deep structures of any language reveal a logical pattern of thought common to all human cultures, since language is merely the cloak or expression of thought. Hence all human thinking, in whatever language it is cloaked, can be translated into any other language. Most linguists, it seems, now prefer moderate mould theories that emphasize the difficulties of intercultural translation but do not deny its possibility. Thus, on the one hand, we need not despair of intercultural communication, yet we must always be acutely aware of the dangers of misunderstanding. Language conditions

our thinking, but we can be confident that by critical thinking we can find ways to overcome the barriers to communication.³⁹ Not that we will always succeed, since Socrates and Jesus failed!

The most obvious example of intercultural translation is the fact that modern science and its technology and business are actually present and operative at least to a degree throughout the globe. People from all cultures now come to our universities to learn the common language, often very technical in character, required for this kind of communication. No doubt we must grant a contextuality by which there are different “mentalities” or styles of rational thought in different cultures, for which allowance must always be made. Philosophers like Jürgen Habermas can be commended for arguing for “civil discourse” and “communicative competence” in an “ideal speech situation” to provide a meeting of minds.⁴⁰ But we must recognize that this rather utopian concept of dialogue seems proper to the academic and democratic culture of the West. Some ancient cultures, like that of India, were tolerant of different opinions, but to the point of indifference, which made them little interested in seeking a positive, critical reconciliation among these views.

Michel Foucault’s contention that discourse is an exercise of power (or resistance to power) used to dominate the other⁴¹ is certainly often verified; but this power, as Foucault also granted, need not be destructive. It is constructive if it seeks to produce a community of persons in truth, and Foucault never proved that the claim to such an aim has to be dishonest. Jacques Derrida and the fellow “deconstructionists” claim to expose the illusion that face-to-face communication by speech is superior to writing. Yet they argue that even writing is inherently ambiguous, since a text’s meaning cannot be determined without reference to other texts, and so on into an infinite regress of “intertextuality.” Yet would Derrida be writing about the ambiguity of writing were there not a desperate hope, even unconscious, of improving honest communication?⁴²

Some writers on multiculturalism, influenced by the concept of “academic freedom,” assume that for genuine dialogue between worldviews to take place, the participants must accept at least a

hypothetical relativism, or (what amounts to much the same thing) a neutralism as regards truth-claims. This assumption, however, restricts multicultural dialogue to relativistic worldviews by automatically presuming that all nonrelativistic worldviews must be false.

Einstein's theory of relativity made time and place relative to the observer precisely in order to maintain the absolute value of the speed of light and the invariance of basic physical laws in the systems of all observers. The only form of relativism compatible with honest multicultural dialogue requires that questions about the nature of truth, whether it is relative or absolute, be left open for discussion. This openness to criticism is the absolute invariant condition of multicultural dialogue. Hence in this book I frankly state what I think to be true and give my reasons, but I leave the evaluation of these reasons perforce to the reader.

Because of human limitations, most philosophies and ideologies are one-sided and ignore other aspects of reality than the one that most interests them. A good rule in dialogue is to begin by finding out the principal concerns of the other parties. What do they especially fear? If one can then affirm that one also shares these concerns and fears, at least in part, then the other parties may be willing to do the same for one's own concerns and fears. Thus the gap in opinion may be lessened. For example, Protestants are concerned not to be seen "to rely on works righteousness," as they say, whereas Catholics are concerned not to be seen, as they say, "to rely on easy grace." If, therefore, at the beginning of an ecumenical dialogue, the Catholic party affirms reliance on faith in the Savior as the sole source of human righteousness, and Protestants affirm that they do not think faith is an excuse for moral irresponsibility, common ground is established.

While all partners in dialogue must be willing to expose their honest convictions to criticism, they need not grant that these convictions may be false. If, in fact, in the dialogue, the criticisms do expose the falsity of some convictions, those who hold these falsified opinions must face up to their dilemma. Either they must abandon some essential feature of their former worldview and undergo a conversion to what they now see to be truer, or they

must break off the dialogue and remain committed, but in bad faith, to what they now know to be false. Thus someone who knows with certitude that the world is round can honestly dialogue with someone who believes it is flat without pretending that perhaps he may be proved wrong or holding that both opinions may be equally true.

Even skeptics who deny that the human mind can ever attain certitude about anything can dialogue with those who claim they know something with certitude, provided they do not demand that those who make this claim first admit they may be wrong. Nor may I demand that relativists in dialogue with me must abandon their relativism but only that they do not require me in advance to abandon my antirelativism. What is required for dialogue is nothing more than the willingness of each party to expose its positions to criticism and to propose answers to these criticisms that are also open to criticism—in other words, to attempt to understand the other’s views in the search for greater truth at all costs.

Thus, it facilitates multicultural dialogue for all partners to make as clear as possible the foundations of their views, “where they are coming from.” Yet some philosophers today attack what they call “foundationalism” on the grounds that what are claimed to be the basic principles of any system of thought or culture are not meaningful outside their context within that total system. These anti-foundationalists claim that all human thinking is historically embedded in such a way that there is no possibility of distinguishing fact from theory, principles from conclusions, truth about the physical environment from psychological projections.⁴³ But if this is true, then it is also impossible for one culture to find any common basis of discussion with another outside of purely pragmatic reasons.

Nevertheless, we need not give up so easily. It would indeed be folly to deny that many subjective factors hinder access to a reality that transcends human subjectivity. If genuinely scientific knowledge is to be in some small measure achieved, these factors need to be critically exposed and attempts made to overcome them. Anti-foundationalists themselves seek to provide a reasoned foundation for their own pragmatic, relativistic

worldview. One can therefore dialogue with antifoundationalists without first agreeing with their anti-foundationalism; and, for their part, anti-foundationalists must expose their anti-foundational convictions to criticism without requiring prior agreement from their dialogue partners. Moreover, each dialogue partner needs to make a careful examination of their foundational presuppositions, including even those that have led them into anti-foundationalism but have perhaps remained implicit and unexpressed.

Persons can be judged really “wise” only if, through reflection, they have become conscious not simply of what their worldview is but also of the bases on which it rests. Nor is anyone truly wise who is unable to enter into dialogue with those of different worldviews. The wise can dialogue fruitfully, because they have achieved a certain warranted confidence in what they think and why they think it, and can formulate this for others to consider. Moreover, it is important to the wise that their views be tested by exposure to other views and be open to the clarification, enrichment, or even correction that such exposure may bring. Finally, the truly wise know how important it is for their own sharing in the truth to share it with others. Yet this multicultural wisdom does not of itself exclude a relativist, neutralist, or antifoundationalist conception of wisdom from dialogue. Socrates said, “I am wise only in that I know I am not wise”; similarly, it is open to relativists to say, “I am certain only that nothing is certain.” But they must be ready to hear and take seriously criticisms of their skepticism or relativism.

Thus one can distinguish three models of dialogue that have three quite different aims.⁴⁴ One form of dialogue aims at *conversion* and hence is rhetorical in mode, since it is aimed at the will as well as the intellect. In this long book I have attempted to avoid rhetoric even at the expense of appearing pedantic. A second model aims at *refutation* and hence is polemical in mode, since it strives to expose error. Though perhaps I have often failed, I have tried to be objective and fair. A third model aims at *reconciliation*, and its mode is analytic, since it aims to formulate basic assumptions held by the dialogue partners so that what is true in both positions may be recognized. This is, I believe, the model most appropriate to metaphysics, the search for human

wisdom, and the model that we need to develop. That development is the aim of this book.

D. THE MODERN UNIVERSITY AS WISDOM'S HOME

These rather complicated conditions for interdisciplinary, multicultural dialogue, whether purely rational or based on some higher form of knowledge, or on both, are not likely to flourish in a culture unless supported by some form of institutionalization. The wisdom of the culture must be embodied in a shaman, a priestly caste, or a faculty of university professors, and in the social structures that support these sages. If different cultures are to dialogue with each other in an exchange or confrontation of their varied wisdom traditions, this dialogue is probably best centered in such an institutional setting. But where are we to look for institutionalized multicultural dialogue today? No doubt it occurs in many modes and many places, yet certainly the institution chiefly devoted to it is not the cave of the shaman or the temple of the priest but the modern university. Indeed it is in the university that multiculturalism and contextuality have posed important issues that are given painstaking discussion. It is there that leaders with the intellectual skills and freedom of thought to transcend their native cultures are being prepared for dialogue with others.

For example, in the United States, for Native, African, or Hispanic Americans to be truly wise and effective leaders for their own people, they must confront the pressures of a multicultural America as the complicated context in which their indigenous minority cultures must survive. Hence they must learn how to make use of these multicultural influences in a positive rather than destructive manner. Today, such indigenous leaders either need a university degree or the counsel of other university educated members of their minority. Only in this way can

disadvantaged minorities learn to know the history of their own culture and its language, art, and legal rights sufficiently to defend and promote it effectively in midst of the dominant majority culture. Hence, any form of wisdom today must become conscious of its multicultural context and make use of the resources of academia to achieve public success.

Yet how is a modern university, or any of our “think tanks,” to engage in or promote multicultural dialogue unless it has reflected on the foundations of its own unity as an institution? To do this it must achieve genuine interdisciplinarity. In a famous book, *The Two Cultures*, C. P. Snow showed how our universities are divided into two worlds, the world of the “hard” sciences and the world of the “soft” humanities, which have quite different notions of truth and method.⁴⁵ Since Snow’s book appeared, in both of these academic worlds “fields” and “departments” and even “interdisciplinary communities” have rapidly further divided and subdivided.

The very term “uni-versity” means many-looking-toward-one, and is related to the term “universe,” the whole of reality. Thus, the name no longer seems appropriate to such a fragmented modern institution whose unity is provided only by a financial administration and perhaps a sports team. The fragmented academy is, of course, the result of the energetic exploration of all kinds of knowledge, but how can it meet the fundamental yearning for wisdom on which each culture is based? Fortunately, recent concern for interdisciplinarity is having its effects. Yet these efforts are generally on a very small scale and lack any basic theory. If we are to make headway in overcoming this fragmentation of knowledge it is necessary first to realize that, though this problem has exploded in our time and must be confronted squarely in this twentyfirst century, it was present at the very birth of the proto-universities and must be approached from that long historical perspective.

Although all the great civilizations have had schools of some type for their cultural leaders, these have generally been very different from the modern university. Schools for the preparation of priests, such as those of ancient Egypt and India, or the schools of meditation of the Buddhists, or the remarkable

Confucian system of ethical education and testing for public office, served different purposes from our schools and so had different structures and programs.⁴⁶ Today it is chiefly in the modern university that there are to be found scholars who study and compare not only the great historic literate cultures but even the preliterate cultures and their contacts with the literate world. Thus, the wisdom resources of every culture today are most completely preserved, studied, and developed in universities.

Unfortunately, the modern university has sometimes itself been closed to all but the Enlightenment culture. Yet, inevitably, it is being forced to assimilate elements from other cultures that at first appeared quite alien to its ethos. Today, it is struggling to do this on a wider scale and more intentionally. As someone reared in that university culture, I cannot honestly claim to be free of its limitations. Yet my intention is to explore the modern university's worldview (or worldviews held in tension) and how it can be put in effective dialogue with the worldviews of other cultures for the sake of mutual enrichment. My hope is that, by doing this, if I have readers formed in other cultures, they will be able to find common links within the desire for wisdom that we all share as humans, links that will facilitate further dialogue.

Thus, to deal with multiculturalism in the university also requires that special attention be given to its interdisciplinarity. How can our universities, if they lack internal unity and common language, communicate with other cultures? To begin the search for an answer to this problem, the next chapter will consider some of the historical developments that account for the present condition of our universities and the decline of their former reliance on "metaphysics" as a unifying discipline.

The Historical Varieties of “Metaphysics” in Western Culture

A. THE UNIFICATION OF KNOWLEDGE BY ONE MATERIAL OR SPIRITUAL PRINCIPLE

This chapter is not intended to be a refutation of the various views of metaphysics with which I do not agree, but a narrative typology (see diagram 1) of the chief views that have been held of the ways in which human knowledge can be unified, a task generally regarded as “metaphysical.”¹ Since the very term “metaphysics” indicates its Greek origin, it is to the Greek tradition that we must first turn in asking whether a “metaphysical” unification of knowledge is possible. This tradition will then be compared to others still current in the Global Ecumene.

Greek culture, even after it became literate, preserved much wisdom that had arisen in oral form, such as in the great Homeric epics. It also borrowed much from the older Egyptian, Mesopotamian, and Mycenaean cultures. Their sages, because they presented the wisdom of the culture poetically through traditional myths about the gods, were called “theologians.” In contrast, certain later thinkers were considered “philosophers” (lovers of wisdom), to indicate that they were not just handing down traditions but were *searching* for a wisdom still to be discovered.

The central problem in early Greek thought was how it can be possible to arrive at certain knowledge in a world constantly subject to

change. These thinkers asked, “Does not any statement we make about a world in constant flux become false even while we are saying it?” It was Heraclitus (fl. c. 490 BCE) who said, “All things are changing” (*panta rei*). Parmenides (c. 515–? BCE) drew the conclusion, made also by Indian thinkers, that since Being *is* and cannot *not* be, therefore change must be only an illusion.

Some consider Parmenides the originator of metaphysics because he pondered the nature of “Being,” but he also said that this Being is a motionless sphere!² Leucippus and his pupil Democritus (c. 460–c. 370 BCE) proposed the most explicit and developed materialism, according to which all reality can be reduced to unalterable atoms falling aimlessly in a void. The notable exceptions to such materialism were the views of Pythagoras (d. c. 497 BCE), who taught that the soul is eternal and transmigrates from one body to another, and Anaxagoras (d. 487 BCE), who held that “Mind” was the first cause of motion.

Diagram 1.

Typology of Approaches to the Unification of Knowledge in the Western Tradition¹

ANCIENT

Unification by One
Spiritual Principle

Unification by One
Material Principle

Socrates & Plato
Spiritual Being known
through Innate Ideas

Aristotle

PreSocratics
Democritus

Spiritual Being known by
Intelligence through senses
Unification by Coordination
of Autonomous Sciences

Stoics,
Zeno, Epicurus

Neo-Platonism
Plotinus
Mysticism

MIDDLE AGES AND RENAISSANCE ("THE LATIN AGE")

Augustinianism
John Duns Scotus

Thomas Aquinas

Metaphysics Epistemo-
logically First

William of Ockham
Nominalism tending
to Empiricism

Suarez

MODERN

Descartes
Turn to Subject
Innate Ideas: Mind-Matter Dualism
Spinoza: Monism
Leibnitz-Wolff

British Empiricists
Sensationalism

Bacon, Hobbes,
Locke, Hume (skeptical)

Transcendental Idealism
Immanuel Kant
Neo-Kantians

Idealism
Fichte, Schelling

Positivism: **Comte**
Evolution: **Darwin**

Hegel

Communism: **Marx**

Life Philosophy
Schopenhauer
Kierkegaard, Nietzsche

Thomist Revival

Process
Whitehead

Phenomenology
Husserl

Analytic Philosophy
Russell, Ayer

Existentialism
Sartre

POST-MODERN

End of Philosophy
Heidegger
Deconstructionism
Foucault, Derrida

Semiotics: **Deely**

Wittgenstein
Hermeneutics
Gadamer, Ricoeur

The search for wisdom (*sophia*) in Greek education centered on the reading of the theological poets, especially Homer, and was at first dominated by the Sophists, or self-proclaimed wise men. These Sophists, of whom Protagoras (fl. 435 BCE) is the best known, accepted the customary values of their times and centered their teaching on the rhetorical skills required for Greek citizens in the public forum.³ Hence these Sophists, like politicians today, unified knowledge only by its practical use for political and legal persuasion, and hence were little concerned with whether their arguments were certain, as long as they gained public favor. Hence they were cultural and moral *relativists* content with the popular opinions of the times. As the self-confidence of Greek and Roman culture rose and fell, skeptical authors—such as Pyrrho of Elis (c. 360–270 BCE) and much later Sextus Empiricus (c. 150–225 CE)—appeared, who mocked the pretensions of the philosophers.⁴

It was Socrates (c. 470–399 BCE) who vigorously opposed the pragmatic relativism of the Sophists and thus reversed the pre-Socratic materialistic reductionism. He followed Pythagoras in accepting the immortality and spirituality of the human soul. This doctrine became central to the thought of Plato (427–347 BCE), who agreed with Pythagoras that the soul is only temporarily in the body and with Parmenides that certain truth cannot be derived from our sensations of the changing world. But Plato went beyond the pre-Socratics to distinguish clearly the ever-changing material realm from the unchanging spiritual realm. Certain truth, therefore, is to be achieved only by turning from the sensible, material world to one's spiritual interior, where one will discover innate Ideas. As we recover these Ideas from the forgetfulness caused by the entombment of our souls in our bodies, they lead us upward, finally to the supreme Idea of the One that draws us to itself through love and hence is also the supreme Good. The meditative process through which this all beautiful, all good, and all true One can be reached is the Dialectic (conversation, discussion) that Socrates had used to compare and then discard probable ideas, so that at last true insight could be reached.

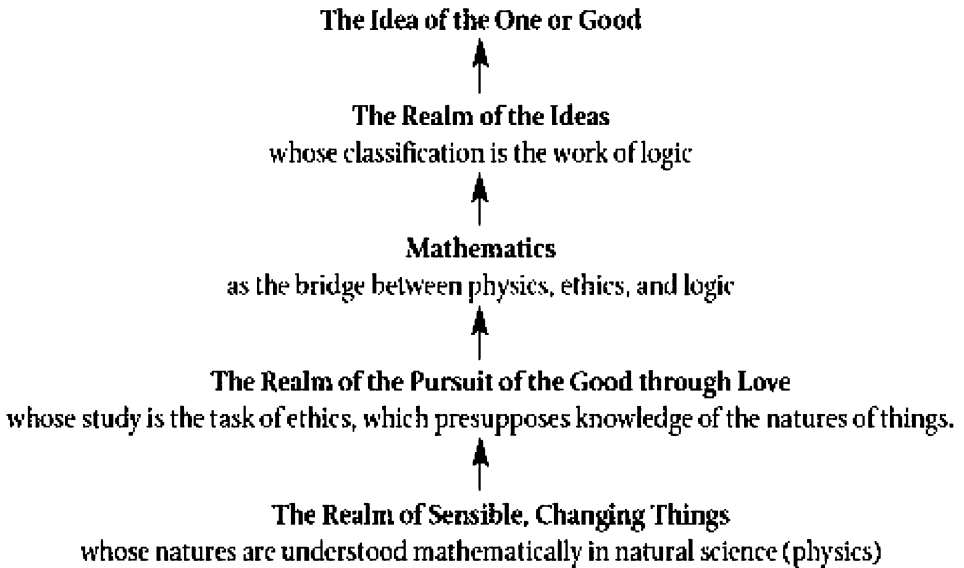
In Plato's Academy, the mother of all universities, studies came to be divided into logic, physics, and ethics,⁵ a division also found among the Stoics. Logic dealt with the method of dialectics. Mathematics was greatly stressed because it was thought that, though it deals with the measurement of material things, it clearly produces certain knowledge. Thus its study is the critical point at which our probable knowledge of

the changing physical world transcends its flux to arrive at changeless Ideas, the “Mathematicals.” Plato, in his dialogue the *Meno*, portrays Socrates as proving that mathematics is based on our innate ideas of its “self-evident” axioms. Thus natural science, though it can only attain probabilities, rises dialectically toward absolute certitude when it uses timeless mathematical models to explain physical change.

Since mathematics deals with the One and the Many, and the Many reduce to the One, the dialectic moves beyond numbers to the ultimate Ideas of the Many, and then to the supreme idea of the One. Thus, for Platonists, the “dialectic” was identified with “physics” (study of the nature, *physis*, of things). Mathematics was not clearly distinguished from the study of material things, since these were described mathematically, as Pythagoras had done. Ethics was reduced to knowledge of the Good, since Plato followed Socrates in holding that we do wrong only out of ignorance of the Good. As for logic, it was the dialectical method itself. (This system is schematized in diagram 2.)

Therefore Platonists really held that there is only one type of philosophy or science, namely, the dialectic. From whatever question one raises about anything at all, the dialectic, if faithfully pursued, inevitably ends in questions about the One that is also the True and the Good, whose beauty reflected in the universe draws eternal souls to return to the One. This fundamental Platonic attitude that attempts to *reduce* all knowledge to one single principle that alone has unqualified validity has continued to inspire thinkers throughout the history of Western thought and has obvious similarities to Eastern spirituality. But this reduction of knowledge to a single principle has taken not only spiritualist forms, as for Plato himself, but also materialist ones, as for most of the pre-Socratics, and later for the Stoics and Epicureans, as well whose natures are understood mathematically in natural science (physics) as for modern scientism. This, therefore, is one major way of approaching the problem I am raising in this book: “How can we unify human knowledge?” It is not, however, the only possible approach, as Plato’s pupil Aristotle was quick to declare.

Diagram 2.
Plato's Dialectic



In the period of the Middle Academy, after the first disciples of Plato had died, it soon became apparent that the dialectic seemed to go on endlessly without arriving at the promised certitude of a vision of the One. By the time of the leadership of Carneades (fl. c. 155 BCE), the Platonic New Academy had come to be content with mere probabilities. Socrates' attempt to refute the rhetorical pragmatism of the Sophists seemed to have utterly failed. Moreover, in that period materialist reductionism again became influential in Hellenistic culture through the Stoicism of Zeno of Citium (c. 336–c. 264 BCE), who revived the dynamism of Heraclitus. Epicurus (c. 342–270 BCE) also revived the atomism of the pre-Socratic Democritus. Thus the Greek tradition remained predominately dedicated to a unification of knowledge through a descending reduction to a single material principle or by an ascending reduction to a single spiritual principle.

The so-called Middle Platonists made serious use of Aristotle's *Metaphysics*, yet later Platonists remained true to the dialectical conception of philosophy and hence to the reduction of all knowledge to the spiritual principle of the innately known One. This remained true even when, as already noted, in the last half century before the coming of Christianity the whole Aristotelian corpus as we know it became available to the Greek commentators. The Christian era, however, also

saw the development of Neoplatonism. Plotinus (205–270 CE), its great leader, was a pagan who, in part, wrote in reaction to Christians' claims that their faith gave them true certitude. He systematized Plato's thought to show that even in this life dialectic can attain the One. Yet it does so not merely by argument but by culminating in ecstatic, mystical insight, which Plotinus claimed to have personally experienced. Thus Neoplatonism comes very close to teachings of India's mystic sages, some of whom Plotinus may have met on a trip to Persia.⁶

When this Platonic tradition was taken up by Christian thinkers, notably by Origen (c. 185–c. 254 CE), St. Gregory of Nyssa (332–394 CE), the Pseudo-Dionysius (fifth century CE), and in a more qualified way by St. Augustine (354–430 CE), philosophy was not distinguished formally from sacred theology but was treated only within the compass of Christian faith. Hence sacred theology became the real unifying principle of knowledge, and metaphysics as an autonomous discipline received little attention. The Arabian Muslim commentators who borrowed Aristotle's works from the Christian Byzantines gave more attention to his classification of the sciences, and hence to metaphysics as a distinct discipline. Yet even the most influential of these Islamic writers, such as Avicenna (Ibn Sina, 980–1037 CE) and Averroes (Ibn Rushd, c. 1126–c. 1198 CE), still Platonized.⁷

B. THE UNIFICATION OF KNOWLEDGE BY COORDINATING AUTONOMOUS DISCIPLINES

It was Aristotle (385–322 BCE), the greatest student of Plato, as Plato had been of Socrates, who, in his *Metaphysics*, sought a *mediating* position between these two reductionisms, namely, materialism and spiritualism. Aristotle thought that Plato had too easily accepted the belief of Parmenides that sense knowledge cannot yield certainty. For his own part, Aristotle also fully accepted Heraclitus's emphasis on change but pointed out that in the midst of such change many objects remain *relatively* stable and identifiable. Heraclitus could marvel at the flow of the river only because the water, the trees on the riverbank, and his own bodily self, for a while at least, endured. Changing objects maintain their identity as objects of knowledge and are known to us as what they are through these very changes. One can recognize what

the water is by the way it flows, freezes, and evaporates. Such a relative stability in sensible things, Aristotle claimed, is sufficient for us to distinguish their essential natures and properties from their more superficial and accidental conditions, and to search out the causes for their existence and characteristic features.

Hence genuine scientific knowledge (*episteme*) can be based on intellectual analysis of sense data.⁸ Thus there is no need to posit the innate ideas that Plato thought necessary to guarantee the certitude of scientific knowledge. In particular, mathematical truth need not be based on innate ideas, as Plato claimed, since quantity is a basic property of changing bodies and can be known by us *abstractly*, leaving out the motions and alterations of actual concrete bodies. We need no innate idea of 10, since we can count our ten fingers and we are *certain* that we have ten and not eleven or nine. Thus we know the number 10 as applicable not only to ten fingers but to our ten toes and any other 10s.

Hence Aristotle contended that though mathematics is the simplest and clearest science, yet it depends on natural science (physics), because natural science is the only discipline that directly studies sensible, changing reality objectively as it is independent of our ways of thinking about it. Mathematics and natural science are thus both true sciences, arriving at certitude; yet they are formally distinct from each other as critically organized disciplines because of their different first principles, which give to each its proper type of certain truth. Hence it is utterly absurd to accuse Aristotle's thought of being too static and deductive, as is often done, since, of all the Greek thinkers after Heraclitus, he is the most insistent on starting from the *fact of change* as the most inescapably certain and clear truth about reality, on which all other assertions of truth must rest. In the twentieth century, Alfred North Whitehead came to be admired for his "process philosophy"; but in fact, as I have argued elsewhere,⁹ Whitehead is in the Platonic tradition, and Aristotle's thought is a more *radical* process philosophy than is that of Whitehead. Thus, although the Platonic and Aristotelian traditions agree in many important ways (so much so that Aristotle has often been interpreted as just another Platonist), actually their epistemologies or criteria of verification are radically opposed.

Sometimes Aristotle is also accused of excessively *a priori* or deductive reasoning from cause to effect. Certainly, for Plato, philosophy can be certain only if it deduces its conclusions from truths that are innate and self-evident. But this is by no means the case for

Aristotle for whom the certitude of principles must first be grounded *a posteriori* by reasoning inductively from observed effects to their causes. Only after principles have been established in this empirical way can they be used as the basis for deductive reasoning in the systematic organization of a science. It is essential to distinguish these two lines of reasoning: one of research or discovery that moves *a posteriori*, from effect to cause, in contrast to the other that moves *a priori* from cause to effect in the systematic organization of the results of research and proof.¹⁰ Even mathematical demonstrations, generally considered the model of deductive argument, presuppose the *a posteriori* establishment of the axioms of mathematics that must be first grounded in the observation of real measurable and countable things if they are to have certitude.¹¹

When, after Plato's death, Aristotle broke with the Academy, he founded his own proto-university, the Lyceum, where natural science was studied, including the whole range of physics, astronomy, chemistry, biology, and psychology.¹² Here too logic, freed of the doctrine of innate ideas, was taught as an *organon* (instrument) that deals only with the purely mental ordering of knowledge already gained from natural sciences about the real world.

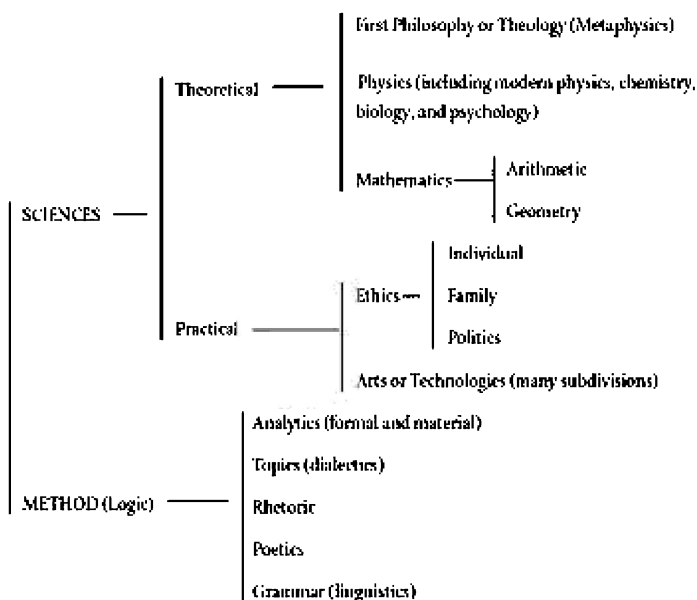
Because Aristotle rejected the Socratic notion that one cannot choose to do evil if one really knows better, he sharply distinguished ethics from physics. Because he was also convinced that mathematics was an abstract study of the quantities of physical objects, he distinguished it from physics, yet held that it could be used in physics as a dialectical instrument to provide models to guide research. As for the arts, he classified them with ethics, because both *techne* (art, technology) and *phronesis* (prudence, of which ethics is the theoretical part) are practical disciplines, not theoretical ones like physics and mathematics.

Thus, for Aristotle, the study of wisdom does not consist in a single discipline with various stages of advancement toward certitude, as Plato thought, but a set of distinct, autonomous disciplines each with its own principles, methods, and goals. Each of these disciplines in its autonomy is truly a "science" and, if formed in a critical manner according to the laws and the truth criteria provided by logic, can in its own right be called a kind of "wisdom." Yet to be wise about how to live (ethics), wise about making useful or fine products (art), wise about how to solve problems about quantities (mathematics), or wise about the visible world of nature (physics) are very different kinds of wisdom.

Thus the problem of what today is called “interdisciplinarity” arises not just from the tendency of the human mind to unify its thinking but also from the interrelations between things in the world, and therefore among the sciences that study such things. Hence, for the Aristotelian tradition, the term “philosophy” includes all these varied disciplines, because each is an autonomous *episteme* (science) capable of describing and explaining its own proper subject matter without direct reference to any other science, and each comes to at least a few certain conclusions. To unify this array of autonomous disciplines in a way that did not destroy their autonomy was for Aristotle a major concern. Hence he sometimes identifies the “philosopher” with the thinker who engages in this kind of philosophy par excellence dealt with in his “*Metaphysics*,”¹³ or, as he himself preferred to call this part of his work, First Philosophy. (Aristotle’s division of the sciences, and their relations, is schematized in diagram 3.)

Aristotle was still perfecting an answer to this problem of interdisciplinarity when he died. He never finally edited the particular work that some follower (probably Eudemus of Rhodes or, slightly later, Andronicus of Rhodes) labeled *Metaphysics*, both because it dealt with problems consequent upon the study of *Physics* and because in a logically ordered edition of the manuscripts, the work in question was placed after (*meta*) the work called the *Physics*. That Aristotle himself regarded this work, “First Philosophy,” as a study of the highest type of wisdom is evident from passages in which he refers to it as the supreme architectonic form of “science” in the inclusive sense of a discipline that unifies all the special sciences, culminating indeed in a study of the First Cause of all being, or “theology,” that is, a divine (*theos*) wisdom.¹⁴ First Philosophy is an “architectonic” discipline because, like the expertise of an architect who has under him many different craftsmen, all of whom he directs in producing a building, First Philosophy unifies the activities of the other sciences.¹⁵ Yet an architect leaves each craftsman to exercise that one’s special skill, which the architect need not personally possess.

Diagram 3. Aristotle's Division of the Sciences



Thus Aristotle is the first to raise this question of a First Philosophy, the architectonic form of theoretical knowledge, that historically has generally been called “metaphysics.” He states this problem in books I (Alpha Major) and II (Alpha Minor) of his *Metaphysics* by dialectically describing the nature and difficulty of establishing a First Philosophy that is based on sensible experience of a changing world by rational analysis of that experience. Since this work in progress was never finally edited, it has baffled its interpreters.

Plato’s Academy in Athens continued its teaching until 529 CE, when the Christian emperor Justinian finally closed it down because he believed it to be a source of the heresies that were dividing the Christian church. But after the deaths of Aristotle’s immediate disciples, Eudemus of Rhodes and Theophrastus (whose own brief *Metaphysics* survives), the Lyceum did not have a very long life. Yet a former student of the Lyceum, Demetrius Phaleron, soon after 258 BCE induced King Ptolemy Philadelphus to found in Alexandria in Egypt the school called the “Museum,” with the largest of ancient libraries and a large student body that kept alive the Aristotelian tradition. This Museum seems to have lasted to at least the first century BCE. Many of Aristotle’s works, especially his dialogues, famous for their literary

polish, have survived only in fragments cited by later writers. According to recent studies of Abraham P. Bos,¹⁶ at least some of these dialogues were written late in Aristotle's life and were in part devoted to theological topics, similar to those found in Plato's dialogues.

The main corpus of Aristotle's writings, including the *Metaphysics*, was for long inaccessible, but was again, especially in Alexandria, read and commented on by various authors, beginning with Alexander of Aphrodisias (fl. 200 CE).¹⁷ Yet these commentaries demonstrate that, while much of the material of Aristotle's thought became generally available, his fundamental epistemological disagreements with Plato went largely unrecognized. Thus Platonism, along with Stoicism, continued to dominate Hellenistic and Roman culture. Though Plato had never used the term, later Platonists often used "metaphysics" for their whole transcendently unified systems of thought. In his *Enneads*, Plotinus—although Plotinus himself never uses the term "metaphysics" for his total synthesis—covers logic, physics, and ethics as a single discipline in which logic and ethics are fused with a total cosmology of just the sort for which many later Platonists appropriate the term "metaphysics."¹⁸ Clearly this is not what Aristotle intended in his own *Metaphysics*. This confusion about whether "metaphysics" is more or less identical with the whole of "philosophy," as in later Platonic usage, or is a distinct discipline among the philosophical sciences, has obscured Aristotle's intentions ever since.

It should also be noted that Socrates, Plato, and Aristotle were not religious skeptics as have been so many philosophers since the Enlightenment, but were in fact religious *reformers*, who might reasonably be grouped with Zoroaster, Buddha, and Confucius. They did not deny the existence of the gods of pagan religion, nor oppose their worship, but sought to give them a more spiritual interpretation and to promote a higher ethics. Even the Stoics, although materialists, taught an elevated pantheism and strict moral standards.

C. MEDIEVAL AND RENAISSANCE "METAPHYSICS"

The same conflict between philosophy and theology occurred in the medieval Christian universities. The scholasticism of the thirteenth century strongly defended the possibility of achieving objective and

certain truth by reason in a manner consistent with Christian faith. The Franciscan Order, with its two great theologians, St. Bonaventure and John Duns Scotus, remained more committed to the Platonism of St. Augustine. The Dominican Order was led by St. Albert the Great and his pupil St. Thomas Aquinas into an Aristotelian but respectful criticism of the Augustinian tradition. Yet Meister Johannes Eckhardt (c. 1260–c. 1328), a Dominican also influenced by St. Albert, proposed a radically Neoplatonic mysticism.

The Franciscans' criticism of Aquinas was motivated principally by their fear that his Aristotelianism would end in the errors of Averroes that had penetrated the arts school of the University of Paris. These suspicions led to the notorious condemnation of Aristotelianism in 1270 by the archbishop of Paris, implicating but not naming Aquinas. The error most feared by these theologians was Averroes' denial of God's freedom, because it struck at the heart of monotheism. Yet the defense of divine freedom in the work of Duns Scotus (c. 1265–1308), and much more radically in the Nominalism of the Dominican Durandus de St. Pourcain (c. 1270–1332) and of the Franciscan opponent of Scotism, William of Ockham (c. 1280–1349), led, for reasons that will be explained later, to a growing distrust of the power of reason to deal with ultimate questions.¹⁹ Thus, in defense of reason, the church leaders felt compelled to condemn the Cistercian John of Mirecourt (fl. c. 1344) for teaching that we cannot be certain about the existence of external reality because God can cause illusions to seem to be real. Nicholas of Autrecourt (fl. c. 1340) taught that only sense knowledge is certain, and that we cannot know causal relations or the existence of substances. He declared, "In all his natural philosophy and metaphysics, Aristotle hardly reached two evidently certain conclusions, perhaps not even a single one."²⁰

In the Renaissance and Reformation, the rivalries between the Greek schools of philosophy and their epistemologies were renewed, but interest shifted more to literary classics and to mathematics. A Ciceronian eclecticism in philosophy became the order of the day. Soon, the religious wars that set in with the Reformation had the effect of again promoting fideism. Luther, in order to reassert the primacy of the Bible in theology, vehemently rejected the use of Aristotle by theologians. Calvin was trained in the law and was somewhat influenced by the Stoic philosophy that had become popular in the Renaissance. He was more systematic in his theology than Luther. Yet his great emphasis on the preached Word led Calvin to favor a

rhetorical rather than a philosophical approach to theology.²¹ Because these religious quarrels of the Reformation and Counter-Reformation were never satisfactorily resolved, Skepticism became very prominent again in the last half of the sixteenth and the first half of the seventeenth century. Michel de Montaigne (1533–1592), for example, had resorted to an unenthusiastic fideism. Even more radical was Francisco de Sanchez who, in 1581, published a book with the title *Quod Nihil Scitur* (*That Nothing Is Known*). This Renaissance skepticism was to yield only to the euphoric confidence of the antireligious Enlightenment in modern science as the sure road to objective truth.

D. MODERNITY AND METAPHYSICS

1. *Cartesian Idealist Metaphysics*

Rene Descartes (1596–1650), a mathematician of genius, fearful that skepticism might undermine the new science, in his famous *Discourse on Method* (1637) and *Meditations on First Philosophy* (1641) took the famous “turn to the subject” that has made him the widely recognized father of modern philosophy.²² Under Augustinian influences, Descartes returned to the Platonic conviction that certitude can never be found in the sensible, material world of change but must be grounded on innate ideas that possess the clarity and distinctness of mathematics. Yet he did not think of these ideas as objective realities envisioned by the spiritual intelligence, as Plato had done, but rather as mental processes that gave him assurance of his own reality as a thinking subject. He expressed this conviction in his *Cogito ergo sum* (“I think, therefore, I exist”) that he claimed could not be doubted. From this as first principle (perhaps mindful of the earlier fate of the hapless Mirecourt²³), he argued for the existence of God as the guarantor that our senses do not deceive us in manifesting the existence of an external, material world. Thus he believed that he had found an irrefutable ground both for a metaphysics of spiritual substances and a natural science of material substances, corresponding to his awareness of himself as a compound of mind and matter. Therefore

Descartes, like Galileo influenced by Democritean atomism as the view of matter most amenable to thorough mathematization, attempted to develop a purely mechanistic natural science.²⁴

Among the thinkers most influenced by this Cartesian turn to the subject were the racially Jewish philosopher Benedict de Spinoza (1632–1677)²⁵ and the German ecumenically minded Protestant G. W. Leibnitz (1646–1716).²⁶ Spinoza sought to overcome the matter-mind dualism of Descartes by a pantheism or monism in which matter and spirit are two modes of a single divine substance. For Leibnitz, who was influenced by Suarez (and thus remotely by Scotism), this meant that the subject of metaphysics is not actual but *possible* being based on self-evident principles known *a priori*, that is, independent of sense experience, just as Descartes had supposed. For both thinkers, metaphysics was a deductive system based on certain self-evident principles, such as they conceived mathematics to be.

Important to note at this historical juncture is the radical semantic shift that takes place in the notion of *a priori* knowledge at this time. In Aristotelian and Thomistic thought, as already noted, knowledge always begins from the senses and proceeds to the intellect: hence a science proceeds from effect to cause (*a posteriori*). Once, however, the causes of the sensible effects have been demonstrated *a posteriori*, the science then proceeds to demonstrate the effects from the causes (*a priori*).²⁷ By contrast, in the seventeenth-century origins of modern philosophy, with the turn to the subject, it comes generally to be supposed that we have *a priori* knowledge *independent of and logically prior to* sense experience.

Leibnitz's industrious disciple Christian Wolff (1679–1754) promulgated this aprioristic conception of metaphysics in a series of systematic works that became widely used textbooks in German universities.²⁸ It was Wolff, also, who introduced the novel distinction between "philosophy" as a deductive system concerned with possibility and the "empirical sciences" concerned with an inductive, experimental study of concrete reality. Throughout the history of philosophy, as we have seen in this survey, the term "philosophy," although often used to refer to metaphysics as philosophy par excellence, had always extended to the *whole range* of critically developed knowledge. With Leibnitz and Wolff, divorce proceedings began to separate philosophy from the then rapidly developing empirical natural sciences. The term began to be restricted to a deductive, *a priori* metaphysics of the

possible. The two types of knowledge were coordinated by assigning to metaphysics the task of establishing the principles of the sciences: “philosophy of nature,” “philosophy of mathematics,” “philosophy of ethics,” and so forth. Hence, in the philosophy departments of modern universities these subjects are often provided as special courses or fields within philosophy as an inclusive whole.

So it happened that, over the course of the Enlightenment, the terms “philosophy” and “metaphysics” began increasingly to mean something very different from what the ancients and medievals had understood by them. By Wolff’s distinction, philosophy in universities was gradually relegated to the “soft” humanities over against the “hard” empirical sciences. In the twentieth century, philosophy and theology (if it was taught at all) were to be even more marginalized and sometimes even reduced to an analysis of language or phenomenological descriptions of subjective experiences.²⁹

2. *British Empiricism*

From the first, however, English thinkers found the Cartesian claims concerning innate ideas unconvincing. In the Enlightenment epoch, there remained not a few advocates of skepticism, eclecticism, or a sophistic reliance on public consensus; but the rapid advance of science provided a strong antidote to such pessimism about the powers of human reason. The precursor of British Empiricism, Francis Bacon (1561–1626), argued successfully for the pragmatic value of experimental science with its technological possibilities. He urged a reliance on “induction” against a deductive epistemology.³⁰ Thomas Hobbes (1588–1679), well acquainted with the dualism of continental Cartesian thought, frankly defended materialism.³¹ More moderately, John Locke (1632–1704) accepted the Aristotelian principle that all our knowledge is derived from the senses, not from innate ideas as Descartes contended; but Locke gave a radically different twist to this principle than had the Aristotelians,³² one which opened the door in British thought to seeing the human mind as differing from that of other higher animals only in degree, a conclusion which David Hume (1711–1796) soon enough embraced.

Locke’s understanding of this principle remained influenced by the Cartesian turn to the subject, since (for Locke as for Descartes³³) what we know are not the sensed objects as such but “ideas” or

representations of these objects.³⁴ Thus, in opposition to continental Cartesianism, British Empiricism ceased to distinguish intellectual knowledge essentially from sense knowledge. It reduced all knowledge to sense impressions (Sensationalism) so that abstract ideas (“ideas of reflection”) are considered merely images that, in our thinking processes, have been rendered less vivid and precise than actual sights and sounds.

In England the Cartesian theory of natural science was soon replaced by the empirically better verified system of Isaac Newton. Newtonianism, however, like Descartes’ natural science, was grounded in mathematics and Democritean mechanism, although Newton was aware of some of the conceptual problems this entailed.³⁵ Another important factor in this British Empiricism was the trend toward deism and unitarianism in religion, a trend that was encouraged by the Enlightenment disillusionment with theological controversy.³⁶ Locke and Newton, although believers in the Bible, tended to rationalize much of the Christian tradition of faith.

The modern Empiricism shared with medieval Nominalism a notable weakness, namely, that by resting knowledge on the concrete individuals accessible to the senses and making universal concepts purely mental constructions it seemed to render certitude in science impossible, and hence skepticism in philosophy inevitable. Another empiricist, Anglican bishop George Berkeley (1685–1753), pressed Locke’s notion that the object of our knowledge is ideas to a logical conclusion that even Descartes had hesitated to make. Since we have no way of knowing whether these ideas correspond to extramental reality, why need we suppose that they are anything but representations produced in our minds by God?³⁷ *Esse est percipi*, “to exist is to be perceived.”

The Enlightenment confidence in reason based on sense experience received a rude shock from Hume, who frankly opted for a probabilistic skepticism, somewhat like that of Sanchez mentioned above.³⁸ Yet Hume also supported the sophistic public consensus theory of truth, in that he admitted that we must live our lives by the common-sense expectation that things will go on as usual.³⁹ In opposition to Hume’s skepticism, his fellow countrymen of the Scottish school of common sense, led by Thomas Reid (1710–1796), made appeal to our natural certitudes that are presupposed to any evaluation of probabilities.⁴⁰ The views of this school had wide influence, notably

on the founders of the United States government. Though bracing in their defense of the capacity of human nature for truth, the thinkers of the Scottish school remained in the Lockean perspective by failing to distinguish intellectual cognition from that of the senses.⁴¹ Eventually a nineteenth-century French thinker, Auguste Comte (1798–1857), proposed a Positivism according to which science only *describes* nature without seeking to *explain* it causally.

Thus arose the two seemingly opposed traditions of modern philosophy: one, Continental Rationalism, stemming from Descartes, and the other, British Empiricism, fathered by Locke, the apparent opponent of Descartes. Yet both share, though very differently, in the Cartesian turn to the subject. Both no longer focus epistemologically on the objects of knowledge, as had been predominantly the case in the whole history of philosophy before Descartes (even for Platonic idealism), but on one's awareness of what one is thinking. How then can one escape *solipsism* (*solus*, alone; *ipse*, self), the denial that I know anything but my own thoughts? ⁴² I am reminded that a contemporary of Descartes, the great Baroque Spanish poet Lope de Vega (1562–1635), wrote a famous play called *Life Is a Dream!*

Yet, in this new perspective, certain interesting problems concerning the knowing subject previously passed over become startlingly evident. Of course, Plato too had believed that truth could be uncovered only by looking within the self. The Aristotelians had also admitted that "What is received is received according to the condition of the recipient" (*Quidquid recipitur, recipitur secundum conditionem recipientis*). Nevertheless, both older traditions were confident that "science is of the universal," not of the individual in its concrete, historical circumstances. Both were also sure that intellectual knowledge unites the knower to the real object. These convictions had prevented Plato, Aristotle, Aquinas, and Scotus from giving much attention to the individual subjectivity and historicity of different knowers in their concrete circumstances. The chief positive achievement of modern philosophy has been to face such problems, recognizing more fully the diversity of perspectives that necessitates intersubjective and intercultural dialogue if there is to be a meeting of minds.

3. Kant and the Post-Kantian Critique

It was, however, the reply to Hume's skepticism worked out by Immanuel Kant (1724–1804) that was to dominate the German universities that became the models for the universities of Europe and America. As the thought of Plato and Aristotle dominated ancient times, and that of Aquinas, Scotus, and Ockham that of the Middle Ages, so Kant is generally recognized as the central thinker of modernity. His early writings were in the field of natural science, and he was a great admirer of Newton. Yet he was also influenced by the German mystical writer Emmanuel Swedenborg (1688–1772)⁴³ in regard to the possibility of the existence of a spiritual realm, and by Jean-Jacques Rousseau (1712–1778) in regard to ethics and politics.

Kant had been raised in a pietistic Lutheran milieu but was an enthusiastic advocate of the Enlightenment and shared its confidence in reason and intellectual freedom. Thus he was concerned to present a *Religion within the Limits of Reason Alone*, as one of his works is entitled; yet he wanted to leave room for a Christianity of faith for those who needed it as a support for civic virtue.⁴⁴ Yet he was also constrained by his education in the Leibnitz-Wolfe tradition to suppose that the task of metaphysics was to provide *a priori* principles for the empirical sciences, a perspective from which he never freed his thinking. Thus, for him, metaphysics seeks to establish the *conditions of the possibility* of the various kinds of knowledge. Hence it resembles Aristotle's metaphysics in that it too has the task of coordinating the autonomous sciences, but it differs fundamentally from Aristotle's perspective by its aprioristic view of human intelligence.

Early in his career Kant was disturbed by the "dogmatism" with which these *a priori* truths on which he believed that all science and morality must be based were being presented in the universities. He says that when he read the attack by the British Empiricist David Hume on the Cartesian *a priori*, "I was awakened from my dogmatic slumber." Thus he was aroused to rethink metaphysics *critically*, in order to ensure that his advocacy of Newtonian science and Rousseau's Enlightenment politics might be soundly grounded. Some consider Kant as the thinker who eliminated metaphysics from modern thought, but his intention was quite the contrary.

Kant believed he would save a *critical* metaphysics for Enlightenment culture, and escape Humean skepticism, by mediating between idealism and empiricism— somewhat as we have seen Aristotle attempted to do between Plato and Democritus. Kant saw no way to do this except by a radical revision of the very notion of "truth."

For pre-Kantian thought, most philosophers supposed that truth, however they thought it could or could not be achieved, meant “the correspondence of the mind of the knower to the reality known” (the correspondence theory of truth). Kant undertook what he claimed was a “Copernican revolution” in philosophy and proposed that truth should be defined as “the conformity of the known reality to the mind” (the consistency theory of truth).

By this Kant meant that, on the one hand, as empiricism holds, all our true knowledge is derived from sense experience for its raw data. But, on the other hand, he maintained that this data is given a necessary order by the constructive activity of the mind itself, thus agreeing with the idealists that truth is derived from within the subject rather than from the extramental reality as such. Hence, for Kant, the human intelligence is no longer, as for Aristotle, primarily passive in relation to its object but primarily active. This active ordering of sense knowledge by the intellect is made possible by two factors. First, the senses themselves intuitively produce an ordering of all raw sense impressions in a pattern of absolute *place* and *time*. Second, the intelligence contains not innate ideas, as Descartes held, but innate *categories*, such as the principle of causality, attacked by Hume yet necessary for Newtonian science. By ordering sense impressions, already initially ordered by the senses themselves in the patterns of place and time, the intelligence can present a consistent picture of reality (“the unity of apperception”). This picture receives its certitude from its conformity to the categories common to all human minds and therefore presupposed to all possible knowledge.⁴⁵

This Kantian synthesis is called “Transcendental Idealism,” because it holds that our view (apperception) of reality manifested in sense experience receives its order and unity from ideal, *a priori* truths that transcend experience. Without sensible phenomena, these ideal categories would remain empty, meaningless, and without reference to the hidden reality from which the sense data arise. The obvious objection to this way of reconciling empiricism and idealism, however, is that it seems to eliminate the possibility of any positive content for our notions of a spiritual reality, God, an immortal soul, and moral freedom, since these utterly transcend intuitions of sense data. Even the material world becomes positively knowable only with regard to its phenomenal aspects, not as to its substantial existence and essential nature (the *Ding an sich* or “thing in itself”). Yet Kant was neither a Berkeleyan idealist nor a materialist, since for him questions of morality and religion remained central concerns

What Kant argued was that, while these real beings are *transcendental* in respect to our *theoretical* knowledge, nevertheless, they remain *regulative* with respect to our *practical* knowledge. Practically speaking we must make moral decisions, just as Hume had admitted. But for Kant these require us to believe (1) in a God who makes moral laws, (2) in a spiritual self that has the freedom to obey these laws responsibly because they seem to be reasonable, and (3) in a universe governed by the Newtonian laws of natural science.⁴⁶ These practical conclusions are not merely probable, as Hume contended, because they also are governed by *a priori* categories innate to the human mind. Hence the reality of the world studied by science, responsible human freedom, and a moral law enforced by a just God are truths convincing to all rational persons, provided only that they freely will to follow their reason rather than their feelings, which Kant admitted tend to overwhelm reason.⁴⁷

This remarkable Kantian synthesis of idealism and empiricism has been so influential in modern culture that all schools of thought have had to take a position with regard to it. Kant had apparently saved metaphysics, by giving it a critical foundation that freed it from a presumptuous dogmatism. Yet during the nineteenth and first half of the twentieth century this mediating synthesis broke down into a complex diversity of philosophies. On the one hand was Absolute Idealism, as variously proposed by the German triumvirate of J. G. Fichte (1762–1814), F. W. J. von Schelling (1775–1854), and G. W. F. Hegel (1770–1831). Fichte supported metaphysics as a ground for ethics and held that it begins not with particular realities but with the unity of the free, thinking subject (ego). In its freedom the ego acts according to a threefold dialectic: first it affirms itself in its own existence; then it affirms the existence of the nonego (world) that limits it; finally, it affirms the human situation in which the ego is limited by the non-ego, but in its freedom perpetually struggles, as Kant had said, to attain moral perfection. Schelling, whose thought was influenced by Spinoza and went through a bewildering number of stages, proposed a philosophy of history that he thought was already implicit in mythology. The Absolute that contains both God and creation unfolds itself step-by-step, arriving at full consciousness in the human subject. It was Schelling who raised the question, later to be taken up by the Existentialists and especially by Heidegger, “Why does anything at all exist?”

It was, however, Hegel who proved far more widely influential than

the former two idealists. From them he took the view, seemingly contrary to Aristotle's dictum that "philosophy is of the universal," that history could be the subject of philosophy. From Fichte, Hegel took the notion that history proceeds not merely by a gradual evolution but through revolutionary crises in a dialectic of affirmation (thesis), negation of this thesis (antithesis), and negation of the negation or inclusion of the thesis in its contradiction (synthesis). Hegel divided this process into a logic, a philosophy of nature, and a philosophy of spirit. In these three disciplines history is portrayed as the advance of the spirit through the logic of being, nonbeing, and thought. It then develops through the human struggle to understand and control nature and form the human community. Finally, the spirit achieves full self-consciousness through art, religion, and ultimately philosophy. In such a system, metaphysics becomes not only an all-encompassing wisdom, but the totality of reality itself, and hence, Hegel believed, transcends mere subjectivity and should be called Objective Idealism.

Though to many Hegel's grandiose system appeared fantastic, it stimulated and still inspires many trends in current philosophy, because it seems to recognize all the subjective, individual, and historical aspects of reality that it has been the aim of modernity to uncover. For example, Karl Marx (1818–1883), founder of the Communist revolution that was at the center of politics throughout the twentieth century, was provoked into "turning Hegel on his head" by interpreting Hegel's dialectic of history in strictly materialist terms as a basis of communist activism on behalf of the oppressed.

The Dane Søren Kierkegaard (1813–1855), the acknowledged father of Existentialism, was himself influenced by St. Augustine.⁴⁸ He reacted strongly to what seemed to him the abstract rationalism of Hegel's philosophy of history. For him, the role given by Kant and Fichte to the will rather than to reason was taken as fundamental, and he held that for each of us reality is determined by our free choices, for which ultimately there can be no rational criteria. For him the Christian faith, to which he was fervently committed, had to be "a leap in the dark."

Somewhat similarly, Arthur Schopenhauer (1788–1860) revised Kant's thesis—that the self pertains to the noumenal realm and is thus unknowable—by claiming that the subject is directly conscious of the will in its ceaseless striving that always remains frustrated.⁴⁹ He was one of the first European thinkers to engage Buddhism in dialogue. He found in it support for his own conclusion that the universal miseries of human existence in its endless frustrated strivings can be overcome.

only by the total renunciation of desire. To the contrary, Friedrich Nietzsche (1844–1900) proclaimed the “end of philosophy,” and proposed to replace the notion of a wisdom based on truth with the “joyous wisdom” of the “will to power.”⁵⁰ For him the will to power was the life force to be manifested in the heroic superman of the future, who would “transvalue all values” by which oppressive bourgeois society cripples the human will. He declared that this total human freedom of the heroic will requires the rejection of the enslavement of Christianity and the declaration of the “death of God.” In the place of God, Nietzsche adopted the ancient “Myth of the Eternal Return,” by which history is fated to repeat itself in an unending cycle. The tendency exemplified by Schopenhauer and Nietzsche is often called “Life Philosophy,” since it shifts attention from abstract metaphysical thought about “Being” to emphasis on the importance of the forceful human will. Thus with Nietzsche doubts about the whole enterprise of rational philosophy again emerged in Western thought.

Yet very different from the antirational tendencies of this “Life Philosophy” is the Phenomenology of Edmund Husserl (1859–1938) who was the Jewish disciple of the philosopher and psychologist Franz Brentano (1878–1917).⁵¹ Brentano was a Dominican priest who had left the church in the controversy over papal infallibility, but in his thought retained elements of a scholastic metaphysics, in particular the idea of “intentionality” as the distinguishing property of consciousness whereby consciousness is always “of ” or “about” some object. By taking this notion as foundational, Husserl hoped to produce a thoroughly scientific and rigorously logical system free of all “presuppositions,” including what he considered Brentano’s “psychologism.” He thought this could be achieved by using a *phenomenological* method that “bracketed” the concrete *existence* of the objects to which consciousness relates us, so as precisely to describe their “essences.” This sounds quite Aristotelian, but in fact Husserl was preoccupied not so much with identifying particular kinds of essences as with trying to isolate a pure transcendental human consciousness that “constitutes” such essences. This “transcendental consciousness,” however, is no longer Descartes’ *ego* of the *Cogito ergo sum*, but a temporal consciousness of the pure flux of time in which thought constitutes concrete entities. Hence Husserl came to a strict Idealism in which empirical reality is constituted by pure awareness.

Husserl’s many brilliant pupils, including the martyr St. Edith Stein, did not accept his final idealism; but his “phenomenological method,”

whose merits will be further discussed in chapter 8, has had wide influence. The Existentialists, led by Jean-Paul Sartre (1905–1980),⁵² adopted this method, as can be seen in Sartre’s major metaphysical work, *Being and Nothingness*. The real concern of the Existentialists, however, was similar to that of the Life Philosophers, namely, to manifest how we humans create our own lives by our free decisions.

Nietzsche’s thought was interpreted by Martin Heidegger (1889–1976)—perhaps not fairly—to signal not only the end of Enlightenment thought but of the whole Western tradition of rational philosophy. Heidegger, under the influence of Brentano and Husserl, claimed that, since Plato, this tradition had inevitably led to a “forgetfulness of Being.” By “Being” he meant the totality of the human knower (*Dasein*) in relation to “the world,” but remained silent on the question of the existence of a First Cause transcending finite reality.⁵³

While continental philosophy was thus suffering increasingly from a lack of confidence in reason itself, in Great Britain and the United States more hopeful empiricist attitudes generally prevailed during the twentieth century. One of the nineteenth-century developments of Empiricism had been the extension by such thinkers as Herbert Spencer (1820–1903)⁵⁴ of Charles Darwin’s (1809–1882) theory of biological evolution as a unifying principle to explain the whole development of human culture. Since this project could easily be assimilated to Hegel’s philosophy of history, as notably was done in the historical materialism of Karl Marx, it is not surprising that Hegelianism was influential for a considerable period in both England and the United States.

In the United States also, the Kantian emphasis on practical thought influenced the development of the various forms of pragmatism represented by Charles Sanders Peirce (1839–1914), William James (1842–1910), and John Dewey (1859–1952).⁵⁵ Peirce was influenced, surprisingly enough, by John Duns Scotus and other later Latin thinkers, notably the Conimbricenses, the teachers of John Poinset,⁵⁶ so it is not surprising that he became the principal modern promoter of semiotics, and a key transitional figure in philosophy to the era of postmodern thought. Neither Peirce nor James, who wrote the still influential *The Varieties of Religious Experience*, was closed to religious spirituality; but Dewey, originally a Hegelian, was principal author of *The Humanist Manifesto* that promoted a Secular Humanism that reduces religion to a kind of reverent, ethical scientism.⁵⁷ Important

to note in this context is Peirce's ultimate dissociation of his version of pragmatism, for which he coined the label "pragmaticism," from all other versions on the ground that both Peirce and Dewey (and, we should now have to add, Quine and Rorty) hold views centrally compatible with medieval nominalism, while Peirce's pragmaticism maintains a "strenuous insistence upon the truth of scholastic realism,"⁵⁸ a position Peirce deemed necessary but not sufficient for the doctrine of signs, or semiotics.⁵⁹

In Great Britain, Bertrand Russell (1872–1970), much influenced by the Empiricism of David Hume, and by the Logical Positivists of the Vienna circle, notably Rudolf Carnap (1891–1970),⁶⁰ came to believe that the real task of philosophy is to clarify the language of the various disciplines by precise logic. Russell and Alfred North Whitehead (1861–1947)⁶¹ even attempted to show that mathematics can be reduced to logic. Whitehead, on the other hand, influenced by Leibniz and the evolutionary philosophy of Henri Bergson (1859–1941),⁶² developed a hypothetical and cosmological metaphysics of *process* in which the ultimate principle is "creativity" of which both God and the universe are evolving exemplifications.

The Logical Positivists were perhaps the first school of philosophy in history that came to admit its own failure. This failure became undeniable when the mathematician Kurt Gödel demonstrated mathematically that a purely formal logical system cannot be known from within itself to be consistent nor sufficiently complete to deal with all problems that can be formulated in that same system.⁶³ After this collapse of Logical Positivism's project to create a unified, logical language for all the sciences, its proponents resorted to Ordinary Language or Analytic Philosophy, which contents itself with "language games," or different ways of using and interpreting texts. Such thinking, however, remains within the empiricist tradition, since it is concerned chiefly with clarifying the language of natural science, but also extends to ethics and issues of "value" as well as of "facts." Most Analysts, but not all,⁶⁴ are determinedly antimetaphysical, since they find no way to give definite meaning to metaphysical language, which they accordingly dismiss as mere verbalization, just "nonsense." For the most part, in American universities today, it is this Analytic Philosophy that enjoys hegemony.

Yet, throughout the twentieth century, suspicions about the real value of philosophical efforts increased. While the Marxists had

strongly defended the validity of natural science and claimed to extend it to include social science, the Neo-Marxists, especially the Frankfurt school headed by Theodore Adorno (1903–1964), with its “critical theory,” had emphasized the ideological and politically interested factors in knowledge. Adorno himself believed that Western rationality destroys human freedom, whose only hope lies in the liberating effect of the fine arts. Sigmund Freud (1856–1939), and later even more radical psychoanalysts, like Jacques Lacan (1901–1981) and Jean-Francois Lyotard (1926–1998), emphasized the role in thought of the pressures of the unconscious. Michel Foucault (1926–1984) dug into the “archaeology of knowledge” to show human views are socially determined. Even regarding the “hard sciences” of nature, Thomas Kuhn (1922–1996), in his theory of scientific “revolutions,” argued that theories are accepted not so much on objective evidence as on cultural factors that produce “paradigm shifts” in thinking. With these thinkers the trust in objective certitude in knowledge was again in decline.

Even those thinkers who in some measure attempted to save the achievements of the Age of Reason did so chiefly by a return to something like the Sophist view of the ancient Protagoras, as with Ludwig Wittgenstein (1889–1951) and Jürgen Habermas (1929–), and still more persuasively in the United States with Richard Rorty (1931–). This can be called the public consensus theory of truth and can be formulated thus: “Objective truth is that which is agreed on publicly in a community, or in a special group after rational discourse.” To a degree, in the present book I am appealing to just this theory in promoting interdisciplinary and intercultural dialogue, as a way not only to social reconciliation, but also to honest objectivity based on openness to different perspectives and the pooling of experience and other data. Yet public consensus can hardly be the *ultimate* or the *only* criterion of truth (“the final logical interpretant,” as Peirce would say), since rational discourse has to make appeal to objective evidence that transcends the subjective biases of those in dialogue.

The influence of Heidegger’s announcement of the death of philosophy, the triumph of technology with its threat of a nuclear holocaust and environmental pollution, the collapse of Marxism and other utopian social hopes, and the domination of the public media have all contributed to a skeptical mood in philosophy and to widespread cultural and moral relativism. Skeptical trends are evident in so-called “postmodernism” that, in the wake of Heidegger, is typified by the brilliant “deconstructionism” of Jacques Derrida (1930–2004). His notoriety was preceded by the rather brief popularity of the

Structuralism of the linguist Ferdinand de Saussure (1857–1913), the anthropologist Claude Levi-Strauss (1908–), and certain literary critics. The Structuralists held that human thinking is based on patterns of binary opposition that are manifested both in language and in cultural symbolism. Derrida has proposed a “grammatology” that emphasizes that human thought always privileges one of the opposing pairs discovered by structuralism. Thus, he maintains that thought inevitably fuses these dichotomies in endless ambiguities of *différance* so that their meaning is always *differed*, that is, open to endless reinterpretation. The real import of these fashionable but evanescent views seems to be an attack on the secular humanism of the Enlightenment epoch (modernity). Positively they seem only to end, as Heidegger did, with a vague, mystical hope for some state of future justice, peace, and better dialogue.⁶⁵ They seem, in a word, less postmodern than “ultramodern” in philosophy.

In a vast study, *God in Exile: Modern Atheism*, Cornelio Fabro points out that older denials of the existence of God were based either on the notion that the visible universe can be rationally explained by the laws of natural science with no need of the “hypothesis that God exists,” or on the contention that the world is absurd, not rational, and therefore cannot be a product of a good God. But Fabro contends that the real source of the atheism that affects our times is to be found in the *immanentism* of modern philosophy that began with Descartes. Once one begins with a universal doubt, as Descartes did, and then escapes skepticism only by finding certitude in one’s own self-aware mental processes and not in a content assimilative of mindindependent reality, it becomes impossible to affirm the existence of God. Fabro argues that this explains why modern post-Cartesian thought split into an idealist and an empiricist tendency, the former reducing everything to intellectual thought, and the latter reducing everything to sensible impressions. The only consensus of modern philosophy has been to accept as the object of all mental activity subjective self-consciousness rather than awareness of the reality (being) of some objects (or aspects thereof) having existence independent of the human mind. Obviously, a First Philosophy as Aristotle conceived it cannot be simply atheistic. To deny the existence of immaterial realities reduces First Philosophy to natural science or to empty skepticism.

4. The Varieties of Thomistic Metaphysics

By the end of the twentieth century, “metaphysics,” either in its ancient and medieval sense or as modified by the Cartesian and Kantian turn to the subject, seemed largely abandoned, except by Catholics or at least by thinkers familiar with and sympathetic to the medieval Catholic tradition, such as Mortimer J. Adler or Henry B. Veatch. The Enlightenment, especially after the French Revolution at the end of the eighteenth century, had caused a precipitous decline in the Catholic religious orders. Hence the Scholastic systems that these orders had supported, and that were already imperiled by the rise of modern science and by Cartesianism, seemed utterly obsolete. On the other hand, Catholic attempts to translate theology into the concepts of the new idealist or empiricist philosophies, themselves at war with each other, proved not only futile but spawned gross heresies.⁶⁶

To meet this grave challenge, Pope Leo XIII in 1879 issued his encyclical *Aeterni Patris*. This papal letter required that all Catholic education should be grounded in the “solid doctrine” of Aquinas, as the system of thought that had proved most consistent with Christian faith. In imposing this requirement, however, the pope urged that Thomism be freed of obsolete elements and reconciled with the positive achievements of modern thought:

Our philosophy can only by the grossest injustice be accused of being opposed to the advance and development of natural science. For, when the Scholastics, following the opinion of the holy Fathers, always held in anthropology that the human intelligence is only led to the knowledge of things without body and matter by things sensible, they well understood that nothing was of greater use to the philosopher than diligently to search into the mysteries of nature and to be earnest and constant in the study of physical things. . . . Moreover, in this very age many illustrious professors of the physical sciences openly testify that between certain and accepted conclusions of modern physics and the philosophic principles of the schools there is no conflict worthy of the name.

While therefore, We hold that every word of wisdom, every useful thing by whomsoever discovered or planned, ought to be received with a willing and grateful mind, We exhort you, venerable brethren, in all earnestness to restore the golden wisdom of St. Thomas, and to spread it far and wide for the defense and beauty of the Catholic faith, for the good of society, and for the advantage of all the sciences. The wisdom of St. Thomas, We say; for if anything is taken up with too great subtlety by the Scholastic doctors, or too

carelessly stated—if there be anything that ill agrees with the discoveries of a later age, or, in a word, improbable in whatever way—it does not enter Our mind to propose that for imitation to Our age.⁶⁷

Note that the letter did not intend to reject other philosophies, or the theologies that made use of other philosophies, except insofar as they were inconsistent with faith. Since in the medieval and Renaissance universities various, often quite opposed, philosophies were permitted to be taught, this admission of the inevitable pluralism of merely human theories is entirely consistent with the privileged place assigned to Aquinas in the Catholic Church's tradition.

At the beginning of this Thomistic revival it was, however, not at all clear exactly what reading of Aquinas had been “canonized” by Leo XIII. In fact, the state of Thomism at the time when *Aeterni Patris* was issued was seriously decadent, colored by the Suarezian presentation of Aquinas (which proved unreliable when subjected to the scholarly debates consequent upon Leo's letter⁶⁸), and by the lingering influence of Leibnitz and Wolff. But, in the period before Vatican Council II (from 1879 to 1962), brilliant attempts were made to recover the original thought of Aquinas in its authentic texts and proper historical perspective. Both Vatican II (1962–1965) and John Paul II's encyclical *Fides et Ratio* (1998) reaffirm that Aquinas's philosophy and theology are a model for Christian scholars; but they also insist that the Church is finally committed only to the Christian faith, not to any particular system of human thought:

The Church has no philosophy of her own, nor does she canonize any one particular philosophy in preference to others. The underlying reason for this reluctance is that, even when it engages theology, philosophy must remain faithful to its own principles and methods. Otherwise, there would be no guarantee that it would remain oriented to truth, and that it was moving towards truth by way of a process governed by reason. A philosophy which did not proceed in the light of reason according to its own principles and methods would serve little purpose. At the deepest level, the autonomy which philosophy enjoys is rooted in the fact that reason is by its nature oriented to truth, and is equipped, moreover, with the means necessary to arrive at truth. A philosophy conscious of this as its “constitutive status” cannot but respect the demands and

the data of revealed truth.⁶⁹

When we review the development of “Neo-Thomism” from the late nineteenth to the end of the twentieth century, we find indeed that the Thomist revival has exposed a lack of agreement on how St. Thomas’s teaching was to be interpreted philosophically. Yet it is the Thomists in Catholic universities who continue to give the most consistent support to the concept of metaphysics as a unifying discipline according to the Aristotelian tradition in which it had originated. Hence it is important to understand how Thomists over the course of the twentieth century attempted to defend the validity of metaphysics and how they attempted to assimilate the positive advances of modern thought.

Modern followers of St. Thomas do not believe that his philosophy is in conflict with sound science nor wholly independent of it, since they argue that, as John Paul II reaffirmed in *Fides et Ratio*,⁷⁰ the Christian faith and human reason cannot be contradictory but are complementary. This complementarity, of course, implies that a religion based on revelation and a philosophy and natural science based on reason are *formally* distinct. Yet this distinction raises the question of how a positive relation of complementarity among them is to be established. Ian G. Barbour, in *Religion and Science: Historical and Contemporary Issues*, speaks of four attitudes in regard to the relation of science and religion.⁷¹ Scientists can view natural science (1) as in conflict with religion, (2) as wholly independent of religion, (3) as in dialogue with religion, or (4) as possibly integrated with religion.

The adoption by Thomists of one or another of these attitudes conditions and is conditioned by their view of metaphysics and its relation to the other disciplines that Aquinas recognized and wrote about, and in particular its relation to natural science. This is necessarily so, because, for Aquinas, metaphysics is a “natural theology” directly in the service of sacred theology.⁷² There are today at least eight chief ways of understanding Aquinas’s views on the nature of metaphysics, marked by different concerns about how it can best be employed to solve present-day problems. These concerns are not necessarily contradictory, yet neither are they easy to reconcile. While all Thomists hold that the subject of metaphysics is Being as Being understood analogically, they differ as to how we know this subject. I will give these different readings of Aquinas the names usually used by critics, even though these names (or “labels”) are not always

acceptable to the proponents of a given view.⁷³ The basic positions are: (a) Essentialist or Conceptualist, (b) Platonizing, (c) Transcendental, (d) Existential, (e) Phenomenological, (f) Analytic, (g) Semiotic, and (h) Aristotelian Thomisms.⁷⁴

a. Essentialist Thomism

The first phase of the Thomist revival was centered on the efforts principally of members of the Dominican Order to present an authentic Thomism and to displace the Suarezian Thomism of the seventeenth century. By the 1930s, the fundamental differences between these two giants of metaphysics, Aquinas and Suarez, were generally recognized. This effort to recover an authentic reading of Aquinas was a chief occupation of the French Dominicans and is exemplified by the work of Reginald Garrigou-Lagrange (1877–1964). Lagrange’s work is characterized by his critics as Essentialist or Conceptualist Thomism. This school holds that the subject of metaphysics is conceived in the third degree of abstraction according to the analysis of the Dominican Thomist Cardinal Cajetan (1468–1534).⁷⁵ According to Cajetan, natural science is in the first degree of abstraction, mathematics in the second, and metaphysics and logic in the third. Thus, Essentialists generally assume, without further discussion, that this degree of abstraction is realistically valid. This reading of Aquinas was formulated in the famous “twenty-four theses” approved by Pius X as expressing the “solid doctrine of St. Thomas” as it had been canonized by Leo XIII.⁷⁶ Its permanent contribution to Thomism is its identification of the central metaphysical positions of Aquinas that are often lost sight of by some of the other readings.

b. Platonizing Thomism

Second, the historical study of Aquinas’s sources has led to an appreciation of how influential in his thought was the tradition of Neoplatonism evident in the works of St. Augustine and the Pseudo-Dionysius. Cornelio Fabro⁷⁷ has provided a moderate Platonizing reading of Aquinas, and A. Little⁷⁸ a radical one. L. B. Geiger, O.P.,⁷⁹ also went beyond Fabro by relegating the real distinction of essence and existence and their composition in created things to a secondary importance in the doctrine of participation, insisting rather on the formal hierarchy of essences as participations in the infinite perfection of God.

These authors stress that Aquinas assimilates to his Aristotelian position a vast amount of the Platonic tradition that he knew chiefly through Neoplatonism. This influence is especially to be found in Aquinas's doctrine of *participation*, a central theme for Plato and generally eschewed by Aristotle. This fact of Aquinas's use of Platonic sources, however, raises no special difficulty for Aristotelian Thomists because Aquinas is always very careful to use these Platonic sources in a manner consistent with his Aristotelian epistemology. He is very insistent that his Aristotelian demonstration from motion shows that the First Cause produces the universe not by formal emanation, as for Platonists, but by efficient causality. To be sure, the doctrine of *creatio ex nihilo* is not explicit in Aristotle's works (nor in Plato's), but Aquinas considers it a necessary consequence of the argument for an immaterial First Cause. Thus participation pertains to *formal* causality that is correlative to efficient causality, although Aristotle in his anti-Platonic polemic was disinclined to emphasize formal causality, as Plato exclusively does. Yet because First Philosophy treats of the transcendental properties of Being as such, that is, of the different kinds of being in their analogical unity, it must also deal with that transcendental property which is *truth*, the conformity of the mind to reality, a type of formal causality and participation.

c. Transcendental Thomism

To some Catholic thinkers, however, these two schools of Thomism seemed so concerned for tradition as to ignore the need to assimilate tradition to what is sound in modern thought. The first efforts toward a third reading that could create a more open Thomism, much opposed by Garrigou-Lagrange, were influenced both by the "philosophy of immanence" of Maurice Blondel (1861–1949) and by notions of evolutionary "process" arising out of biological evolutionary theory, especially as represented philosophically by Henri Bergson. These tendencies soon raised opposition at the Vatican. Consequently, some philosophers, concerned for a more open attitude to modern thought while remaining within the limits of Catholic orthodoxy, sought common ground between Aquinas and Kant. Outstanding in this effort were two Jesuits, Pierre Rousselot (1878–1915) and Joseph Maréchal (1878–1944).⁸⁰ Both in somewhat different ways considered that Aquinas had thoroughly transformed Aristotle's epistemology. Rousselot emphasized the intuitive character of intellect as primary, in comparison with its rational, discursive mode.⁸¹

The University of Louvain, under Joseph Désiré Cardinal Mercier (1851–1926), had been one of the first centers of the Thomist revival, and was less concerned to assert the uniqueness of Aquinas’s metaphysics than to bridge the gap between it and modern thought as expressed first in Leibnitz-Wolffian metaphysics and then in Kant’s criticism of that version of their system. In this milieu, Joseph Maréchal, in his five-volume *Le point de départ de la métaphysique*,⁸² accepted Aquinas’s view that human intelligence depends on the senses, yet he attempted to reconcile this with Kantianism by finding in Aquinas also a certain *a priori* for metaphysics in the selfconsciousness of the knower. Maréchal held that, although for Aquinas the proper object of our intelligence is sensible, material being, in knowing it we indirectly know our own immaterial act of knowing and experience an innate dynamic of questioning that can be satisfied only by God as the Absolute Answer. This is sufficient, Maréchal argued, to form a “transcendental horizon” for knowledge, in which the Absolute Being and his creation are included. Thus, Thomists can use Kant’s transcendental method and still overcome his limitation of theoretical knowledge to sensible reality, and can thus establish the certainty of metaphysical thought for modern thought.

A somewhat different transcendental Thomism was developed by Bernard Lonergan, S.J. (1904–1984), a Canadian who was for a long time a professor at the Roman Gregorian University.⁸³ He sought to defend the validity of metaphysics through a “cognitional theory” that analyzes the special sciences so as to uncover an *a priori* element in knowledge. In his later works, he especially emphasized what he called “historical consciousness” as against “the classical worldview,” which later he described in a manner that better fits Platonic fixity than the Aristotelian focus on change.⁸⁴

Transcendental Thomism is the most radical rereading of Aquinas but is regarded by the other schools as a surrender to modern philosophy. Yet, through its advocacy by a major theologian at Vatican II, Karl Rahner (1904–1984),⁸⁵ it has attained wide influence among Catholics and, wholly contrary to Rahner’s intentions, has often been used to support dissent from official church teaching. In the United States, though he is sympathetic to the Platonizing trend, W. Norris Clarke, S.J., in his recent metaphysics text (and probably the best of current Thomist treatises on the subject), *The One and the Many*, also grounds metaphysics in the “[r]adical dynamism of the human spirit toward all being as true and good.”⁸⁶

Proponents of other schools of Thomism have done so thorough a job in refuting the Transcendentalist reading of Aquinas textually that I will not repeat the attempt here.⁸⁷ Here my purpose is to acknowledge the contribution that the members of this school have made to a genuine modernization of Thomism. The achievement of modern thought has been to bring to attention the subjective aspects of human knowledge, which Aristotle and Aquinas certainly recognized, but to which, because of their concern to get right the objective elements of knowledge, they gave relatively little attention. While they placed problems in a dialectical context of opinion, they seldom touched on the way history and sociology color our view of the world, or on the way in which individual and social tendencies enter into its construction. The Transcendental Thomists have opened up such questions, and I am convinced that, if Thomism is to survive in our times, it must also deal with these issues.

d. Existential Thomism

The participants in the controversies among the three schools just described were principally clerics, especially members of the Dominican and Jesuit Orders, the former more concerned for an authentic understanding of Aquinas *ad litteram* and the latter more concerned to make his thought acceptable to moderns in the face of the rising cultural dominance of the empirical natural sciences. Two brilliant laymen, however, Jacques Maritain (1882–1973) and Étienne Gilson (1884–1978), became the most influential guides to Thomistic metaphysics, especially in the United States and Canada, because they were both ardent defenders of St. Thomas's originality and fully conscious of the problem raised by the contrast between his medieval and our modern historical contexts. They vigorously opposed Transcendental Thomism because of its Cartesian, Kantian, idealist tendencies, but also attacked Essentialist Thomism, earning the label for themselves as proponents of Existential Thomism.

Gilson began as a historian of the roots of modern Cartesian thought in medieval philosophy and then became the paramount historian of the whole range of medieval thought. He was indignant at the lack of appreciation of medieval thinkers in the French universities, and to remedy this neglect he worked to show the originality of Aquinas as a philosopher. He thought this originality could be found in the fact that St. Thomas, though an excellent commentator of Aristotle, quietly but radically transformed Aristotle's metaphysics in the light of the

Christian doctrine of creation.⁸⁸ Thus, for Gilson, Thomism, though formally a matter of reason, is in fact a “Christian philosophy.” Today, however, most adherents to Existential Thomism desert Gilson on the issue of “Christian” philosophy, preferring to maintain the autonomy of metaphysical reason.⁸⁹

Thus, according to Existential Thomism, although Aristotle’s metaphysics is a metaphysics of Being as Being, for him “Being” is nothing more than substance actualized by essential form. For Aquinas, by contrast, metaphysics is about “Being as Being” in the sense of *esse*, “to be,” *actus essendi*, “existential act.” God is Pure Act, the One Who Is, and creatures must be understood as participants in that “to be.” Our knowledge of this “to be,” moreover, cannot be intuitive or conceptual, but must be through an existential judgment that asserts real existence but leaves the plenitude of “Being as such” as a mystery that transcends adequate conceptualization. Jacques Maritain, originally inclined to the Essentialist position, later joined Gilson in emphasizing *esse* as the subject of metaphysics. The proponents of both Essentialist and Existential Thomism, apart from Maritain himself, are generally content to criticize the developments of modern philosophy rather than enter into dialogue with its perspectives. Gilson thought that modern science has made Aquinas’s natural science entirely obsolete, and hence he became concerned only to defend the unique validity of his metaphysics. Maritain, by contrast, applied his existential view of metaphysics to a number of typically modern problems, without, however, accepting the perspectives of modern thought. He attempted to save both a Thomistic “philosophy of nature” distinct from modern science and a Christian philosophy of ethics, positions I will later examine.

In spite of what I see as shortcomings in this Existentialist reading of Aquinas, I would not for a moment deny the great contribution Gilson made to Thomism by placing Aquinas in historical perspective, nor what Maritain achieved by his emphasis on the importance of the division of the sciences and recognition of their proper autonomy. Maritain has also advanced our understanding of the intuitive and connatural aspects of knowledge. Joseph Owens and John Wipple have also contributed to a better understanding of the Thomistic sources. Owens in particular granted that the way to immaterial being has to be through material being—although (mistakenly, in my opinion) he circularly assigned this task to First Philosophy, instead of seeing that, until the existence of immaterial being has been demonstrated by

natural science, the First Philosophy *is* natural science (as St. Thomas himself emphatically stated⁹⁰).

e. Phenomenological Thomism

Phenomenological Thomism has gained prominence especially through its use by Karol Wojtyła (Pope John Paul II, 1920–2005) and the Thomists of the Polish University of Lublin.⁹¹ He was a pupil of Garrigou-Lagrange and remained faithful to an unquestionably authentic Thomism, but attempted to meet modern concerns by adopting the phenomenological method of Husserl while retaining the critical realism of Aquinas against Husserl's constitutive idealism. This approach to metaphysics focuses on personalism (as Maritain had also done), that is, on the human person as manifesting the harmony of the material and the spiritual in the analogy of Being. Its special concern is to emphasize the dignity of the human person and its moral responsibilities in the face of modern materialism and moral relativism.

f. Analytic Thomism

Analytic Thomism is exemplified by the works of Gertrude Elizabeth Anscombe (1919–2001), the editor of Wittgenstein's works, and by her husband, Peter Geatch,⁹² as well as by Anthony Kenny, Fr. Brian Davies, O.P., John Haldane, and notably in the United States by my colleague at St. Louis University, Eleanor Stump.⁹³ Analytic Thomism is concerned to be authentically Thomist by applying the methods of Analytical Philosophy to the clarification and defense of the logical meaningfulness of metaphysical terms and the logical consistency of its arguments. In common with other Analysts, however, these Thomists usually avoid epistemological questions as self-defeating and thus so far have been content to show that those who call metaphysics "nonsense" are themselves talking nonsense. Thus while Analytical Thomists are not concerned to develop a metaphysics as a systematic discipline in its own right, they engage in a metascience that seeks to clarify other systematic disciplines. Hence they are free to analyze ontological questions that concern real or purely mental entities such as Aquinas deals with in his systematic metaphysics.

I recently complained to Prof. Stump that Analytic Thomists seem more concerned with language than First Philosophy. She insisted that it is precisely metaphysics in the sense of ontology, the reality to which language refers, that is currently the emphasis of Analysts. But concern

for reality is the purpose of every science except logic and I am not sure that the Analysts have yet awakened to the question of what precisely is First Philosophy. Yet certainly one of the great strengths of both Aristotle and Aquinas is their attention to matters that greatly concern Analysts: clear definitions, distinctions, and “good reasons” for assertions.

g. Semiotic Thomism

This more recent development has close ties both with Aristotelian Thomism and, through the work of Jacques Maritain,⁹⁴ with existential Thomism. The development is exemplified in the work of John Deely and his coworker, the Dominican Ralph Austin Powell,⁹⁵ together with the work of Vincent Guagliardo, another Dominican. Thomas A. Sebeok (1920–2001), easily the most important figure in the development of semiotics within intellectual culture generally over the closing decades of the twentieth century, considered the development in question to be a veritable “Dominican tradition or sub-tradition” extending from Aristotle through Aquinas to the contemporary scene; and he cited it as an example of the possibility of “a judicious infusion into the brew of ingredients from all other currents that had something constructive to offer.”⁹⁶ Proponents of this development have contended that to save metaphysics from the dead-end debate between Idealism and Realism is possible only through semiotics.

This discipline was originally made possible by a speculative initiative of St. Augustine,⁹⁷ but was first critically developed by the Thomist contemporary of Galileo and Descartes, John Poinsot, O.P. (John of St. Thomas, 1589–1644, regarded by Maritain as his “principal teacher” in mastering the thought of St. Thomas), and later by the American Charles Saunders Peirce.⁹⁸ Semioticians argue that we must admit an initial concept of Being that abstracts from the real and the ideal (mental), that is, from Being and Non-Being, and thus escapes Cartesian solipsism. This initial concept of Being is a sign that confusedly contains both mind-independent signs and mind-dependent signs and thus transcends their opposition. Both kinds of signs signify objects of thought and form a “semiotic web” that must be critically unraveled. Modern thought has the merit of fully recognizing the mind-dependent objects of knowledge—which medieval thought too much neglected—but needlessly despairs of ever untangling the web.

The initial concept of Being, what St. Thomas calls “being as first

known” (*ens primum cognitum*),⁹⁹ they point out, is an initial awareness of “reality” as consisting of more than objects in their relation to us, of objectivity as including an order of “things,” the physical environment which is the same for all creatures, however differently organisms objectify it in constituting a world of experience.¹⁰⁰ The experienced world, in contrast with the physical environment, thus includes signs that confusedly contain both mind-independent sign-relations and mind-dependent sign-relations, and thus transcends their opposition. Hence the “objective world” (the *Umwelt*) includes both subjective physical realities of a mind-independent character and purely objective or mind-independent “realities” which have no subjectivity (no mind-independent reality) outside of our experience of them.¹⁰¹ Modern thought has the merit of fully recognizing the subjective aspects of knowledge that premodern thought too much neglected but has been unable to reconcile these with the objective aspects of knowledge that premodern thought had dealt with more adequately. Hence the argument is that a semiotic perspective is neither premodern nor modern but strictly *postmodern*.

h. Aristotelian Thomism

A Thomism emphasizing the reliance of St. Thomas on the philosophy of Aristotle is also sometimes referred to as “River Forest Thomism,” because the members (of which I was one) of the Albertus Magnus Lyceum for Natural Science located in that Chicago suburb (1950–1969) contended for this interpretation of Aquinas.¹⁰² James A. Weisheipl (c. 1923–1984) of the Medieval Institute, Toronto, and William A. Wallace (1918–) of the Catholic University of America provided it with a good historical grounding. It has, however, other independent supporters.¹⁰³ For this position, which I have principally adopted in the present work, the validity of metaphysics depends on two conditions:¹⁰⁴

1. There can be no valid metaphysics formally distinct from natural science unless its subject, Being as Being (*esse*), as it analogically includes both material and immaterial being, has first been validated in a manner proper to the foundations integral to natural science by a demonstration of the existence of immaterial being as the cause of material beings.
2. Modern natural science can achieve such a demonstration, but only

if its own foundations are rendered unequivocally consistent with sense observation by an analysis such as is exemplified by Aristotle's *Physics* as interpreted by Aquinas.

This position, therefore, seeks a *positive* dialogue with natural science, looking toward the integration of *philosophia naturalis* with the foundations of modern science and the establishment of a valid metaphysics formally distinct from natural science, yet open to the possibility of Christian revelation or some other divine revelation. The reasons for preferring this Aristotelian version of Thomism concerning how we can validly arrive at the subject of metaphysics will be developed step-by-step in what follows, in a manner that remains in dialogue with the other views and attempts to assimilate their insights.

From this typological sketch it should be evident that the need and validity of metaphysics has been in serious question since Descartes, and is difficult indeed to defend against the remarkable advance of a modern natural science that is not only independent of metaphysics but seems to render it unnecessary. As soon as Leo XIII revived Thomism and made it for a time the quasi-official philosophy of the Catholic Church, it was apparent that it had to meet this challenge. Unhappily, most Thomists simply assumed, as the medievals generally had done, that there is such a valid discipline as metaphysics and sought to defend Aquinas's version of metaphysics by elevating it to a level of certitude beyond the probabilities of empirical natural science.

The Transcendental Thomists achieved this elevation by making self-consciousness the point of departure for metaphysics. Garrigou-Lagrange and others, vilified by the Existential Thomists as "essentialists," largely ignored the problem, while the Existential Thomists, such as Maritain, Gilson, and Fabro, tried to bypass the problem by claiming access to *esse*, known intuitively or through a judgment, prior to and independent of all considerations of essence. Maritain, who of all these thinkers took the problem of natural science most seriously, tried to bolster existential metaphysics by recognizing modern natural science as a science formally distinct from Aquinas's natural philosophy, but only as a study of appearances without proper ontological content.

Recently, as exemplified by the fine work of my fellow Dominican, Thomas O'Meara,¹⁰⁵ Thomists are rightly emphasizing that Aquinas was a theologian, not a professional philosopher, and should be read as a theologian. In effect, this was what Gilson did in his presentation of Christian Thomism based on the *Summa Theologiae* with little

regard for Aquinas's strictly philosophical commentaries on Aristotle. It was also what the theologians Karl Rahner and Bernard Lonergan did with their Transcendental Thomism. Yet it can hardly be denied that what, in part at least, made Aquinas so great a theologian was his critical use of philosophy in the service of faith. This harmony between faith and reason is why John Paul II, when declaring that "the Church has no philosophy of its own," still pointed out Aquinas as a model for philosophers.

In my own opinion, the reason that Aquinas so successfully used philosophy in his primary work as a theologian was that he alone among patristic and medieval theologians fully appreciated the significance of the epistemological stance of Aristotle. Although he certainly advanced Aristotle's thought, he never, I believe, deviated from Aristotle's epistemological commitment to the grounding of all purely human knowledge in our experience of a material changing world known through the senses. Hence, whatever value Transcendental Thomism may have in its own right, and I do not dispute this here, it fails to preserve this important feature of Aquinas's work. I would say that this is also true of the Existential Thomists, because of their failure to appreciate how this epistemology made it possible for Aristotle to propose a valid metaphysics and for Aquinas to defend and develop it.

The more recent developments of Analytic and Semiotic Thomism may cast light on the causes of these disagreements among Thomists. In this book I will not be able to take full account of these developments, but I welcome the clarification of language and discourse that they promise and the chance here to make some initial use of it. As to my more specific focus and concern, my reasons for preferring the Aristotelian reading of Thomism as to *how we can validly arrive at the subject of metaphysics* will be developed step-by-step in what follows. Before pursuing this, however, it may be useful to describe a little more fully the present state of the question at this beginning of the twenty-first century, when modern philosophy itself is reeling under violent attack by "postmodernism."

E. POSTMODERNISM AND METAPHYSICS

Martin Heidegger was in many respects the most influential

philosopher of the twentieth century, although generally contemned by Analytic philosophers as a purveyor of verbalizing nonsense. Moreover, as his disgraceful collaboration with Nazi totalitarianism has been more exposed, he appears to some as a sinister figure.¹⁰⁶ But the collaboration of other modern thinkers, such as Sartre, with Marxist totalitarianism was no less disgraceful. Heidegger echoed Nietzsche's proclamation that "philosophy is dead," and in his Freiburg lecture of 1929, *What Is Metaphysics?*¹⁰⁷ proposed to "overcome" that discipline. Hence, although his main work was in the first half of the twentieth century, he deserves to be considered a herald of postmodernism,¹⁰⁸ with its anti-foundational doubts about any common ground for differing modes of thought or even of the possibility of communication between worldviews.

We must therefore, said Heidegger, again raise the question of "Being as different from that of beings." He had written his doctoral dissertation on Duns Scotus's univocal concept of Being, and this view seems to form the background of his own thought. He came, however, to the position—very different from Scotus's and more like that of Husserl, or even the Transcendental Thomists—that this Being forms the "horizon" of all authentic human thought. According to John D. Caputo,¹⁰⁹ although Heidegger was greatly influenced by Husserl's ambition to construct a presuppositionless, scientific philosophy, he launched an all-out attack on the possibility of any "metaphysics of presence" such as the Idealists had attempted to develop. Against Descartes, he insisted that our knowledge of ourselves is always as "beings in-the-world." Against Husserl, Heidegger denied that we have a pure consciousness that transcends our world. In his most famous work, *Being and Time* (1927), he claimed that the fundamental problem of modern philosophy is that once, long ago, Parmenides and Plato initiated a metaphysics of presence that was fated to work itself out until it self-destructed in the twentieth century with both the "death of philosophy" and "the death of God," just as Nietzsche had so prophetically announced.

The human being is essentially that being which is conscious of its inevitable death, and therefore whose experience exists only in the flow of time. Consequently, any metaphysics of presence can only be false, since the truth of the world and of ourselves is never simply present to us in knowledge. Being conceals itself at the same moment that it reveals itself in different ways in different epochs of time. Thus, Being is not only *aletheia* (Greek for "truth") but also *letheia* (from Greek *lethe*

for “forgetfulness”). By this Heidegger seems to have meant *historical* being as the essential mode of human existence. He believed this sense of our historical being has been forgotten in our times because it has been smothered in modernism’s triumphant search for technological control of nature and human life. His own conception of metaphysics, which he identified with philosophy, was that it was not a science but was “philosophizing,” the uniquely human mode of exploring the relation of man (*Dasein*) to the world as a totality. Thus, since it is not a science, metaphysics began to degenerate when it broke up into logic, physics, and ethics, and forgot the totality of Being. Nor is it a “worldview” in the sense of a framework for living, because the truth of Being not only reveals but conceals itself, and therefore it is a continuous “questioning.”

Later, Heidegger tended to “overcome” any kind of metaphysics that had originated with Plato and Aristotle, because it led to a rational control over thinking that was destined to end in the modern ambition to control, rather than to be open to nature as it is. Hence he pushed his notion of Being as temporality or historicity still further by insisting that our focus should not be on the human knower who can only provide “an opening” for the experience of Being. Instead we should attend to the flow of history itself as, in successive epochs, it so conditions human knowledge and human existence in lived experience that what appears as “true” in one epoch appears quite differently than it does in another. Consequently, philosophy became “hermeneutical” or interpretative, concerned not so much with the attainment of some unitary “Truth” but with how both to interpret the thinking of different epochs and to translate one mode of truth into another.

Heidegger was not optimistic about such convergence. Instead, he hoped for a reversal of the trend from the original pre-Socratic awareness of Being to the “forgetfulness of Being” that has culminated in our purely pragmatic technological culture. This reversal will only come through a new “sending” or “event” (German *Ereignis*) of Being that initiates some new historic epoch of thinking. Heidegger made the horrific mistake of thinking for a time that Hitler’s revival of German nationalism was this epochal event. Afterwards, he looked forward to the emergence of some utterly different form of thinking, even suggesting it might be the mysticism of the East. While he did not deny the existence of God, he held that this matter pertained to faith, not reason, since to philosophize about God is “onto-theology” that reduces God to finitude. Moreover, he could not see how a philosopher could have faith, since faith, as he understood it, excludes questioning,

and that is what philosophy does.

Hence it is not surprising that, under Heidegger's potent influence, Jacques Derrida¹¹⁰ produced the much more radical hermeneutics of "deconstructionism." He sought not only to puncture Heidegger's hopes for the recovery from oblivion of "Being," but even to squelch the lingering hope that in some new "event" it will be again revealed. For Derrida, such a hope is the product of just another worldview, or metaphysics of presence. All thought, he argued, is expressed in "words" or "texts" that are inherently ambiguous. Hence, in interpreting such texts we should have completely free play and in the Nietzschean manner should revel joyously in this freedom of "deconstruction." Caputo shows that this deconstructionism is motivated by a political attitude that wants to undermine authoritarianism, whether in the state or the academy, by revealing its hidden purpose to dominate. Hence he seeks to expose the blind rigidity of thought that authoritarian domination inevitably enforces.

It should be evident, at least in the present context, that this type of hermeneutical attack on the possibility of metaphysics is relevant only if "metaphysics" is identified both with a Platonic conception of philosophy and with a Hegelian historicism. A metaphysics of presence is one that supposes we can arrive at a vision of ultimate truth that is an exhaustive "revelment," free of all "concealment." Caputo shows that such views ignore the Aristotelian emphasis on *kinesis* (motion, change, dynamism) in favor of Parmenides' denial of the reality of change or at least of a Platonic reduction of change to a mere imitation of real being. On the other hand, Caputo himself sometimes seems to praise Derrida for adopting Heraclitus's *panta rei*, "All is flux." Michel Foucault also has proposed an "archaeology of knowledge" that seems to undermine metaphysics by showing how even our most basic understandings of reality are historically and culturally conditioned.¹¹¹

In chapter 9 I will discuss the nature of historical knowledge and will argue that all theories such as Heidegger's that imply some "law" of history accessible by human reason are untenable. If history has a predetermined goal, it can only be known by revelation, not by reason. Derrida is right that to suppose, as Heidegger did, that the notion of Plato's views initiating an inevitable historical process of "the forgetting of Being" is mere mythmaking. More fundamentally, however, I will try to show in this book that Aristotle's conception of a human wisdom is based precisely on his recognition that the only being we directly know is changeable being, being in process, being becoming. Hence our

knowledge of reality, although it can be in some respects certain, is always inadequate and capable of further refinement.

Even those things that are immediately evident from experience and hence can be used as principles to acquire other knowledge are always capable of more profound and precise formulation in view of further experience. It would be a serious error to suppose that to avoid Parmenides' denial of *kinesis* we need to accept the pure flux of Heraclitus. Aristotle shows a middle way between Heraclitus and Parmenides that made possible natural science, from which he derives a human wisdom that was always open to the event of more adequate experiences and deeper understanding. Such a "metaphysics" never claims a truth of perfect "presence."

Moreover, it must be said of Heidegger's thought in particular that to hold that the human essence or openness to Being is no more than openness to temporality or historicity is to jump to an insufficiently explored conclusion. While it is certainly true that by reason of our embodiment we live in the flow of time, and that all our knowing is conditioned by temporality, this only raises, not answers, the question of what it is to be human. Since only we human beings in the material world of change ask about being and time, about our own being toward death, or about that Being to which we must remain always open for further truthfulness, we cannot avoid the question of whether there is not some aspect of our being that transcends the temporal. Heidegger avoided that question, but we will have to ask it.

Another important factor in postmodernism comes from Analytic Philosophy through the work of the Viennese Ludwig Wittgenstein, who did much of his work in England and had connections both with the Logical Positivists and the Analysts.¹¹² His later writings are obscure, but are best interpreted for our purposes as an attack on the Cartesian dualist and idealist conception of metaphysics. In this sense they point, unknowingly and indirectly, as it were, to the need for a return to the Aristotelian insistence that if there is to be a valid metaphysics it must rest on ordinary human experience of the world of sensible objects and the human body, not on "the turn to the subject" cut off from the world. Wittgenstein, however, did not propose a positive direction that such a recovery of a no-nonsense metaphysics might take.¹¹³

More positively, Peter F. Strawson (1919–), generally grouped with the Analysts, in his work *Individuals* has nevertheless sought to develop what he calls a descriptive metaphysics.¹¹⁴ A trend more positive than deconstructionism is also to be found in the Hermeneutic

Philosophies of Hans Georg Gadamer (1900–2002) and Paul Ricoeur (1913–2005).¹¹⁵ They denied that the older metaphysics was meaningless, and argued that a critical interpretation of classical and serious contemporary texts can yield profound insights. They are joined also by the followers of Charles Sanders Peirce, who argue that semiotics enables us not only to interpret written texts but the human meaning of the world, since not only humanly invented languages signify but also real objects are meaningful signs. It was for this reason that Peirce, along with Thomistic developments in semiotics, regarded “scholastic realism” as essential to a sound semiotics, a “doctrine of signs.”

In view of the foregoing, oversimplified typology, from which the attitudes of many important thinkers to “metaphysics” are necessarily omitted, it should be evident that there are rich but confusing resources to solve the problem of finding a unifying ground for interdisciplinarity and multicultural dialogue. This typology shows that in Western thought the question began with Greek thinkers, among whom Aristotle provided the most important mediation between the idealist and empiricist poles of opinion. It also shows that, for the medieval and Renaissance periods, Aquinas, in direct continuity with Aristotle, played a similar mediating role. Yet for modern times this mediating position was assumed by Kant, with little appreciation for either Aristotle or Aquinas. This inadequate Kantian resolution, and the other solutions it generated, is now, at the beginning of the twenty-first century, under devastating attack by postmoderns. In what follows, I will reexamine the Aristotelian Thomistic view of metaphysics as a basis for effective interdisciplinary and intercultural dialogue in the twofold perspective of the achievements of modernity and its criticism by postmoderns.

This sketch of the fate of metaphysics during the “modern period” can thus be summed up. With the breakup of cultural unity of Western Europe by the Protestant Reformation and the consequent religious wars, the intellectual elite began to abandon a worldview based on revelation and to replace it with a purely rational worldview relying especially on science. From the seventeenth century on, this elite was able to give substance to this new worldview by its sponsorship of the growing importance of modern science (with its roots in Aristotelian and other Greek empiricist tendencies), especially as it led to an increasing technological control of nature. This Enlightenment or Secular Humanism, though it had its scientific origins in the debates between

Platonism and Aristotelianism in the medieval Christian universities, ultimately, in the nineteenth century, was to give rise to the modern university.

In the modern university, natural science came to be more and more dominant, but was also revised so as to rest on quite different foundations than those that Aristotle had supplied to medieval and Renaissance science. Cartesianism introduced a dualism between mind and matter that was the beginning of the profound split in modern universities, already described, between the “Two Cultures” of the “soft” humanities and “hard” sciences. Modern physics, conceived as the prototypical value-free, hard science, was now reconstructed on purely mechanistic, mathematically formulated foundations.

This dualism that Kant unsuccessfully attempted to overcome has survived in the current conception of “scientific method” as the purely mental creation of theoretical models into which the data of sense observation are to be fitted as neatly as possible. Yet today multiculturalism raises questions whether these Kantian categories are common to all human minds or are simply cultural constructs. Even for Kant himself a metaphysics that could treat of God, the soul, or other immaterial entities transcending space and time for which there is no sense data could only be an unverifiable construct, one that might pragmatically support the ethical conduct needed for social order but could claim no objective truth. Yet modern philosophy, in all its conflicting trends, contributed to Western thought the exploration of the historical, individualistic, and subjective perspectivism that was largely lacking in the thought of the Middle Ages and the Renaissance. It thus prepared us to face today’s interdisciplinarity and multiculturalism.

John Paul II deplored the “deep-seated distrust of reason which has surfaced in the most recent developments of much of philosophical research, to the point where there is talk of ‘the end of metaphysics,’ ” and “philosophy is expected to rest content with more modest tasks such as the simple interpretation of facts, or an enquiry into restricted fields of human knowing or its structures.”¹¹⁶ But he also called for a new interpretation of the historical epochs or ages of philosophy as required for any deep understanding of how the term “postmodern” is finally best to be understood in philosophy,¹¹⁷ a principal theme of the semiotics movement. The time is ripe for a postmodern reconsideration of First Philosophy itself, now that the events of intellectual culture have brought us to the point where “metascience” can be seen to be the logically proper postmodern name for the recovery of this ancient enterprise in the spirit originally proper to it.

Natural Science Is Epistemologically First

A. THE LOGICAL STRUCTURE OF ANY DISCIPLINE

1. *Every Science Has a Foundational Treatise*

In chapter 2 we saw the current need in our universities, if they are to be ready for today's multicultural dialogue, for a kind of wisdom that demands interdisciplinarity and the recognition of the contextuality of knowledge. While it has often been recognized that these problems go very deep, and hence are "metaphysical" or "ontological," there has been no agreement as to what "metaphysics" or "ontology" is, or even if it exists as a valid discipline.¹ Since historically the initial formulation of a First Philosophy or "metaphysics" was that of Aristotle, it is from that formulation, which I personally believe remains the most sharply focused, that our inquiry will begin. In the last section of chapter 4 I will compare this, briefly and schematically, with other historically important formulations. Since it was in his logical work, the *Posterior Analytics*, that Aristotle worked out a general theory

of how to organize any critical discipline, it is to that treatise that one must first look to see what he thought about the problem of an architectonic Wisdom.

Aristotle, in *Metaphysics* III, deals with the generic object of human wisdom.² One often speaks of the “subject” of a science, because a science proves the properties of some entity, expressed in propositions of which the subject is the name of the thing and the predicates are names of its properties. For example, in arithmetic, one can say, “A number (subject) is either even or odd (predicate).” But, more properly, a science is an intellectual skill that deals with a field of knowledge that is its “object.” Henceforth, therefore, I will usually speak of the “objects” of the sciences, and especially of the object of metaphysics. With regard to any science, a distinction must be made between its *material* object, namely, the concretely existing *things* that it studies, and its *formal* object, which is the aspect of that material thing with which the *science* is concerned (which the science objectifies or specifically makes known in a developed and thematic way), since more than one science may study one and the same material object from different perspectives. Yet the light under which the human intelligence knows anything is “being” or actuality, because the scientist must establish that the object exists before its nature can be explored as a feature of reality. Mere fictions are not proper objects for a science of nature.

Furthermore, nothing is intelligible except as it is in act, as it has actuality or being. If it also has potentiality, this must be known through its actuality and in relation thereto as a correlative cause, and this can be designated as the formal object *quod*, that which is actual (and therefore intelligible) in the concrete object. Hence sciences are distinguished not through their material objects but by their formal objects. The formal object determines the kind, field, or scope to which exploration of the concrete reality is limited, in order to attain clarity and precision—systematic unity. Thus, although natural science and mathematics are both about material things as their material object, they differ in their formal objects: natural science is interested in things as they are subject to change, mathematics is

interested in them only as they are measurable, and so on.

Therefore some authors have concluded that, while for the human intellect there can be several formal objects *quo*, that is, several systematic points of view (otherwise there would be only one science), it has only one formal object *quod*, namely, being (*ens*). Hence, like Scotus, they tend to reduce all the sciences to metaphysics, because metaphysics treats of Being as Being. This, however, is an error, because the light by which (*quo*) an object is known *limits* what can be known about that object. By the light of my eyes I can only see color as the genus of different kinds of color, not of sounds or smells, although I can differentiate this genus into its species, namely, different kinds of color. Thus, intellectually, I can only know in a given science what can be understood in terms of its particular first principles. Hence, although every science deals with “being”—the actual—as its formal object *quod*, it is limited by the particular principles it uses in understanding that being. By the principles of mathematics, for example, I know only the quantity of things, nothing of their other aspects, although *through* their quantities I can come to know other things about them. Thus Aquinas can say, without contradiction, both that the proper object of the human intelligence is “being,” and also that the proper object is “the essence of material things,” and that it is *ens mobile*, “being” in the process of change.³

These statements are true because we cannot know positively anything about changeable things except what is revealed through their changes. Thus the formal object *quod*, as Aquinas says many times, is “the quiddity or essence of sensible things,” and this is known through their most generic feature, “change,” which shows us that, though they are *actual being* (*ens*, otherwise they could not be observed by us), they are also changeable. They come and go. That is the kind of being they are, and that is how we must first know them through their first principles, such as the principle of non-contradiction, which says that, although changeable things can be and not be, they cannot *both* be and not be at the same time and in the same respect, or the principle of causality, which says that nothing can be changed

without a cause of that change.

It should be noted that Aquinas's phrase "the essence of sensible things" should not be understood, as some have done, to mean that we know only their essences and not their existence. We cannot know the essence of what is not first known to exist, and we must, therefore, understand Aquinas as meaning "the essence of sensible things" as it exists in actuality, since otherwise it could not be known at all. It should also be noted that in saying that "being" is the proper object of our intelligence, and that "Being is somehow all things," Aquinas obviously does not mean that we know all things, or that in knowing Being as Being, that is, as act, we know the actuality of all things. We must begin our knowledge of all being with *ens mobile*, sensible being, as the only "Being" that we can sense and thus know intellectually. But from that starting point, by observing the order of the sciences we can widen our understanding of beings, even until our notion of "Being" analogically includes all created being, and through that, as the work of God, we get some idea of God as First Cause. Therefore, "science" is not one single discipline to which all knowledge is reduced, but several sciences having distinct formal objects and proper principles of understanding.

Aquinas, commenting on the *Posterior Analytics*,⁴ agrees with Aristotle that the proper objects of all the logically systematized disciplines and the special first principles that define these proper subjects formally distinguish them from each other. This definition of the object, the methodology and principles of its exploration, and the epistemological criteria for evaluating its conclusions form a *foundation* that is proper to the science. Students of natural science, however, are often asked to take these foundational concepts and principles on faith in the expertise of their instructor. The basic terms of the science are passed over in a merely terminological manner, and the student is expected to believe that they are correct and have valid reference to reality. Only later are the critical problems and controversies in the field concerning its foundations taken up at the graduate level, and may be referred to as the "philosophy of science," "the philosophy of mathematics," and so forth, *extrinsic* to science itself.⁵ Then

students may be shocked to find out that prominent experts in their own field disagree with much that they have taken on faith. Modern Analytical Philosophy in this respect revives Aristotle's own great concern that each science be aware of its own special logical problems in view of a general logic of science. This requires a special attention to the critical formulation of the basic principles of the science, beginning with a definition of the subject it studies.

According to Aristotle's *Posterior Analytics*, the definition and defining principles of a subject, though intrinsic to the science, cannot be *demonstrated*, at least not by that same discipline itself, but must be known by direct insight.⁶ For example, a teacher of arithmetic does not prove the axiom that "equals added to equals are equal" but simply calls the students' attention to that fact as it is obvious in their experience. Therefore, it might seem that every critical discipline, to be such, must be absolutely autonomous, since it must be based on principles that are independently evident. Thus, an interdisciplinary architectonic discipline, such as we are supposing human wisdom to be, would be impossible. We will see later, however, that, although each discipline has its own evident first principles, an epistemological order prevails among these evident first principles.

The common statement, that first principles are "*self-evident* from their terms," however, is misleading if it is taken to mean that such a principle is known to be true simply from the terms as *stipulated*, that is, merely *nominally* defined. Instead, it is necessary that the terms be known by some appropriate form of objective evidence, though the type of evidence varies with different disciplines. In the case of natural science they must be verified through direct sense observation (though see also the discussion in section D.1 of this chapter).

Furthermore, any critical discipline must be broadly structured by what are traditionally called the "four scientific questions," and hence by the process of answering these questions in terms of the "four explanatory causes" as these emerge in research. According to the *Posterior Analytics* II, chap. 1,⁷ these four scientific questions are:

1. Does the subject of inquiry exist?
2. How can it be defined? (or, What is this?)
3. What are its properties?
4. Why does it have these properties?

If these four questions must be asked in every science, it will appear in what follows that these are the problems presented first of all to natural science as ones that must also be repeatedly asked at every level of that science if we are to explain what our senses show us about the material world, our physical environment. Since all our knowledge is derived from our senses, natural science is first among all the sciences; and thus, since any other science presupposes the findings of natural science, every science must somehow confront these same questions as regards its own special object of study.

2. Question 1 about Existence

Question 1, “Does the subject of inquiry exist?” primarily concerns something that naturally is intrinsically unified and has a stable existence. This is what Aristotle calls a “substance” (*ousia*), a “being” without qualification, what simply is. Thus a substance is not a mere collection of smaller substances, such as a pile of rocks, or an artificial construct, such as a clock, because these are not primary existents but are composed of primary existents. Aquinas points out that we are most convinced that something exists by the information provided by the sense of touch.⁸ Thus, in the Gospel story, Doubting Thomas said, “I will only believe it is the risen Lord if I touch him!” (Jn 20:25). Hence to wake up from dreams is to find oneself in the real world by touching it. We do the same when we wonder if we are suffering from an optical or auditory or other sense illusion, and we say of a psychotic that “he has lost contact with reality!”

Modern psychologists by their “sense deprivation” or “isolation” experiments have also confirmed scientifically that someone suspended in the dark in water at body temperature to

minimize all sensations of touch soon falls into a dreaming state.⁹ This is also illustrated by the famous story of how the blind and deaf Helen Keller behaved like a little animal until her teacher put her hand in running water and spelled out the sign for “water.” Suddenly, Helen began to think like a human being and became a learned scholar, yet one who had to receive almost all information through touch.

To know that something exists, however, is an act of judgment, not simply of sensation, though we cannot make that judgment unless our senses supply the necessary existential data. Our whole worldview is built on our experience of changeable being, the world in the process of *becoming*, because what touch tells us is that some real thing is making contact with and causing a change in our bodies. What we then feel and understand is a real world that exists only in the dynamic process of interaction between bodies.

Neo-scholastic Thomists put great emphasis on the fact that St. Thomas Aquinas’s philosophy is about “being” (*ousia*), and above all *esse* (“to be,” the act of being, *actus essendi*). True enough, but it must always be kept in mind in reading him, as in reading Aristotle, that the “being” we know best, and through which alone we human beings can know any other kind of “being,” is *ens mobile*, *being in the process of becoming*. If God or angels really exist, this can be known humanly only by reasoning from effect to cause: from the observation that beings in the process of becoming actually exist to the awareness of the existence of such non-observable spiritual beings. Thus the being of God, or of any spiritual being that cannot be sensed, is not actually included in our original judgment that “being exists.”¹⁰

Certain recent and distinguished Thomists have declared that Aquinas “radically transformed” the thought of Aristotle by his emphasis on *esse*, an emphasis derived from his Christian faith in God as the Creator and hence on the radical contingency of creatures. They emphasize that the term “existence” (Latin *existentia*) does not have the force in Aquinas of the term *esse*, “to be.” Hence they note that many older Thomists were in error when they wrote of the “real distinction of essence and existence”

as central to St. Thomas's thought, when in fact he spoke only of the distinction of *esse* and *essentia*. They point out that "to exist" can mean no more, as Scotus insisted, than the bare *fact* that material things are observed to exist outside the mind and their causes.

True enough, but, in my opinion, this is to fail to appreciate the way that Aristotle, and Aquinas in full concordance with him, moved toward that profound understanding step-by-step, not attempting to propose it at the foundational level and initial analysis of our experience. They both begin with the bare fact of existence as an answer to question 1, because it is this fact that raises question 2, an exploration of what the fact amounts to, and the subsequent questions 3 and 4. But to make a leap in the dark from that sensibly observed fact to the profound understanding of *esse* at the level of the foundations of First Philosophy imperils its validity. I will not make that leap, but will follow Aristotle and his disciple Aquinas step-by-step.

Aristotle insists that "no discipline proves the existence of its own subject," since every theorem of the discipline, if it is not to be liable to self-contradiction, requires that we first know that this subject really exists.¹¹ Thus, the common accusation that Aristotle tried to "deduce" a system of conclusions from a few axioms is utterly wrong. At every level of specification, new empirically established data must be introduced as minor premises in any valid deductive arguments. Hence Aristotle says that in a logically systematized discipline "the premises are almost as numerous as the conclusions."¹²

Therefore nothing is a legitimate object of critical research unless we first know empirically that it is real, in other words, actually exists or has existed. Aristotle's requirement that this question come first in any discipline shows the sense in which his epistemology is rigorously realistic and—to use an adjective very laudatory today—"existential." Leibnitz and others have thought, as I noted in the last chapter, that philosophical inquiry is based on what is possible. Aristotle, to the contrary, held that we never can be sure what is possible except from what is known to be or to have once been actually real.

Aristotle and Aquinas would also have rejected Descartes' notion that certitude comes from the clarity of our intellectual concepts. How can we be sure that a concept, even the clearest mathematical concept, does not implicitly conceal a contradiction like the concept of a "square circle"? To Ptolemy, it seemed quite clear that the sun may orbit the earth, although he knew the sun was the much larger body; but Newton showed that such a notion is contradictory, since the sun is so much more massive than the earth, and the law of gravity demands that the more massive body be relatively at rest. Hence, to be certain that our concepts of objects refer to something that is noncontradictory and therefore really possible, we must always ground our concepts in sensible evidence, ultimately in a judgment based on the sense of touch. Jean Paul Sartre famously said that "existence precedes essence." Aristotle would have heartily agreed except that, unlike Sartre, he did not therefore deny that all existents have essences. To exist is also to be some kind of thing. An essence is simply the way that what exists does exist.

Therefore a distinction must be made between several senses of "to exist." When we say something "exists," we may mean simply that it is not a mental fiction, that it has extramental reality, and that it is not merely virtually present in its possible cause. Thus, for an artist imagining a picture he intends to paint, the painting somehow "exists" in his mind and in his ability to paint it, but it does not yet have *real* existence. As to things that really exist independent of the mind and their possible causes there are also many degrees of existence. An existing atom is a relatively very simple thing compared with a racehorse.

Thus the question about existence can be answered affirmatively without saying whether what exists has simple or complex existence. So we begin to see that "to be" (*esse*) and the noun "being" (*ens*), therefore, have a fuller sense than is usual in English for "to exist" or "existence," since "being" includes various degrees of existing, from the way an atom exists to the way that the First Cause, or even a living, thinking, freely acting human being, exists. Thus there is always a *proportion* between what a thing is (its essence) and the way it exists (its existence), and this proportionality is connoted by the term "being."

Therefore the question “Does it exist?” can be answered in two ways: (1) Does it exist at all? and (2) How does it exist? This latter question is the same as scientific question 2, “What kind of a thing is it?” about its essence. Hence, to ask about the “being” of something is to ask *both* whether it exists *and* what kind of thing it is, as these are correlative and proportional.¹³

3. Questions 2 and 3 about Substantial Essence Known through Properties

Question 1 about factual existence must be asked first, because any critical and systematic discipline in physical science is interested in observed reality, not in mere fictions of the mind. But, of course, inquiry does not cease there but proceeds to question 2, “How can this existing substance be defined, by a real, not merely nominal definition?” But how can we observe that something exists unless we also observe something of what it is? Should not question 2 rather be question 1?

This puzzle resolves, however, when we note that, in actual experience, we first know a changeable thing as something real (i.e., existent), but have at first only a very vague concept of what it is. Human knowing, as Aristotle says,¹⁴ always moves from what is more general to what is more particular, although the sense knowledge on which it is based, and which we share with animals, is particular and individual. Sense cognition on which all human knowing depends and that we share with animals concerns individual objects; but human knowing, as human, moves gradually from what is only a very general knowledge of these particulars toward more precise understanding of them. To “define” is to limit and make more precise, and hence a “definition” indicates this gradual focusing and increasing resolution of our answer to “What is it?” For example, on seeing a bee on a flower for the first time, I first see it as a very real, individual, brown and yellow, small, fluttery, buzzing object; only step-by-step do I determine that it is living, an insect, and finally a bee getting honey.

Yet, just as it was asked how question 1 about existence could be asked before question 2 about essence, it now must be asked how question 2 about the essence of a thing can be answered without first answering question 3 about its properties. How could we know what a thing is essentially except by first examining its properties? Certainly Marie Curie established the existence and definition of the element radium only by first observing its property of intense radioactivity.

It is true that our senses first show us the properties of substances as their regular ways of behaving, and it is through these properties that we come to know that a substance is a certain species of thing. Because we observe that an existing thing has many interrelated properties, we are stimulated to analyze them so as to find their interrelationships and to explain how and why these are unified. We hope that this may finally lead us to understand the unity of these properties as the necessary effects of the real nature or essence of the thing. Thus Marie Curie studied all the various properties of radium until she understood not only its property of radioactivity but how all its other properties manifested its specific unified structure. Then she and other scientists became able to formulate a real definition of this substance that located it in the periodic table of the elements: Ra, atomic number 88, most stable isotope 226, having a nucleus of 88 protons and an equal number of neutrons, surrounded by an equal number of electrons, with a valence of 2. After that, she could reverse this process of inductive (or “abductive”) discovery and give a theoretical, logically deductive explanation of how the properties of radium are caused by its specific atomic structure.

We need, therefore, to distinguish the *via inventionis*, or way of research and discovery, from the *via demonstrationis*, or way of scientific explanation, as opposite to each other. In seeking to understand a real object we observe its properties as these are accessible to our senses or can be inferred from sense observation. A sensed object has many properties; for example, H₂O has specific freezing and boiling points, a specific weight, and so on. Once these properties are determined, however, analysis shows that they have interrelations that unify them and

can serve to identify the kind of object that possesses them. This unified character of the object that explains its properties is all that Aristotle meant by its “essence” (*eidos*), not some exhaustive grasp of some hidden mystery.

This conception of essence, of course, is utterly different than the Platonic *eidos*, which was an archetypal Idea or Form primarily existing in its own right and only imitated imperfectly by the objects we can sense. Such an Idea could be knowable to us only innately, independently of sense experience. As was shown in the last chapter, beginning with Descartes, theories of cognition similar to Plato’s have dominated modern philosophy and discipline. The common notion of scientific method today is that scientists invent a theory or model of reality, and then verify or test it by its adequacy to explain sense observation. Sir Karl Popper argued that scientific theories are never verified, but only “falsified” to make way for better ones.¹⁵ Aristotle would not deny the value of this process of investigation that he himself regularly employs, but would consider it to be *dialectical*, not strictly scientific (epistemic).¹⁶ Dialectical reasoning never arrives at anything more than probability, because one can never be sure that a mentally constructed model is not internally self-contradictory, nor that its fit to sensation is more than approximate. Thus several different models can “save appearances.” The Ptolemaic astronomy was highly probable, as was the Newtonian theory of gravitation, yet, in both cases, through the spiral of semiosis,¹⁷ a better model was eventually discovered.

Since Aristotle hoped that a critical discipline could achieve more than dialectical probability for at least a few of its conclusions, the Platonic theory of cognition did not satisfy him. He held that, at least in some cases, the properties of things can be sufficiently well established by us through sense observation, and their interrelations can come to be sufficiently understood that we can transcend the probable dialectical theorizing about them and be certain of the essence of certain objects such that they can be given a real definition, thus answering question 2.

Was Aristotle’s hope misguided that strictly epistemic, certain

science is possible? Most moderns, I believe, would be tempted to answer that “Yes, all our knowledge is only probable.” Why this probabilism is untenable (because self-contradictory) will be discussed in chapter 8.¹⁸ Here it suffices to point out that this extreme probabilism is contrary to the obvious fact that we can identify a cat from a dog, water from alcohol, a human being from a chimpanzee. After all, the earth *is* spheroid, not flat; the earth *does* revolve around the sun, not the sun around the earth. To claim that we have certain essential knowledge of things is not to say, however, that we perfectly understand the nature of these objects—and Aristotle made no such claim. It is only to say that we *sufficiently* understand some objects of our experience so that we cannot be mistaken about their fundamental identity and difference from similar kinds of things.

In natural science, the systematic discipline based most directly on sense experience, the first essence that must be defined is its generic or total subject: changeable being or substance. This generic definition will then enter into the definitions of the essences of all the different genera and species of the classification or category of substance (those realities that have independent existence). To ask this about changeable being as a whole, we must consider the most radical sort of change that we observe, namely, the coming into existence and the passing out of existence of some substance, some thing that has independent existence—the beginning and the end of individuals.

Because “changeable being” is the first term in the category of substance, it cannot, of course, be defined in a strict sense, because everything else in that category is generically defined by it. It can, however, be analyzed into the simpler notions of “actual” and “potential” being. The claim of Parmenides, that “Being cannot change, because Being is not non-Being,” failed to distinguish these two different, though analogous, meanings of the term “being.” Aristotle’s fundamental achievement was to recognize and remedy this error. He saw that a changeable being can change because it is not only an actual being, but potentially some other being. “Potential being” that is not “nothing” is not a mental fiction, but a mind-independent reality. Yet it is not a substance, an independent reality, but the capacity of an existing

substance to become actually something other than it currently is. If actual substances did not have this capacity they could not change, just as Parmenides argued. But in fact they do change. Hence, before they changed, they must have had a potentiality for change. "Potential being," therefore, is real, and is rightly called "being," although only by an analogy based on its relation to actual being.

The human intelligence, however, dependent as it is on actual beings and their remembered images, can directly conceive only what is actual. Hence, throughout the history of human thought, thinkers have tended to deny potentiality and consequently to deny the full reality of change, with the result that they can provide only a *static* picture of reality. This Parmenidean claim that underlies all Platonism, strange to say, still lurks in modern mathematized physics. If mathematical models are our only representations of physical reality, it follows that, since mathematical entities are changeless, change is an illusion. Even when we speak of a mathematical "function" changing and use it to represent stages of change, that function is in fact an *unchanging* set of quantitative relations.

For example, to write algebraically, $x = 2y$, and read that as meaning "as the quantity x changes, the quantity $2y$ changes," is not to speak of any actual change. It is only to assert that any quantity x is equal to twice some corresponding quantity y that is half as large. Thus if x is 4, y is 2 ($4 = 2 \times 2$), but if x is 6, y is 3 ($6 = 2 \times 3$); yet such relations of equality and double, or the related numbers themselves, never change. Similarly, in modern mathematical physics, motion and time are conceived statically, after the analogy of a mathematical "dimension" or a line in which one end represents ten o'clock and the other twelve o'clock, but all of whose parts are simultaneous. Potentiality, therefore, should not be reduced conceptually to actuality but should be conceived analogically and *relatively* to actuality. The potential is a capability of *receiving* actualization, not something in any way actual itself.

Thus "form" does not mean simply "shape" or "pattern," as in modern English, but any kind of actuality possessed by a changeable thing. "Matter" also has a quite different meaning

today, since scientists use this term to refer to objects having mind-independent existence, such as an atom or molecule, and having the property of inertial mass. “Matter,” taken in this way (“having inertial mass”), therefore, has a very much more limited meaning than Aristotle’s “potentiality.” For Aristotle, all changeable things have potentiality (“matter” in his usage), while modern science recognizes the existence of changeable things, such as photons (and perhaps neutrinos), that have no inertial mass.

The famous Aristotelian notion of “prime matter,” therefore, does not refer to a substance, but to the potentiality of *all* the actual substances studied by natural science to be changed into other specifically different substances. Democritus thought that the objects we observe change, but only in the sense that their unchangeable parts are inalterable atoms (the term is from Greek for “what cannot be divided”) that are being rearranged in empty space. Modern science, however, recognizes that nothing we observe is permanent, and that anything can be changed into anything. Even elementary particles come and go.

The metaphysics of John Duns Scotus, which was based on a univocal concept of “being,” was mentioned briefly in chapter 2. Scotus, although he accepted Aristotle’s concept of matter as potentiality, seems to have denied that matter can be *pure* potentiality (that is, *materia prima*, as Aristotle and Aquinas understood the notion).¹⁹ Instead, he attempted to mediate between the Aristotelian concept of matter as pure potentiality and the Democritean and Platonic tradition that explained change as the motion of atoms in the nothingness of empty space. To do this, one would have to give Aristotle’s “potentiality” a minimal actuality *in its own right*.

The genuine Aristotelian analysis of what we observe as essential to all changeable beings is that they *are* actual but have the *capability* (potentiality) to change. This fact enables natural science to describe changeable being as *actual reality capable of change*, or “actual material being,” or “substance composed of matter and form.” This answer, it can be added, obviously was suggested to Aristotle by the analogy between “art” (in the broad

sense of any technology) and “nature.”²⁰ As the human artist produces an artificial object by imposing a form or organization on some material that previously lacked it, so nature produces substances by informing matter. Where the analogy limps, of course, is that the artist’s material already has and retains some natural actuality. The sculptor works on marble, but, even though it gets a new shape, it remains marble. Hence the artist depends on his material and is limited by it. Natural forces, on the contrary, are *not* always limited by any material already formed. If these forces are powerful enough and act long enough, they can radically alter anything they act on and produce something other than what they act on so that no actuality that the matter first had remains in the final product, except the capacity for further change (prime matter). For example, according to the prevailing Big Bang theory, for the initial seconds that our universe existed, it was capable of becoming all the kinds of things that *now* “actually” exist, but *then* existed in a state radically different than any of these present substances.

Thus, natural science has as its generic subject all “changeable being” that sense experience shows us exists, namely, a changeable substance or substances (question 1). This observation also initiates the answer to question 2 by defining a changeable substance as essentially composed of matter and form. The science can then proceed to subdivide this genus of “substance” down to the empirically identifiable species of substances that exist, or can be proved to have existed (such as the dinosaurs), to form the “category of substances.”²¹ Of course, for each of these classified kinds, its own essential definition must be sought in terms of proximate genus and specifying differences—or, better still, unique difference. Thus, science today can classify the elements and kinds of molecules and has developed an elaborate taxonomy of animate organisms. It can locate an atom of radium in the periodic table, a molecule of H₂O among other molecules, and a fungus, amoeba, or hippopotamus among living things.

What actually exists, of course, are not species of substances as such, but individual substances essentially classifiable in some

species. These individuals, though essentially the same, differ in many secondary ways. Because, as Aristotle said, “science (*episteme*) is of the universal,”²² it primarily looks for general laws in nature, not individual differences that simply result by chance. This restriction, however, raises the famous problem, much debated among the Scholastics, of “individuation” and its relation to essential, universal definitions. This question I will discuss after a more detailed treatment of properties and their relation to the essences of substances (as required by questions 3 and 4). Before these questions can be addressed, however, it is necessary to formulate the first two principles of natural science. This is now possible only because the existence and definition of the generic subject of natural science has first been established by answering questions 1 and 2 concerning that subject.

B. THE FIRST PRINCIPLES OF NATURAL SCIENCE

1. Principle of Non-contradiction

Along with the phenomenological and analytic descriptions of the generic subject of natural science, two general first principles of that discipline also become evident. Because they are evident from sense observation of our changing world (and only for that reason), these “first principles” require no proof. The first such principle is the principle of non-contradiction (sometimes called, less accurately, the principle of contradiction): “Nothing can exist and not exist in precisely the same way.” We have seen that Parmenides misused this principle to deny the possibility of change, but that in fact the distinction of the two senses of “being,” actual and potential, cures this error. That which exists actually is, but is *also* potentially something else, that is, it is changeable.

We have already seen that the truth of this principle is evident from our sensible experience that we cannot touch something that is not real, that is, something that does not exist independently of the mind. While it is true that illusory judgments can be made about unusual or abnormal sense impressions, these errors can be corrected by more careful observations. For example, if I mistake my image in a mirror for another real person, I can touch the mirror and discover that it is a flat surface. In the real world itself, the principle of non-contradiction is constantly verified. Unless this principle were true, of course, any scientific proposition could be both true and false, since all *logical* reasoning is based on it. Note, however, that, at the *epistemological* level of natural science, this principle is restricted to our experience of changeable beings; it has not yet been extended to apply to non-changeable beings, if in fact, any such beings exist. If we can prove they exist as causes of what we know with certainty by sense experience, then the principle will apply to them as well.

2. Principle of Causality

A second foundational principle of natural science, which is also evident once we have analyzed the essential nature of changeable being, is the principle of causality: “Nothing can cause itself.” This is evident from the principle of non-contradiction, since to claim that something is the cause of its own existence amounts to saying that it is both cause and effect, that is, in the same way both dependent and independent in existence.

Absurdly, Spinoza and other eminent philosophers have said that God is *Causa Sui*, that is, that he causes himself! They must have really meant that God, if God exists, is uncaused, since the principle of non-contradiction does not mean that everything that exists has a cause, but only that if something exists it *either* has a cause *or* exists necessarily as uncaused. The possibility that something uncaused exists is by no means excluded by this

principle. We have defined a changeable substance as “that which exists independently.” Whether this “independence” is absolute (so that a substance can be uncaused) or only relative (so that a substance can be caused to exist with a certain relative independence in existence) is a question still to be explored. What we directly know from sense experience is that some substance does in fact have an existence that is independent here and now of other substances. For example, my dog exists whether my cat does or not, I am still alive whether my parents still are or not, and so forth.

While this “definition” of substance is certainly correct, in the case of changeable substances it must be nuanced, because, as we have seen, a changeable substance has intrinsic formal and material causes on which its independent existence depends. This fact does not, however, contradict the principle of causality since the substantial form, although it gives the whole substance existence, is not alone the whole substance, because the substance as a whole is composed of both actuality and potentiality. A substantial form cannot exist of itself since it is nothing more than the actualization of the matter of the substance. Hence, its matter existed previously under some other substantial form and now exists not of itself but through its actualization by this form. Matter as potential and form as actualizing are *correlative* causes of a substance. They cause each other and are the constituting causes of a changing subject.

Thus, these different relations of causality constitute a substance in its independent existence, but not all in the same way, and hence no contradiction is entailed. A substance exists independently in relation to other substances yet is dependent for its own existence on its intrinsically constituent material and formal causes, each in their respective types of causality. For example, it is true to say that a giraffe is a substance since it exists independently of other animals and of the zoo where it lives; yet internally its various parts are caused to exist by other parts. Its brain would die without the heart, and the heart could not exist very long after brain death. So far in this presentation, this principle is asserted only for material and formal causality. Later it will be extended to two other types of causality: efficient

and final.

3. The Fundamental Theorem of Natural Science

So far we have obtained through observation of its properties and phenomenological analysis a real definition of changeable being in terms of its existence and its essence as composed of form and matter, that is, *an independently existing actualized potentiality for becoming another kind of changeable being*. This definition has been arrived at by a dialectical process of eliminating false opinions, until it has become intellectually evident exactly what we are observing when we observe by our senses that there is changeable being. Thus we can talk about this reality that we observe, and be understood by others from their own experience and reflection. So—it now becomes possible, using this definition, to formulate the very first theorem or demonstrated conclusion of natural science.²³

Major Premise: **The actualization of the potential as such** is the generic property of changeable being.

Minor Premise: Change is **the actualization of the potential as such**.

Conclusion: Therefore, change is the generic property of changeable being.

In this syllogism, the middle term (in bold face) is “the actualization of the potential as such,” and, since this is the definition of “change” as it has been phenomenologically described above, this premise is evidently true: for any being to change is to have its potentiality somehow actualized. This is the case when a new substance is produced by substantial change from a previous substance or substances (a molecule of water produced from two atoms of hydrogen and one of oxygen, for example). But it is also true even when a substance merely undergoes some secondary type of change (H₂O is frozen or

evaporates, while remaining H₂O). The major premise also is evident from phenomenological analysis, since this analysis has shown that all the changeable beings of our sensible experience are composed of actual form and potential matter.

This theorem may seem mere word play, or so obvious as to be trivial, but in fact it is fundamental, because it tells us that, since the whole of natural science must always be a study of the changeable, all of the other properties of the substances it studies will be dynamic. Thus whatever we can know about the world of our sensible experience must be known in terms of change as the defining mark of all existent changeable things. In fact, that is what modern natural science really does when it verifies or falsifies (in order to eliminate wrong hypotheses) its assertions. It checks them against observed changes in nature, not merely by reference to the consistency or inconsistency of these assertions in relation to a hypothetical mathematical model. Thus Aristotle's hypothesis of inalterable celestial spheres was falsified even before Galileo by the observation in 1572 of a new star in the heavens.²⁴

Therefore, in natural science, we will never be dealing with merely static objects but always objects that reveal themselves or are revealed through the changes that we observe them undergo. How absurd then is the often repeated charge that Aristotle's worldview is static! In fact his whole enterprise was to save the insight of Heraclitus's *panta rei*, everything flows. This he did by showing that true scientific and certain knowledge need not be only of the unchanging, as Parmenides and Plato thought, but can discover the nature of relatively stable yet changeable substance through sensibly observing its properties and analyzing how they change and produce change.

C. QUESTIONS 3 AND 4 ABOUT THE CAUSES OF PROPERTIES

1. *The Nine Categories of Properties of All Changeable Beings*

We have so far seen that, in the order of research (*via inventionis*), we find the properties of a changeable substance, and then from their unifying relationships we come to an intuitive though imperfect grasp of its essence, which we can express in a real definition.²⁵ We have done this for the generic subject of natural science—changeable being—and found that to be a changeable being is essentially and radically to be an actualized potentiality, that is, composed of formed matter, or a composite of matter (potentiality) and form (actuality).

Thus the properties of a substance, concerning which questions 3 and 4 are asked, are effects of the substance and not identical with it, and are therefore said to be “accidents” of the substance, although they are necessary to it, since natural causes act uniformly when not interfered with (*in pluribus*). This term “accident” (Greek *symbebekos*, “happening”; Latin, *accidens*, “what leans on another”), however, is also applied to traits of a substance which are not natural and necessary to it, because they are caused not by the essential substance but either by chance or by free human artifice. For example, it is a natural property of water to freeze at zero degrees centigrade and to boil at one hundred degrees centigrade. But it is a matter of chance that a pond of water happens to be warm because it is in the sun, while the same pond would be colder on a cloudy day.

These are changes that happened to the pond irregularly and by chance.²⁶ If I put water in the refrigerator to cool it, or drop ice into it, this is artificial, and dependent not on its nature nor on mere chance, but on my purposeful free choice. Aristotle and Aquinas admit not only natural events, but also chance and free events.²⁷ Natural science is primarily about natural events that can be expressed in “natural laws.” Hence, in what follows, I will generally use the term “properties” to mean a *proper* accident derived from the essence of a substance, and *mere* accidents to mean those caused by chance or artifice.

Nevertheless, the fact that properties are what are known directly through the senses does not show, as Kant is usually said to have asserted, that the essences of sensible things (the *Dingen an sich*, the things in themselves) are inaccessible to human knowledge.²⁸ In knowing the properties of something already known to exist as a substance (question 1), we know what that substance is, we know its unifying essence as the source of its many properties; but we know this existing essence *confusedly*. The purpose of question 2 is to make a clear distinction between the essence of the substance and its properties through which that essence is known. Thus the blind man whose sight Jesus restored at first saw what looked like “trees walking,” and then he realized they were men (Mk 8:24).

Yet, although we can come to know what water is, namely, H₂O, only through its observable accidents, not everything that we may sense about a particular sample of water is of help in determining its nature. Some of its “accidents,” those that are not properties but *mere* accidents, result, as I have already noted, from purely chance events. For example, the fact that the H₂O in this glass is cold or hot tells a scientist very little about whether it is H₂O or not, since it is merely a matter of chance that it has a particular temperature here and now.

Hence the third and fourth scientific questions are the deductive reversal of the first two questions. Once a real definition of a thing’s essential nature has been attempted through an analysis of its properties by the method just described, the answer to the third question, “What are its properties?” becomes evident. Then, but only then, the fourth question, “Why does it have these properties?” can be answered deductively (*a priori* in the original sense) by demonstrating that these same properties exist in the thing because they are the effects of the essential nature of the substance. For example, once we have defined the essential structure of the radium atom through an analysis of the interrelationship of its properties, we can then demonstrate deductively from that definition why it has these properties. Of course, these answers are subject to further precision, as for example in the case of radium, where it has been

found that, besides its most stable form, it has less stable isotopes and that its nuclear protons and neutrons are constituted from quarks.

The third and fourth scientific questions, therefore, ask, “What is it about the substance that makes it the necessary cause of its different kinds of effects or properties?” Question 4 asks for answers that pertain not to the *via inventionis* from sensibly observed individual substances to universal essences, as do the answers to questions 1 and 2, but to the *via demonstrationis* or *a priori* explanation of effects through their proper causes that is the ultimate aim of any critical discipline.²⁹ This *a priori* or deductive procedure, however, presupposes for its validity not only the empirical answers to questions 1 and 2, but also an empirical answer to question 3, “What are its properties?”

Since, however, we are still at the most generic foundational level of natural science, the properties we wish to explain are those common to all changeable things, and this is what Aristotle meant by his doctrine of “the categories” other than the category of changeable substances itself. His nine categories of accidents, in the broad sense of both mere accidents and properties, are listed and in part described in his short work the *Categories*,³⁰ and are mentioned in the *Topics*, both of which are parts of his great logic, the *Organon*.³¹ In the *Organon*, Aristotle deals with the categories only from a logical point of view, but that they exist as necessary properties of every changeable substance he demonstrates in the *Physics*.

The nine categories other than that of substance (*ousia*), already discussed, are named by univocal terms, and each constitutes a classification of physical properties or mere accidents of a certain type: quantity (*poson*), quality (*pion*), relation (*pros ti*), action (*poiein*), reception (*paschein*, often translated “passion” or “being acted on” or “affection”), place (*pou* or *topos*), time (*pote* or *chronos*), position or orientation (*keisthai* or *thesis*), and possession (*echein*, sometimes translated “state”).³²

Whether this list of nine kinds of properties is exhaustive or

whether it can be reduced to fewer is open to question, but even in the light of modern science it is hard to propose any other categories that are needed to describe physical objects or to reduce them to fewer. Some commentators assert that Aristotle's categorial system merely reflects the Greek language and hence is of little philosophical value. The Neo-scholastic manuals treat it as an important topic of metaphysics, because it is discussed in Aristotle's *Metaphysics*³³ and probably also because Francisco Suarez, S.J., treats it in exhaustive detail in his very influential *Disputationes Metaphysicae*.³⁴

On the other hand, these categories were often treated simply as "modes of predication," whose study is proper to logic.³⁵ In the once well-known Neo-scholastic manual of Joseph Gredt they were treated twice, once as part of material logic and a second time as metaphysical.³⁶ The most famous modern attempt to replace Aristotle's categories was made by Immanuel Kant who derived his own system from the late scholastic logic of the Leibnitzians.³⁷ With Kant, the categories become not a classification of empirical realities but mental pigeonholes into which empirical data is to be fitted to achieve objective consistency.³⁸ But Aristotle treats them primarily as part of natural science, not of metaphysics or logic, and demonstrates empirically that these categories are required for any adequate description of physical phenomena. Thus, as background to questions 3 and 4, the categories of "proper accidents" must first be defined and then demonstrated to belong necessarily as properties to all changeable substances.

2. Why All Changeable Substances Have These Nine Properties

To form a category or classification of the proper accidents, it is necessary first to explain briefly four preliminary logical notions, called by the Scholastics the *antepredicaments* because the categories themselves, as providing the predicates for descriptive

propositions of substances, were called “the predicaments.” These four “logical preliminaries” are (1) the distinction between *simple* and *complex* terms, since only simple terms can strictly be classified; (2) the distinction between terms that are *univocal* (having only one sense) and *equivocal* (having more than one sense), since only terms having a single, precise sense can in a strict sense be classified; (3) the notions of *genus*, *species*, and *difference*, by which a classification is formed; and (4) the difference between *substantial* terms (naming independently existing entities) and *accidental* terms (naming entities that exist only as aspects of substances, whether as properties or mere accidents). As I have explained already, the following demonstrations of the nine properties of all changeable being have to do with accidental terms, but not *mere* accidents, since the latter do not belong to a substance necessarily, but according to chance or artifice. (For an elementary classification of these terms, see appendix 2.) Sophisticated, scientific taxonomies are more complex and controversial.

a. The Intrinsic Properties

1. *Quantity*. That all changeable things are quantified is evident if we consider the most minimal kind of change a substance can have, namely, to be moved. A changeable substance cannot be in motion without having at least two parts, one that has passed a limit and another that has not yet passed that limit. If the substance were not in motion it would be either wholly within that limit or wholly beyond it. Hence every changeable thing is a body, that is, it has quantity defined as the property of having “parts outside each other” that coincide at no more than a common boundary. Thus two parts of a line meet only at the same point, two parts of a plane only at one line, two parts of a solid at one plane.

If the parts have common boundaries then the quantity is *continuous*, but if they have no boundary in common, the quantity is *discrete* and is called a “number.” Discrete quantities are numbers, the units of which do not limit each other and each of which has no parts though they are parts of some larger quantity

—the 3 units (1, 1, 1) of the number 3 are each indivisible parts of that number 3. The limit of a number as it is a whole is not a figure, as it is for continuous quantity, but the last unit counted (which can indifferently be any one of its unit parts), such as the third unit for the number 3, which specifies 3 as not 1 nor 2 nor 4 and so on.

2. *Quality*. Again, since the objects of our senses are qualities (color, temperature, hardness, etc.), we could not observe a changeable quantified substance unless it also possessed at least one sensible quality. There are at least four genera of qualities whose existence can be verified in different ways. One of these genera includes qualities that are either *directly observable in sensation*, such as color, sound, taste, smell, pressure, or temperature, or qualities that are not directly evident to the senses but can be known indirectly to exist through such observations. Examples of the latter are colors in the infrared or ultraviolet portions of the spectrum of light, or the sound vibrations that some animals can hear but we cannot. Another species of quality is shape or figure, which is sensed by touch or sight as *a limit or boundary of a quantity*; for example, the circumference of a circle, or the cubical or spherical shape of a solid.

A third and very important species under quality are the *powers*, whether active or passive, of a body (often called “forces” in modern science) by which it acts on other bodies or is acted upon. For example, electromagnetism in inanimate bodies, or the powers to nourish, grow, and reproduce in living organisms are active powers, whereas the property of metals to be malleable (i.e., pressed into different shapes) or of animals to be aroused to action by external stimuli are passive powers. Such powers are not directly observable, but the actions or receptions that they make possible manifest their existence.

Finally, a fourth species of quality is *conditions* (traditionally but misleadingly called “habits”), such as the stability or instability of chemical substances, the health or disease of animals, or, in the case of animals and humans, conditions of openness to learning new behaviors, or learned abilities to act appropriately or inappropriately. These conditions also are not directly observable

but can be inferred from observing actual performance of a substance in various situations. For example, a physician judges health or sickness from “symptoms” of normal or abnormal behavior or reaction of an organism.

b. Relation and the Relational Properties

3.*Relation.* Once it is seen that a changeable thing must have parts (quantity) and that these parts also have characteristic qualities, it becomes apparent that the parts can be either homogeneous or heterogeneous. Thus, some parts may be *equal* in quantity to others (I have two eyes, two arms, two legs), or *similar* in quality (both my two eyes are brown, my arms are similar in shape, and so are my legs), or they may be unequal or dissimilar. Hence there is the category of relations, subdivided into relations of *equality* and *inequality* and relations of *similarity* and *dissimilarity*.

Yet some philosophers, notably William of Ockham, have maintained that relations are not real, but are merely mind-dependent.³⁹ Certainly there are some merely objective (in the sense of pure mind-dependent) relations, such as those studied in logic (the relation of a predicate of a proposition to its subject) or in language (such as are expressed by terms like “and,” “therefore,” or “if ”). Nevertheless, although it is true that a “relation” existing between two sensible changeable things is not itself an object of the senses, analysis shows that it is no mere figment of the mind.

If it were not possible to be sure that some real things are really equal in quantity or similar in quality, natural science would be impossible since measurements of bodies and classification of substances based on similarities and dissimilarities would become impossible. Hence no scientific, universal assertions could be established. This becomes even more evident when it is realized that the notion of “cause and effect” also involves a relation as is evident from the fact, already mentioned, of the existence of material and formal causes. These three species of real relations, *equality*, *similarity*, and *causality*, are pure relations in that they do not reduce to any special foundation in the things

related. Thus, they are neither of the two related things in themselves, but only a “betweenness” that links the two things.⁴⁰ Some have suggested that only these four categories—substance, quantity, quality, and relation—are necessary for the work of natural science; but this is not the case. The remaining categories do indeed imply the existence of relations,⁴¹ but they are not pure relations but their foundations, what in the bodies causes them to be related.

4 and 5. *Action and Receptivity*. Since change is real and is the effect of a cause, the relation between cause and effect is not the product of our minds but a fact of nature. The reason that Ockham and later David Hume could deny the reality of the relation of cause and effect is because this kind of property is not directly observed by our senses. What we observe is the fact that certain changes take place regularly, but only when the appropriate bodies are in contact with each other either immediately or through a medium. Water does not boil on its own, but only when another body, either immediately or mediately, heats it. Thus, one can heat water by placing it on a hot plate, by placing it in a microwave oven in which electrically generated vibrations are transmitted to it through the medium of the air in the oven, or in many other ways. Whatever the way, direct or mediated contact between bodies is necessary for an action to take place, since, were there no such contact, the receptive body would not be specifically related to the acting body and the effect would have no location.⁴²

Since the principle of causality demands that a changing substance cannot give itself a form it does not yet have, it cannot change itself. Therefore, in order to change, it must receive this actualizing form (the property of reception) from an agent other than itself. This agent, in turn, must be a substance having the property of action, and the substance changed must have the correlative property of reception. Yet if the two bodies did not first have some pure relations to each other that makes them appropriate for one to act on the other and for the other to be receptive, no action or reaction could take place. For example, one body cannot scratch another (e.g., a diamond scratch glass)

unless one is harder (quality) than the other—a reality of dissimilarity.

Thus actual causality presupposes the species of pure relation previously mentioned between an agent with the capability of acting and a receptive body with the correlative capacity, and these provide a foundation for the relation of causality. Thus, we know that a body has an electric charge (a “force” that is classified as a species of power in the category of quality) only when it actually causes another body to move by attracting or repelling it; and we know that a human being has the ability to think logically (a quality in the species of condition or “habit”) only by observing their appropriate behavior when faced with a problem whose solution requires logical thinking.

These correlative categories of action and reception are obviously of the utmost importance in natural science since together they answer a question that is not answered simply by knowing that some substance exists. This is the question whether the universe is a single substance, as Parmenides, Spinoza, and monists have generally maintained, or many relatively independent substances, as Aristotle and Aquinas held. Since nothing can change itself, this principle of causality demands our changing world must be made up of at least two and perhaps many bodies that act on each other and are acted upon.

Hence, to the two *intrinsic* causes, the formal and material, already established by the definition of a changeable substance, Aristotle showed that two *extrinsic* causes are also required to explain natural (regular) changes.⁴³ The first of these is the *efficient* or agent cause that explains change not by something within a body but by the external action of another body upon it, as well as its own reception of this action. The modern use of the term “cause” in natural science generally refers only to such efficient causes. Yet it is evident that efficient causes presuppose material and formal causes since an efficient cause actualizes (gives some form to) some potentiality (matter) of the body on which it acts.

The second of these kinds of extrinsic cause that is correlative to the efficient cause is the *final* cause necessary for any natural

change to occur. This notion of “finality” or “teleology” (Greek *telos*, goal) is commonly rejected in modern science, yet it is a concept absolutely necessary to the explanatory power of scientific thought. Since natural science seeks to establish universal natural laws, it deals primarily not with chance or free events that are unique, but with uniform, regular events that produce relatively stable things or states of affairs. When we speak about “nature,” or say that it is “natural” for massive bodies to attract each other gravitationally, we mean that we observe this to happen regularly, and our explanations seek to establish a regularly observable state of affairs such that a “law of gravitation” (for example) can be scientifically formulated and verified by repeated observations. This is the same as saying that efficient causes produce regular effects, and hence must be *predetermined* by the kind of power or forces that are natural to them to do this regularly.

For example, massive bodies “tend” (are predetermined) to attract each other. That predetermination of efficient causes to produce definite effects resulting in some relatively stable situation is what Aristotle meant by final causality or teleology. This in no way suggests that the efficient cause must have a conscious purpose in producing such a result. The kind of final causality or teleology that involves conscious purpose is, of course, also sometimes natural, but only at the level of animal and human life. An animal can be stimulated by the sight of food or a mate and can move toward that goal with some kind of consciousness of its goal, and thus such action is “teleological.” But only in the case of beings having abstract intelligence can such behavior be called “purposeful” in a strict sense. For this reason, some find it useful to replace the term “teleology” with the term “teleonomy” in order to express accurately the most general notion of so-called “final causality.”⁴⁴

6, 7, and 8. *Place, Position, and Environment.* In order to change, a body must be in contact with another whose efficient causality it receives. Scientists, particularly after Newton proposed his great theory of gravitational attraction to explain the solar system, have often debated whether an efficient cause can

produce an effect at a distance (*actio in distans* is the Latin phrase). In fact suppositious examples of such “action at a distance” have usually been eliminated from disciplines, by the eventual discovery that the action is through a medium. The problem was raised for Newton because he supposed that gravitational attraction is instantaneous, but today it is supposed to travel at the speed of light.⁴⁵

Thus the four fundamental forces of modern physics—gravity, electromagnetism, the weak and strong nuclear forces—are attributed to the exchange of “virtual particles” (mesons) between other kinds of particles (hadrons) and by leptons traveling at the speed of light. Moreover, the idea of a vacuum or void extending between material particles has been replaced by the concept of a “field” or “fields” having qualitative properties such as “curvature.”

As a matter of fact, the notion of action at a distance, taken literally, involves a contradiction. An agent cannot produce its effect except in a specified recipient, since the two are correlative, like form and matter. The only way that we observe such a specification of the agent to a recipient of its action to take place is by the contact (immediate or mediated) of the two bodies. Hence, action at a distance would imply that the agent and recipient are both in contact and not in contact at the same time and in the same respect.

Hence, for any change to take place, there must not only exist two or more bodies, but these must be in immediate or mediated contact; and from this follows three categories that are best discussed together, namely, place, position, and environment. That these three properties are distinct is evident from the fact that a body can be rotated (and thus change its position) while remaining in the same relation of contact with the immediately surrounding bodies, that is, in the same place; furthermore, it can change this immediate relation to other bodies while remaining in the same environment, that is, in the same general region of bodies. For example, a fish can swim about in the pond that is its environment.⁴⁶ It must be noted, however, that modern quantum theory has raised important difficulties about the “nonlocality” of certain actions at the level of the elementary particles that will be

discussed in chapter 9.

9. *Time*. Philosophers have spent many pages over abstruse discussions about what is meant by “time,” and, as I have mentioned earlier, Heidegger decided “Being” was temporality. For Aristotle, however, thinking in natural science terms, this category is not so very mysterious. Since the universe is a system of bodies undergoing change by acting on each other, it is not strange that we observe that some of these changes, and in the simplest case motions, are more regular than others. Consequently, the more regular motions regulate or stabilize the less regular motions. For example, the many complex changes on our earth are kept in order by the cycles of day and night and of the seasons, resulting from the diurnal rotation of the earth and its annual orbital motion.

Time is simply this relation between a less regular motion and a more regular motion, and hence for the universe is ultimately its most regular motion. Currently, this “most regular cosmic motion” is thought to be the rate of the Hubble expansion of “space,” that is, of the radius of the universe observed from any point within it, believed to be about 13 billion light years. Yet formally speaking, for Aristotle,⁴⁷ “time” comes to exist only when some mind takes some such regular motion and uses its preservation in memory to measure other motions or occurrences in its environment.

c. Summary

These ten categories, as I have enumerated them (the nine “accidents,” plus substance or the individual), are necessary to describe any natural phenomenon. For example, an atom of hydrogen cannot be well described without saying that it is a natural unity that can exist independently of other atoms, to wit, that it is a substance with a certain essential structure. This structure consists in a nucleus with a single proton and one orbital electron along with a virtual particle, the meson, carrying the electromagnetic force between them. Moreover it has nine kinds of properties that result from this essential structure. Thus a hydrogen atom has certain specific kinds and numbers of parts with certain dimensions (quantities). These parts have the

capacity to attract or repel other parts, or be attracted or repelled by them. The atom as a whole has the capacity to emit and absorb certain types of radiant energy and to enter into molecular combinations with other atoms (qualities), such as oxygen with hydrogen to form H₂O, water. Not only do its parts form a structure, but they are also in relation with each other as similar or dissimilar (the electron is dissimilar to the proton). These parts are further related as cause and effect (the capacity of particles of unlike electromagnetic charge to attract each other). Finally, the atom as a relatively stable substance has relations of similarity, dissimilarity, equality, inequality, and causality to other atoms and to molecules.

Besides these pure relations, the atom also has relative qualitative properties, such as result from its capacities to act or to receive actions (action and reception). Such actions and receptions, moreover, demand that an atom be in contact with other bodies that it acts on or act on it (place). The orientation (position) of the atom and its environment may also be of considerable scientific interest in understanding its actions and receptions. Thus we can speak of the “natural” place of hydrogen, since it could not exist in the first phases of the Big Bang, nor come into existence in interstellar space until some years later. In certain kinds of high-energy situations hydrogen burns, that is, combines with oxygen to form water. Hence water now exists as a relatively stable entity only within a certain environment in the order of the now existing universe. Thus one question for scientists who study the planets was whether H₂O exists on Mars.⁴⁸

In addition to the ante-predicamental terms and the categorical terms, natural science also requires the so-called *post-predicamental* terms, namely: opposite, prior, “together with,” motion or change, and “to have”—to have a property (*oppositio, prior, simul, motus, habere*). These are terms that apply to more than one category of being. Of these, motion (or, more generally, change) applies to all. Finally, the terms “one and many,” “true and false,” and “good and bad,” traditionally called the “transcendental terms” because of their extreme generality, must

also be used in natural science.

The universe is made of many simple and complex substances that form some sort of a unified system. Natural science attempts to discover what these substances are really like and to formulate this in true propositions, winnowing out false ones. Finally, the notion of final causality or “teleonomy,” on which the uniformity and relative stability of the universe and the possibility of finding natural laws is based, entails the notion of what is good and bad about it, not in a moral sense, but in the sense of being constructive of an orderly universe of which we can have scientific knowledge, or destructive, leading to a meaningless chaos.

Thus natural science, embracing all the topics covered today in physics, chemistry, biology, and psychology and related fields (the natural and the social sciences generally), has to be verified by sense observations and analysis of these observations in terms of their four causes. This initial process of each stage of natural science has to answer the four scientific questions for the total, generic subject of natural science, namely, all changeable beings. This provides the foundation for asking the same questions concerning each subgenus of changeable things, down to the species level. Of course, the more precise our knowledge, the more difficult it is to arrive at conclusions that are certain; and much of our specific knowledge at any point in the history of scientific advance remains only more or less probable.

D. ARE THE ARISTOTELIAN FOUNDATIONS OF NATURAL SCIENCE OBSOLETE?

1. The Natural Senses vs. Instruments and Experiments

I have already defended the empirical character of Aristotle’s analysis of the essence of changeable being in terms of matter and form, pure potentiality and its various actualizations. I have

also shown how he demonstrates that all changeable being must have the nine categories of properties. In doing this, I have shown that these facts can be explained in terms of Aristotle's four causes. The obvious response of the reader must be: "Is this consistent with the findings of modern science or relevant to them?"

To answer this question, two observations are necessary. First, it is of the utmost importance to note that, in natural science, the foundations of the discipline must be considered prior to the application of *artificial* techniques of observation. It is often supposed that science has proved that the natural observations made by our unaided senses have been shown to be in many cases false. For example, to our senses the earth does not seem to move; yet science has proved that it is rotating on its axis and also orbiting the sun. Again, what seems to us to be a solid continuous object, like a static dinner table, has been shown to be an empty space sparsely populated by molecules, or atoms, which also are largely empty space traversed by elementary particles in constant motion.

On further examination, however, it is evident that such examples do not prove that our senses are in *positive* error. All that they show is that while our senses correctly inform us about the broader aspects of reality, they cannot directly fill in all the details. The "errors" of normal sense knowledge (if they can even be called that) are purely *negative*; they are *insufficiently* sensitive to show reality in all its details. But what they do show us is really there. Relative to us on the surface of the earth, the earth is stationary and the sun moves. The tabletop does resist our hand and uphold most anything set on it.

Yet, as we focus the lens of telescope or microscope, the more precise visual resolution provided by these instruments shows us more and more details in what we first saw correctly but only, as it were, in outline. To arrive at finer details than our naked senses can give us, the use of instruments and controlled experimentation becomes necessary. Thus, the difference between ancient Greek and medieval science, compared to modern science, lies not so much in their epistemology as in the modern invention of observational and measuring tools and in

techniques of controlled experimentation. My eyes can provide only an incomplete picture of reality, and the use of instruments may reveal much more.⁴⁹ Sir James Jeans made the famous assertion that all modern scientific knowledge “reduces to pointer-readings on a scale.”⁵⁰

Hence natural science would be impossible without human observers able to read the scale correctly and check each other’s readings. Thus, if what little I do see could be proved to be in *positive* error, then no instruments could ever help me arrive at the truth, not even at probable truth. If my senses deceive me in reading my instruments, these instruments are useless.⁵¹ The obstinate Aristotelians who would not look through Galileo’s telescope had a right to be suspicious of what information it might give about distant objects until it had been tested by looking at nearer objects already well known to them by their unaided eyes, but they had no right to preserve their obstinacy by refusing to make such tests.

This priority of ordinary experience over artificial observation (of cenoscopic over ideoscopic knowledge, as it were) applies also to observations made by experimentally isolating objects and by comparing these observations with controls. Experiments have an artificial character and cannot be evaluated without first showing they are consistent with naturally observed facts. Thus we cannot be sure that the behavior of a caged monkey is the same as its behavior in its normal habitat until we can compare its behaviors in both situations. Hence, epistemologically, all of natural science depends on basic natural sense experiences, and, to be valid, must be consistent with them, even though ideoscopic knowledge carries us far beyond what could ever be established or even guessed at by purely cenoscopic means. Thus if Aristotle’s analysis of what we know about changeable things based on natural observation is accurate, it cannot be refuted by modern techniques of observation. Rather, the data obtained by these techniques must be shown to be consistent with this foundational analysis and interpreted in its light in order to become practical.

2. Scientific Universality and Individuation

Even in the Middle Ages some difficulties were raised about Aristotle's dictum that "science is of the universal," since he also held that nothing exists but individual substances with their properties and other accidents. This was called "the problem of individuation," and led the Franciscan John Duns Scotus to propose a theory of a special principle of individual difference or *haecceitas* (thisness). Another Franciscan, William of Ockham, carried this emphasis on individuality to a still more radical Nominalism or Conceptualism that denied a common essence to members of a species. This problem will be discussed more fully in chapter 8. Yet something must be said about it here, because critics of Aquinas often accuse him of neglecting individuality; and in modern thought this is a very serious charge.

Following certain indications in Aquinas's work,⁵² Thomists argue that, if substances were immaterial, each individual would be specifically different from others by reason of their different forms. In the case of material things, however, it is evident that many things may have a common essence and yet be individually different, that is, each species has many members. For example, we are all human beings, yet each is quite individualized in his or her humanity. These are observed facts, and the problem is to account for them theoretically. Once it has been recognized that changeable substances are composed of matter and form, it is obvious that the common essence that unites a species is somehow a consequence of form, while the individuation is a consequence of their different matters. We see this in Xerox copies that all contain the same information on different sheets of paper marked with different ink.

Yet simply to say that individuation is due to matter is not an adequate explanation, since prime matter cannot exist of itself and has no features by which one portion of matter could be distinguished from another. It has been shown, however, that the first property of any changeable substance is its *quantity*, which conditions its matter, just as the property of quality conditions its form. Hence quantity gives to a substance the distinct parts that

make it a “body.” Thus there can be many distinct bodies having the same common form.

If all substances pertaining to a single species also had portions of matter that did not differ in any significant way, as, for example, two sheets of white paper with the same Xeroxed text, or two identical twins or artificially cloned sheep, this answer to the problem of individuation would be sufficient. Yet experience shows us that in nature members of a species are much more different than copies or clones. Aquinas argues that God would never bother to create exact duplicates, since it would add nothing meaningful to the beautiful order of creation.⁵³ As we go from the simpler to the more complex species of things, individual differences increase and between persons are very great. Finally, while Scotus held that there can be many angels in a single species,⁵⁴ Aquinas argued that each angel is a species unto itself, and that in the hierarchy of angels in the ascending order this difference between the essence of one angel and the next higher increases.⁵⁵

Among material things, therefore, the individuals within a species, because they have distinct matter that makes them capable of change, receive their properties from their forms in different ways, and furthermore have these properties modified by chance. The most striking example is the difference of gender in members of the same species. While sexual reproduction is a property of many organisms, modern genetics has shown that it is purely a matter of chance that a given individual is male or female.⁵⁶ Furthermore, by its discovery of mutations, genetics has been able to explain how chance conditions every individual, giving us each a unique set of genes, although we all also have the same basic genes that make us members of the human species.

Before this genetic information was available, Thomists pondered the question of “temperament,” that is, certain types of body and physiology that resulted in different psychological tendencies, such as the melancholic, the choleric, the mercurial, and the phlegmatic type. The psychoanalyst Karl Gustav Jung (1875–1971) also developed a theory of extroversion and

introversion, and then a four-fold theory of personality.⁵⁷ Since matter and form are correlative causes, and thus proportionate to each other, this means that individual differences that result from bodily dispositions are also reflected in the form, without, however, destroying the essential commonness of the specific nature shared by all.

Thus human beings are individualized not only by size, complexion, and so on, but by gender, metabolism, intelligence, and other attributes, both as regards body and soul. Such differences can be called “modal” since they do not add any difference to the human essence but modify it in relation to bodily differences. Thus the problem of individuation can itself be given a scientific and therefore universal character by seeking universal explanations of how material substances exist and have an essence or nature from which properties are derived.

3. The Scientific Revolution and the Foundations of Natural Science

A third difficulty about the relevance of the Aristotelian foundations is the interpretation of the history of science that focuses on the “scientific revolution” waged by Copernicus and Galileo as the true origin of modern science.⁵⁸ The overthrow of Aristotle’s geocentric astronomy in its Ptolemaic version, as sketched in chapter 1, was indeed revolutionary, but like most revolutions it weakened some of the very foundations on which it had to build.

The great scientists who in the sixteenth and seventeenth century discredited Aristotle did not disprove his foundational analyses or establish better ones. Instead, they gave exaggerated certitude to new mathematical models and interpreted them physically according to mechanistic principles derived from the pre-Socratic Democritus. Later, when Hume’s criticisms had seemingly undermined the principle of causality, Kant proposed a new foundation for natural science reflecting his epistemological idealism. In current science, quantum theory has

killed mechanism and inclines to idealism, yet few scientists are idealists. Thus an uncomfortable and confused mixture of idealism and realism prevails, so that the defense of quantum theory is left to a kind of technological pragmatism.

A leading physicist Brian Greene can write,

Nevertheless, the debate about what quantum mechanics really means continues unabated. Everyone agrees on how to use the equations of quantum theory to make accurate predictions. But there is no consensus on what it really means to have probability waves, nor on how a particle “chooses” which of its many possible futures to follow, nor even on whether it really does choose or instead splits off like a branching tributary to live out all possible futures in an ever-expanding arena of parallel universes.⁵⁹

Thus physicists, in their efforts to make physical sense of their remarkably successful mathematical models, are forced—at least in trying to explain these theories to the educated public—to indulge in paradoxes. They talk of “empty space” that is finely textured by quantum fluctuations, and of “time” as if it were a simultaneously existing spatial dimension. They talk also of causal relations between entities that no longer have contacts with each other, not even through a medium. Again, they discourse on an infinity of universes bubbling out of our own at every moment and our own universe beginning with a Big Bang that “just happened.” They even declare that it is their own observation of the world that makes it what it is.⁶⁰ No doubt our universe has its mysteries, but if we cling to the principle of non-contradiction, we cannot be satisfied with these scientific oxymorons.

These paradoxes do not mean that modern science is false and absurd. On the other hand, neither has modern science shown that the foundations of natural science as Aristotle formulated them (and on which modern science was originally built) are false. The truth of these foundations, based on an analysis of natural experience, is independent both of Aristotle’s

hypothesis of a steady-state, geocentric universe and of the standard theory of the universe based on quantum physics. Their validity depends only on such arguments as I have outlined, arguments based on the evidence provided by our natural senses—arguments the earliest outlines of which were drawn by Aristotle and followed by Aquinas.

Natural science, like every critical human discipline, has to have a foundational part that establishes the basic concepts and principles of the discipline as a whole. Although errors or confusions in that foundational part can wreak havoc in the more specific parts of the discipline, the reverse need not be true. In fact, errors in mathematical proofs can be discovered only by reference to foundational definitions, postulates, and axioms. Of course, in the actual state of knowledge in any discipline there may be controversies and errors, even with regard to foundational issues. These are discovered by reference to logical inconsistency among its principles (paradoxes) or because these principles are not adequately grounded on insights developed out of sense experience.

Aristotle's errors in the more detailed parts of his account of nature warn us (just as do the errors of Newton and the controversies over quantum physics) that we always need to reexamine the *Physics* critically to see if present errors result from still more basic errors in that foundational work.⁶¹ Yet, if we discover errors that originated only at a more specific level than the foundational principles, or even if we discover errors that demand a refinement of some foundational principle, these errors cannot of themselves invalidate the Aristotelian foundations of natural science, which are nothing more than the reliability of the senses systematically understood as providing the constant contact between constructions of the mind and the mind-independent dimension of the surrounding physical environment that we call the material universe.

Because natural science is epistemologically prior to the other critical disciplines, it constitutes a model for all the others. Yet this epistemological priority does not sufficiently qualify natural science to serve as the architectonic, interdisciplinary, and cross-cultural discipline that human wisdom must be. This is the case

because it is by no means evident that the scope of natural science, namely, changeable being, extends to the whole range of reality. We can only say, as Thomas Aquinas often quotes Aristotle as saying, "If nothing but sensible, material things existed, then natural science would be First Philosophy."⁶²

Although many scientists seem quite convinced that nothing but sensible material things exist, they have no way of proving that this is the case, nor does their scientific enterprise in any way depend on such an assumption. While they are right to be cautious about explanations of phenomena through nonmaterial causes, they cannot reasonably assert *a priori* that all phenomena can be adequately explained by material causes alone. Indeed, the very fact that the scientist has created science, which transcends even as it studies and controls nature, suggests that perhaps intelligence is not a property of matter. Therefore, it is to that question, the culminating question for the foundations of natural science, that the next chapter will turn.

The Culminating Foundational Theorem of Natural Science

A. THE PRIME MOVERS OF SYSTEMS

1. All Systems of Interacting Bodies Have Prime Movers

The previous chapters have provided an analytic description, derived chiefly from Aristotle, of changeable substances, from which it should be evident that changes take place not in isolated substances but in interacting systems of substances. Each such system is a causal series of bodies activating other bodies in which any observed effect has to be explained as the result not only of immediate causes but also of that whole system of causes. For example, the life and behavior of an animal ultimately depends on a series of agents through which it derives its energy. This series ends only in the sun as the chief source of energy on our planet. If the sun were to cease to shine, our earth would not sustain life. In current science, there are at least four such causal series ending in the four or five fundamental forces that are taken simply as “natural.”

These fundamental forces (or rather the substances of which they are natural properties) are “prime movers,” a notion familiar

from mechanics. No machine can operate without an engine or other energy source, which is why the dream of inventing a “perpetual motion machine” that moves itself circularly forever is recognized as absurd. Hence such mechanical prime movers are only *relatively* prime, since the spring of a clock must be wound up, the fuel in an engine must burn, and so forth. Therefore the question of the prime mover of the universe as a total system is unavoidable.

For Aristotle, whose hypothetical universe was a steady-state, eternal system that appeared to be a perpetual motion machine, this problem was especially urgent. Today, on the basis of the alternative hypothesis that the universe had a beginning with the Big Bang, the same question nevertheless again presents itself. This Bang is supposed to have been the first event in the vast causal chain that has produced our universe, and hence also its prime mover, the ultimate source of all its energy. “What then caused the Big Bang?”¹ To say either that it “just happened” or “it caused itself” would not be deemed a reasonable answer to any other scientific question.

Because the question of whether the universe had a beginning is presupposed to all more specific questions in natural science, Aristotle considered it at length in the last book of his foundational treatise of the whole of natural science, the *Physics*.² His treatment cannot be understood, as some have tried to argue, as a metaphysical insertion—an almost ludicrous contention. The whole structure of the *Physics* culminates in book VIII, and provides the terms and premises that book employs. Aristotle has shown in the previous books of the *Physics* that, according to the principle of causality and the analysis of changeable being into matter and form, no material substance can move itself, since each such substance is only potentially in act and thus cannot give what it does not have, namely, actual motion.

Therefore Aristotle, in *Physics* VIII, needs to confront the question, “What causes the whole universe to be in motion, as it manifestly is?” In Aristotle’s hypothesis that the universe has always existed, this material prime mover is the outer sphere of the universe that, by its continual and eternal motion, keeps the

whole universe in perpetual motion. In recent times, before the Big Bang hypothesis became current, the steady-state hypothesis of Hoyle and Bondi had won considerable favor. This theory proposed that the prime mover intrinsic to the universe was the constant “creation” of a small amount of new matter and energy.³ In the current Big Bang hypothesis, this prime mover would be the original, immensely dense, and very small mass of matter (the “singularity”) that began to expand at the first moment of the cosmos’s existence.⁴ What Aristotle recognized and faced squarely was that no matter what hypothesis one might accept about this original material prime mover, it could not itself act on anything without being itself activated by some other prime and truly ultimate mover. This mover, not relatively, but ultimately prime, must be able to act without being activated by another; it must be an *unmoved mover* in the absolute sense. It must, therefore, be in act by its very nature and be a cause free of the potentiality of matter. Aristotle’s solution in *Physics* VIII to this inescapable problem can be formulated in a theorem that is not deductive (*a priori*, from cause to effect), but develops from an empirically observed effect to the existence of its sufficient cause (*a posteriori*) by a demonstration *quia* (of the fact), a form of argument typical also of modern science.

2. Proof that a First Immaterial Cause Exists

The actual demonstration in natural philosophy on which, as we saw in the last chapter, Aquinas relied to ground metaphysics, is that given by Aristotle in *Physics* VIII, an argument that Aquinas explains and defends in his commentary on that work. He also makes it his own in the *Summa contra Gentiles*.⁵ In all these formulations he treats of this question in a manner proper to natural philosophy and directly based on natural science, namely, by arguing from motion as sensibly known to us to the existence of a First Cause that cannot be material.⁶ If one denies the certitude of the principle of causality as Aquinas formulates it by denying that nothing can move itself, as Duns Scotus is said to

have done,⁷ then the concept of real potency is replaced by degrees of act. In such a Platonizing system, as for Parmenides, change becomes an illusion, since Being can never be other than what it actually is.

Though according to Aquinas natural science demonstrates the existence of nonmaterial being, it can know nothing of the *nature* or *essence* of an unmoved mover except by inference from the very effects that demonstrate its existence. Of course, such a situation is not exceptional in natural science, since we often know the existence of certain natural entities by their observable effects. Thus the existence of the planet Neptune, even before it was actually observed, was discovered by its effects on the motion of the planet Uranus, and similarly the existence of “black holes” can be known only through their effects.

Therefore we can only conclude *positively* that such an unchanging First Cause exists and is the cause of the observed effect of motion. *Negatively*, however, we can conclude three things. First, if our universe is a “uni-verse,” there cannot be many such substances unless they are subordinated in their existence to one, prime cause of their existence and changes. Second, this prime cause of the effects known to us by our senses is not itself caused. Third, it cannot be a material substance. To some⁸ this third point seems doubtful, because they think that probably Aristotle arrived only at what he believed to be the outermost sphere of the universe as its prime mover (that always exists in motion and thus requires no other cause than its own nature). But, as regards Aristotle’s hypothesis that the universe had no beginning, Aquinas says,

If the world and motion began *de novo* it is obvious that it is necessary to admit some cause which *de novo* produced the world and motion, since all that is produced *de novo* must take its origin from an innovator, since nothing educes itself from potency to act or from non-existence to existence.⁹

Of the contrary hypothesis, Aquinas says,

[Some object that these demonstrations] proceed on the hypothesis of the eternity of motion, that Catholics consider false. To this it should be answered that the most efficacious way of proving that God exists is on the hypothesis of the eternity of the world. If this hypothesis is granted, it is harder to see that God exists.¹⁰

Aquinas even commends Aristotle for preferring the hypothesis of the eternity of the world to its having a beginning, because it seems proper for natural science to proceed on the assumption that the universe is as self-sufficient as possible.¹¹ Yet even on the hypothesis that the universe has always existed, an immaterial unmoved mover is required to account for the infinitely continued motion in the world.

Some have also argued that Aristotle's proof of the existence of a Prime Mover in *Physics* VIII only demonstrates the existence of the outermost celestial sphere, or that it only proves a God who is the cause of the motion of the celestial spheres but not of their existence as substances. Certainly this was not Aquinas's interpretation of Aristotle since he says explicitly: "The opinion of those who claimed that Aristotle thought that God is not the cause of the substance of the heavens, but only of their motion, is false."¹² Since, however, the context of this statement is in reference to the metaphysical treatment of the being of the celestial spheres, it might not seem to apply to what natural science says of these hypothetical spheres. Yet in his commentary on Aristotle's *Physics* VIII,¹³ Aquinas takes pains to refute Averroes, who had interpreted Aristotle as maintaining that the celestial spheres are pure forms that exist with absolute necessity, that is, without any potentiality for nonbeing. Hence Aquinas explicitly denies that Aristotle's proof concludes only to the motion of an outermost celestial sphere:

In the foregoing arguments [of certain commentators] it is supposed that the first moved thing, namely the celestial body, is moved by itself. From which it follows that it is ensouled; which by many is not conceded. Yet to this it must be said that

if the first mover is not said to be self-moved, it is necessary that it should be moved immediately by what is entirely non-moving. Hence Aristotle draws this conclusion with a distinction, namely, that it is necessary *either* to come immediately to a prime unmoved mover, *or* to a [relative] self-mover, from which again one comes to a prime unmoved, separate, mover.¹⁴

Thus in Aristotle's hypothesis of the eternal motion of the celestial spheres, and hence of their eternal existence, these spheres would have a factually "necessary" existence; yet that existence would nevertheless not be absolute but dependent on the First Immaterial Cause. There is no contradiction, Aquinas says, in something being at once necessary in a relative sense, yet dependent on a higher cause that gives it necessity.¹⁵ Thus since the celestial spheres are potential not only as regards motion but also as regards their existence, their eternal existence must be received from the Unmoved Mover and thus be distinct from their essence. For Aquinas, this reading of Aristotle is necessary in order to make valid the demonstration of the existence of a first immaterial cause given in *Physics* VIII. Since this work pertains to *physica*, that is, natural science, this demonstration cannot be metaphysical, but is presupposed to metaphysics, that is, First Philosophy.

Yet, even granted the validity of this physical demonstration of the existence of the unmoved mover as the cause of the motion in the universe, some still doubt that this unmoved mover is the Creator, that is, the cause of the very existence of the universe. This doubt is plausible, I believe, only if one neglects to understand this demonstration in the context of the whole development of natural science in Aristotle's *Physics* (from which Aquinas draws his argument) and only if one forbids Aquinas to carry this argument to its logical conclusion beyond the point that Aristotle developed its consequences in his surviving texts.

For Aristotle, natural science demonstrates that motion (or change in general) is the natural and proper act of existing, changeable, material substances, and hence manifests the

nature or essence of these existents, that is, that they are essentially changeable. The reason for this is that they are composed of matter (potency) and form (act). Basing himself on this conclusion of Aristotle, Aquinas then shows that existent substances composed of matter and form must also be composed of essence and existence. Hence no body can give itself *esse*, the act of “to be,” any more than it can give form to its matter, that is, move itself. Aquinas’s reasoning for this further conclusion is that matter receives its existence from its correlative but cannot do so unless the form is not merely possible but actual. Forms of material things, however, do not have existence of themselves, since they exist only as an actualization of a matter.

Aquinas considers the possibility that a form might be able to exist without matter, as he really believes to be the case with the angels. Even such a pure form, however, unless its very essence is to exist, would have to receive its existence from the absolutely Unmoved Mover. *A fortiori* this is the case for the human soul, which naturally requires a body, and for all material things composed of matter and form. That ordinary substances composed of matter and form do not exist by their very nature is evident in our experience since we observe that all such substances come into existence and pass away. Even if we consider the hypothesis that there are some material substances (Aristotle’s celestial spheres) composed of an extraordinary kind of matter that exists eternally in motion, yet, if they have a matter-form composition, their existence cannot be self-explanatory but requires another agent. If such an agent is material, it cannot produce eternal motion; and, if immaterial, cannot be a finite intelligence but must be the absolutely Unmoved Mover. No step in this argument requires a metaphysical notion of Being as *ens commune*, but only the analysis of *ens mobile* proper to natural science. If the argument were proper to metaphysics, it would be circular, since metaphysics presupposes the argument’s conclusion, namely, that immaterial being exists.

This argument from effects to cause for the existence of a First Cause of the universe and of its nonmateriality can be formulated as follows.

1. With our natural senses we observe changeable substances A, B, C . . . in the process of change, and first of all in motion. Thus, by rational analysis, we know A exists, and we can define it with a real and essential definition by finding a certain unity among its observed categorial properties.
2. Since, by the principle of causality (that nothing that is moved moves itself), A's observed motion must be caused either by some other material or nonmaterial agent B as its efficient cause.
3. The efficient action of B is either essentially identical with B, in which case it is Z, the prime unmoved mover of the motion, or it is only some mover C whose action also depends on the action of Z.
4. The number of movers that, like C, act to move others only when they are themselves moved, cannot be infinite, since in an infinite series of such moved movers there would be no prime mover Z, and hence none of the intermediate agents would be in act but only in potency to act, and hence not actually causing motion.
5. Therefore, Z, a prime mover that requires no other mover to act exists, but it cannot be a material mover, since no material thing either moves itself or is in motion without being moved by another.

In this demonstration no term or principle is used that has not already been directly observed by the senses, or that is not evident directly from an intellectual analysis of the data of the senses, or demonstrated logically from premises formulated on the basis of such data. Thus, this theorem pertains to the foundational generic subject of natural science, not properly to any other science. Hence it is presupposed to all the more specific conclusions of natural science, that is, to all of modern science that refers to the fundamental forces of gravity, electromagnetism, the weak and strong nuclear forces, and perhaps¹⁶ a counter gravitational force called "dark energy" that explains cosmic expansion.

Each of these fundamental forces is treated in modern science as a natural property of certain kinds of bodies to which all natural

phenomena are thought to be ultimately reducible. Scientists today in all their explanatory theories recognize such fundamental natural, material forces as ultimate causes in the physical order. Even if other fundamental forces pertaining to as yet undiscovered particles or other material entities, such as “dark matter,” are eventually found by scientific research, the argument will still hold. This will be true even if, as Aristotle hypothesized of the celestial bodies, these ultimate properties pertain to bodies composed of a different type of matter than is now recognized by science. All that is supposed is that these bodies are subject to some type of change that at least involves quantitative properties and motion, that is, that they fall within the scope of natural science.¹⁷

In the case of the relatively prime material movers, two possibilities present themselves. (1) They may be only potentially in motion and, since they are prime in the order of physical, material movers therefore require to be set in motion by a more ultimate mover or efficient cause that is immaterial. Or (2) their efficiency is “natural” to them, so that when any obstacle to their efficiency is removed their effects immediately follow, as, for example, modern science holds for gravity and the other three fundamental forces. The obstacle to their action can be either (a) some counterforce holding them back or (b) the lack of a suitable receptor body on which they can act. The first possibility is the simpler, and is accepted by some authors, but Aristotle takes the alternative possibility as the more difficult for what he is trying to prove. Hence he proceeds to show that, even on that assumption, the argument still holds, because in that case the body having a force that is naturally in act when not impeded still has that act as a property. But when bodies are produced by other bodies, they receive their properties along with their substantial nature or essence. This causal chain of production again requires an immaterial prime mover, because changeable beings do not exist necessarily but are produced and perish.

Such natural forces always in act when not impeded are active qualities that are properties of various kinds of bodies. The properties of a substance necessarily belong to it, not because the substance efficiently produces them, but simply because they

are necessitated by the form of the substance, that is, they depend on the substance by formal, not efficient, causality. Hence Aquinas (borrowing a term from Neoplatonism) says that these properties “emanate” from the substance without efficient action.¹⁸ Thus, in Aristotle’s own chemistry, heavy bodies, when not supported by another body, naturally move toward the center of the earth without requiring any efficient cause of that motion. Yet they could not do so unless the immaterial First Cause efficiently produced them as a certain species of body having that property of motion toward the center of the universe.

Similarly in modern science it is taken for granted that bodies that naturally possess one of the four fundamental forces will exert that force whenever not hindered. Massive bodies will attract each other gravitationally, electrically charged bodies will attract those oppositely charged and repulse those of the same charge, and so on. No further efficient cause is sought for these activities, though it is also recognized that bodies would not have these properties unless they were themselves produced. For example, scientists inquire how massive and charged particles come to exist with these properties. It may turn out, of course, that what were thought to be bodies naturally possessed of fundamental forces actually were produced by other physical material forces, and hence were not strictly fundamental and “natural.” Nevertheless, such a regress cannot be infinite. Some forces that are truly fundamental and simply “natural” must exist in any hypothesis.

For later Aristotelians the great puzzle was how to explain *projectile* motion. A ball obviously has no natural tendency to fly through the air, yet when struck with a bat moves until stopped. Aristotle himself tried to reconcile this obvious fact with the principle that “nothing moves itself ” by supposing that when the ball is struck some force is communicated to the medium through which it moves, which then keeps it moving after it has left the bat that put it in motion. This seems to us absurd, but we should recall that today science still relies on the notion of “field,” that is, a medium, to explain the motion of bodies through that field. The Aristotelian commentators, beginning with John Philoponus (fl. sixth century CE), preferred (rightly, in my opinion) to say that an

impetus or force was imparted to the ball by the stroke of the bat. While they considered gravity to be a fundamental, natural force, a property of certain bodies, the *impetus* was a secondary type of force or active quality, accidental (preternatural) to the body that received it.¹⁹

In this way, Newton's later laws of motion could be accounted for, since the *impetus* would keep the ball moving until stopped by another force. Moreover, since it was not strictly natural but secondary, it need not be predetermined to some specific result (final causality, teleonomy). To this explanation we can add that such an *impetus* is, as it were, "second nature" to the moving ball. Hence the *impetus* is not an efficient cause but a *quasi-property*, which can be eliminated from the body in a way that its true properties cannot. A heavy body remains heavy, even when another body stops its motion; but a ball will not start moving through the air without again being struck. Thus, as long as any force, whether strictly natural or imposed, can be traced back to fundamental physical, material forces (active qualities) that are natural, the argument for an immaterial Prime Mover still follows. As previously noted,²⁰ Newton realized this problem when he concluded that the gravitational force on which his whole system was built required that God as Prime Mover will its action.

Current science simply ignores the question or refers to Kant's claim to have refuted the classical "cosmological argument" for God's existence. Kant's refutation holds, however, only if his idealist epistemology is accepted. He argued²¹ that only three types of proof for the existence of God are possible: (a) a *physico-theological* proof, which would argue from empirical effects to the First Cause; (b) a *cosmological* proof, which argues from an experience that is purely indeterminate (being); or finally (c) an *ontological* proof, which argues *a priori* from the concept of God. Aquinas rejects the ontological proof because it is *a priori*. He also rejects the cosmological proof as Kant understands it. But he supports the physico-theological proof, because, with Aristotle, Aquinas holds that necessary truths can be derived from sense experience, and it is this Kant (along with Platonic tradition) denies.

Kant's refutation of the cosmological proof in his sense, which Aquinas also rejects, raises difficulties for the Existential Thomists, for it bears directly on their attempt to argue from a claimed metaphysical notion of *esse* supposed to be knowable without any correlation with finite essences, as we saw in chapter 2. These same difficulties have no bearing whatever on Aquinas's own argument from our experience of motion and of *ens mobile* to a First Cause of motion. Hence neither do they bear on the judgment of *esse* taken to refer indeterminately to immaterial as well as material being from which the notion of *ens commune* (being as a notion common to material and immaterial realities) results, and which judgment alone (for Aquinas) gives assurance that metaphysics indeed has a subject matter broader than the material being of which physics treats.

Furthermore, modern scientists realize that if more than one such fundamental force exists, these autonomous forces would not produce the universe as a unified system unless these forces are somehow unified. That is why a principal task of current physics is the development of a "Grand Unified Theory" (GUT),²² which will show that all four fundamental forces were originally one single force at the moment of the Big Bang and were only gradually differentiated. Thus it is supposed that this law of the unification of the forces of matter and energy is a property of material substance. Since no material thing can change itself, the question therefore remains, "What accounts for this original force existing in act?" Natural science cannot escape this question and, within the limits of its own proper scope and method, must try to answer it by the foundational principles of natural science itself, as Aristotle tried to do.

The proof from *motion* of the existence of a first immaterial cause of all material changes given in *Physics* VIII, as we noted earlier in this chapter,²³ was adopted by St. Thomas Aquinas as the first and "most evident" of his famous "five ways" to demonstrate the existence of a First Cause.²⁴ The second way from *efficient agency* and the third from *necessity* are variations on this first way. Once we understand the first way based on the observed effect that is motion, the second way argues from the

agents or moved movers that cause the motion. Furthermore, if we consider the efficient causality of these agents, we see that the action of the first immaterial cause is *necessary* if they are to act, since the fact that they as moved movers are in act is merely *contingent*; and this is the third way. Thus the first three of the five ways are based on three effects, all related to efficient causality: (1) the effect of *motion*, (2) the effect of *agency* of the moved movers, and (3) the *necessity* of the first cause for these contingent agents to act and produce the observed motion.

The first way is the most evident because through observing a motion we recognize its agent, and through seeing that this agent cannot act without being activated by another agent we perceive the contingency of its action and hence the existence of a first uncaused (necessary) cause.²⁵ The other two of the five ways Aquinas uses to prove the existence of what “everyone understands to be ‘God,’ ”²⁶ namely, those through formal and final causality, will be discussed as pertaining more properly not to natural science but to First Philosophy. Whether this First Cause is really the “God” of the monotheistic religions is a question to be discussed later.

B. THE SPECIAL CASE OF THE HUMAN SOUL

Aristotle, in book III of the *De Anima*, and Aquinas in his commentary on that work, but also in many other places,²⁷ apply the principle used in *Physics* VIII in the demonstration of a First Immaterial Cause to the problem of the human soul. Aristotle’s *De Anima*, like his *Physics* VIII, is often treated as a “metaphysical” work. But in fact, for him, it treats of an integral part of natural science and is continuous with his study of comparative zoology. He considers animal psychology and especially human psychology to be, after the study of the total cosmos, the highest and most synthetic part of natural science. Humans are interested

in the whole universe, but we are especially interested in ourselves and how we fit—not always very comfortably—into that universe.

Unlike Descartes, who was later to claim that animals are automatons without cognition or feelings,²⁸ Aristotle held that animal sense cognition is true, conscious cognition. He argued that a form can be received in matter in two ways. First, it can be received as the form of a *correlative* matter so as to constitute a substance or, as in the case of an organ in a living substance, to constitute a part of a substance (a subject or some aspect of subjectivity, let us say). Second, a form can be received as a *modification of some quality* (especially an active quality) that belongs to a substance as one of its properties, without constituting any new substance or part of a substance, but rather giving rise to a relation of the cognizing subject to some object beyond the subjectivity of the one cognizing. Any of the powers of sensation (touch, sight, hearing, etc.) is such an active quality and as such is the *form* of a sense organ. When the form of an object is received in this power of sensation, it is received as a form of the organ (for example, skin as the organ of touch is compressed by the tangible object). But it is also received as the *form of the form* of the organ, so that the sense power is modified and specified to produce a specific cognitive act relating the organism to another as known. I feel something touching me in a definite way. Thus cognition (consciousness or awareness of an object) is the acquisition of the form of an object as terminating a cognitive relation, not primarily as the knower's own form (the physical change in the organ), but precisely as the *form of the other*, that is, the object.

For example, when I touch a piece of ice, if the ice did not cool my hand and my hand simultaneously warm the ice, I would feel nothing. The ice is the cause of the specification of my sensation so that what I sense is something cold rather than hot. My resultant act of sensation is not as such an act of the object (it is heated by my hand but feels nothing) but my own act as a living organism having the power of sensation. Yet what I sense directly is not just the cooling of my hand but principally the coldness of

the ice. Hence my act of sensation is of a different order than the mutual physical acts of the ice and of my hand as material bodies reducing each other to an equal temperature. This difference constitutes the act of cognition as nonmaterial,²⁹ although, since it is sense cognition, it cannot occur without a material organ that undergoes some physical change.

This difference between a form received in the mode of material change (subjectivity) and in an immaterial mode of change (relationally), while true even of the sense of touch, is more evident in the case of sight, in which visual objects specify my sensations in a very complex manner (e.g., all the details of a printed page); yet the physical change in my eyes required for this specification is very minimal (an image on the retinas of my eyes). Thus when I “know” an object I become that object as regards its own form, yet I remain myself as regards my substantial constitution from a correlative form and matter, my soul and my body. In this way, when I see an elephant, I remain a human being, yet also possess relationally the *information* that tells me that the elephant exists and what it is.

Thus the sense power, when affected by a material object, is able to respond in its own action in a specific way receptively conditioned by the object that has specified and stimulated its response. An act of sight is never just “seeing.” The seer sees *something*, a specifying object, even when it is only a foggy blur of light. Hence this way of receiving a form as a modification of a form (suprasubjectively, as terminating a relation) in contrast to the *material* reception of a form by matter (subjectively) can be said to be an *immaterial* (or even “spiritual”) mode of reception,³⁰ although in sense cognition a material sense organ is necessarily involved.

What is received from the sensible object is, in modern terms, “information” about that object as it is divested of its particular matter. In modern discourse, however, there is often much confusion in the use of such terms as “experience,” “sensation,” or “sense data” between (1) the object sensed or experienced, (2) the knower’s psychological process, and (3) the knower’s self-consciousness of her or his positive or negative reactions to the

object or attempts to verbalize this total “experience.” Yet it is the maintenance of the primacy of the object in cognition on which all the rest of the “experience” depends and without which there would be no such thing as cognition.

In sense cognition, the object known is in contact with the organ by which it is known, either directly, as in touch, or mediately, as in sight and hearing. The sense power is thus acted upon by the object so as to determine that power to a specific act of knowing. Thus, as in all cognition (as has already been explained), a form is received in a form. Each of the five powers of sense cognition has as its object some active quality in the category of quality, but it cannot perform a specific act of sensitive cognition until it has been specified to perform it by the form of the sense object as it terminates the relation of cognition. This form received in the form of the sense organ enabling it to perform a specific cognitive act is called the “impressed likeness” of the object (*species impressa*) that renders the object immediately present to the knower. This likeness or image is then recorded in the internal sense of memory and becomes available to the other senses (imagination and estimation) in forming sensations into *perceptions*.³¹

Intellectual knowledge, however, knows the sensed object *abstractly* in order to distinguish its essence or nature unconfused by *mere* accidents, or even by its properties (inasmuch as they are not the essence but its effects). Hence, in intellection, the act of knowing does not directly contact the object in its physical complexity but as universalized. I recognize you intellectually not in your individuality but as a human being. This means that the intellect that actually knows (the *intellectus possibilis*) has an object known only as an abstract form (*species expressa*), not, as in sense cognition, the immediately present physical object.³²

Yet as a power the *knowing* intellect (*intellectus possibilis*) cannot perform a specific act of knowing without first being determined by some object to do so. Therefore, there must also exist another intellectual power, the *abstractive* intellect (*intellectus agens*) that renders an object abstractly intelligible as an essence and impresses this abstract essential form on the

knowing intellect so that it is able to perform the act of knowing what is essential in the object, thus making the object present to the knower. In this way the question “What is it?” concerning any object is answered. Note, however, that for this defining answer to be a real definition answering the first question “Does it exist?” and not merely a nominal definition depends on the joint action of the intelligence and the senses, because it is only through our bodily senses that we are in actual contact with the changeable world and can thus make an existential judgment.

Aquinas compares the abstractive intellect to a light that renders a sensible object visible.³⁴ What we see is not the light itself but the object made visible. So in intellection what we know is not created by the abstractive intellect but is the object that it makes abstractly intelligible for the knowing intellect to attain by its own act specified by the *species impressa* given it by the abstractive intellect. Commonly, Aquinas, and Thomists generally, speaks of the two powers *intellectus agens* and *intellectus possibilis* together simply as the active quality of “intellect.” Yet they are really distinct, since the abstractive intellect is a prime mover always in act and thus superior to the knowing intellect, since to act it requires no other efficient cause than the First Cause that created it.³⁵

The argument that intellection must be caused by an immaterial prime mover applies primarily, however, to the agent intellect. Yet, since the possible intellect produces an abstract concept freed of the material conditions of its object in its existential state, it too must be immaterial and imperishable. Of course, this leaves another difficult question: if the human soul is radically immaterial, it cannot be corrupted by the death of the body. It must, therefore, survive as a pure form. How is this consistent with the fact that matter and form have a correlative existence, and the fact that the soul is the form of a body?

To understand this developed Aristotelian nondualistic conception of the human material substance whose form is a nonmaterial intellectual soul, it is essential to note, first, that the soul is a formal rather than an efficient cause. Hence it is not the soul as such, but the human substance that it informs that acts as

a prime mover of the activities of the various powers that are qualitative properties of each human substance. Among these powers the agent intellect is the prime mover of all the rest, although the lower powers also have a certain degree of autonomy.³⁶ Hence the human soul, although immaterial, informs the differentiated bodily organs as parts of that one complete substance that is the human person. Thus these organs are enabled to function with the generic vegetative capacities of nutrition, growth, and reproduction, and the generic animal capacities for various kinds of sense cognition. Moreover, human persons informed by souls with immaterial powers of intelligence and free will act as prime movers through these specifically human spiritual powers.

These spiritual faculties need no material organs intrinsically, yet depend on the material organs directly as their instruments for obtaining sense data and for executing the free choices of the will. Modern biology shows that the brain is the organ of internal sensation (memory, imagination, etc.). Yet, since intellection depends on the sense data that these internal senses store and synthesize, the brain is the immediate instrument of the intelligence and will, but does not itself perform these abstract, spiritual acts.³⁷

Aristotle, therefore, would have no objection to those who claim that *consciousness* can be explained as the act of a material organ such as the brain, or that a nonliving material computer can be a crude analogue of a living brain. He would, however, deny that any cognitive act can be reduced simply to the physical change that in sense cognition is the specifying stimulus of some sensation. Moreover, the consciousness he attributes to animals is consciousness of objects, of the environment through which the animal must move, of edible objects, of possible mates or enemies, and of an animal's own pained or pleased body.

Yet Aristotle did not attribute to any animal, except to the human animal, a subjective *self-consciousness* of its own acts of distinguishing between the essential and the nonessential in things—no animal thinks like a scientist, but all humans can do a

little science. Even unlearned humans recognize what are the causes of some ordinary effects in their lives. We are all puzzled and seek answers. Hence Aristotle did not attribute to subhuman animals the capability of freely choosing between alternative means to an end—no animal has moral responsibility for its acts. We humans do, and we may choose to try to explore and understand our world. Scientists freely make that choice and freely invent explanatory theories and test them. Humans, but not other animals, possess this cognitive power that enables us to make free choices, though all animals possess the powers of sensation.

Recently it has been shown that certain of the most intelligent animals, such as chimpanzees, not only recognize their bodies in a mirror, but when they feel themselves marked on the skin with a pattern they return to look in the mirror to see what change this marking made in their image. Some experimenters interpret this as “selfconsciousness” (although human infants of less than two years of age, not usually considered self-conscious, can do the same). In my opinion this remarkable behavior does not require self-consciousness.³⁸ When I feel a fly against my cheek I may look in the mirror to see how to brush it off without, as we say, “thinking twice.”

Chimpanzees also need to remove foreign substances on their skin, and they instinctively do this by reacting to unusual sensations of touch. Thus, when the chimp is marked, it instinctively attempts to rid itself of the marking by returning to the visual image in the mirror that it associates with various bodily sensations. This does not mean, however, that it is thinking about taking means distinguished as such to an end, any more than I deliberate about getting rid of the fly on my skin. Its instincts and learning from repeated experiences move the animal to make an appropriate response to such a stimulus. The fact that such behaviors only occur in higher animals and also in human infants indicates that the brain as an instrument of specifically human thought must be highly developed to serve mature human intelligence. Hence the highly developed brain of nonlinguistic primates, for example, makes possible activities that approximate

human thought but are essentially inferior to it.³⁹

The Greeks called the specifically human power of cognition *nous*, possibly from the Indo-European root for “to see,” from which is also derived the English “to know.” In Latin this is *intellectus*, from the Latin *inter-legere*, to put together or read, in other words, to see relations. For Aristotle, the empirical evidence for this distinction between sense cognition and intellectual cognition is to be found in the nature of human language and the social and cultural diversities associated with its use. Human language differs essentially from the kind of signals used by some animals, because human language includes not only performative signals such as mating, fighting, or warning calls, or the recognition of objects by their “names,”⁴⁰ but abstract concepts—including in particular a knowledge of relations.⁴¹ Recent work in semiotics points to the direct intellectual awareness of relations as such, which neither sensation nor perception can directly attain, but only “related things,” as the key activity distinguishing human awareness from the awareness of nonlinguistic animals, a thesis that was “anticipatorily summarized,” so to speak, in Jacques Maritain’s observation that “animals make use of signs without perceiving the relation of signification.” He goes on to say:

The discovery of language, then, coincides with the discovery of the relation of signification, and this would explain why, as a matter of fact, the invention of language and the birth of ideas, the first release of the intellect’s power, probably took place at the same time.⁴²

Relations, although real and of the physical order, are not objects of sensation. Animals can sense two equal or two similar things, or a thing that is the cause of another and its association with its effects, but cannot sense the relations of equality, similarity, or causality that can only be known abstractly by intellectual cognition. This is very evident in the fact that all human languages contain words that indicate the purely objective but mind-dependent relations that are studied in logic. Although

we form such mind-dependent relations in imitation of real relations, they cannot actually exist outside cognition. For example, the mind-dependent relations signified by such words as “and,” “if,” “therefore” and even “is” (when that is used merely as a sign of predication⁴³) are purely mind-dependent. They are, however, formed in imitation of some real, that is, some mind-independent,⁴⁴ relation. For example, “and” signifies a mind-dependent relation that imitates the real relation that we know from *adding* one material object to another.

Moreover, as Aristotle had learned from Plato (and perhaps Plato had learned from the mathematics of Pythagoras), the very possibility of a scientific understanding of the world cannot consist merely in a description of phenomena. It requires an analysis of phenomena in universal, abstract terms. Such an analysis is impossible without abstract thought that eliminates data irrelevant to the particular aims of research. This is most simply and clearly seen in the mathematical sciences, where the abstract concept of 5 as a universal is certainly not the same as the image of some fingers or other collection formed by physically adding five sensed objects from which this concept is derived. At least that is the case in Aristotelian epistemology, although Plato was led by this same fact to posit innate ideas.⁴⁵

Thus, while all human knowledge, just like that of animals, begins with sense cognition and perceptual consciousness of concrete objects, it also simultaneously involves an abstract kind of cognition that we call intellectual knowledge, without which neither human language nor human science would be possible. When I see an antelope, I see it probably much as a lion does, but (at least if I have previously observed antelopes), on seeing it, I also recognize it as something included in the abstract notion of “antelope” as a living, animal substance of a certain species. If I could not recognize it as such, I could not express this event in human language, nor could I proceed to consider whether I would be justified to shoot it, capture it and by what kind of trap, simply paint its picture, or just study it scientifically. Thus again in all human thinking, however untutored, there is a “scientific” or causally explanatory element.

Yet scientists are not scientists when they merely observe antelopes. They are scientists only when they freely choose among the wide range of alternatives supplied by some abstract classification of objects, already at least sketchily formed by an analysis of their sense experiences, to pursue this initial understanding. And they pursue their inquiries further than a hunter might, because for them certain observations raise abstract scientific questions about this species of animal and its traits and behaviors. Therefore human intellectual cognition, though it presupposes sense cognition as its necessary condition and, like sense cognition, is immaterial (the reception of a form by a form), is unlike sense cognition in that intellectual cognition is altogether free of direct dependence on a material organ. It is nonmaterial or spiritual in a strict, essential sense, because its act is freed of the material conditions of its objects by its power to abstract from them and to distinguish what is relevant to knowing the nature of the object and what is not.⁴⁶

This conclusion of Aristotle in *De Anima* III is, of course, highly contested today by those who believe that even abstract thought is entirely explicable as an action of our material brains and that someday computers will be invented that will think like humans. But scientifically, this “mind-body problem” remains highly controversial. Thus, the noted physicist Roger Penrose in his *The Emperor’s New Mind: Concerning Computers, Minds, and the Laws of Physics* (1991) can declare that this problem is still unsolved and may be insoluble by the present methods of natural science. Unfortunately, in these current discussions, little attention is given either to Aristotle’s skeletal solution or to the more fleshed out and more developed arguments of Aquinas.

Aquinas chiefly emphasizes two related arguments to show that human intelligence, though it depends on a material organ for its sense data, cannot itself be properly and essentially a function of any material organ.⁴⁷ The first of these arguments is based on Aristotle’s analysis of the difference between a concrete sense image and an abstract concept developed from it.⁴⁸ Even when a sense image derived from an external sense is rendered more general by the internal senses, and hence more vague and

“confused” or abstract, that image always retains something of the concrete singular from which it was derived. For example, my image of a dog may blur the difference between a bulldog and terrier, yet this image always has *some* size, shape, and color, however generalized and confused. Like a composite photograph in which images of several faces have been superimposed, it is vague and blurred, as if out of focus. It was John Locke’s failure to distinguish such generalized images that he called “ideas” from true intellectual concepts that gave rise to modern empiricism.⁴⁹

This ability of our internal senses to form generalized (and even synthesized) images explains why most animals can instinctually recognize members of their own species and their enemies of other species and can learn to recognize individual human beings as friendly or hostile. A dog can learn to recognize itself in a mirror by associating that image with its sensation of its own body. Such behavior can result from generalized images that are similar to each other, much as Locke and other nominalists supposed universal concepts to be formed. But such generalized images, although they play a necessary role in the formation of abstract concepts, differ radically from them.

I can note the similarity between two oranges, two apples, two dogs, and two men, and form generalized images of a pair of blurred objects, but this image is not identical with my abstract concept of the number 2. I cannot think mathematically if I try to use only that blurred image. My intellectual concept of 2, or of a dog, abstracts from all these individual differences to retain only what is essential and specific. Since this conceptual act is abstract, and thus free of the details of the object as it is concretely material, it could not exist in the intellect if that were a function of a material substance such as the brain. A failure to distinguish between sensible *similarity* and abstract *essential identity* is one of the defects of Nominalism.⁵⁰

Aquinas’s second argument to show that the human intellectual power is immaterial is based on the human capacity for “self-consciousness” in the strict, subjective meaning of that term. Indirectly and implicitly I am usually, though not always, aware not only of the objects I am thinking about but also of the

fact that I am thinking about them. Yet for me to know my act of knowing and also explicitly and directly that it is my act, I must *reflect* on that act and, since the act in question is the act of a subject that is a substance, on myself as a thinking substance. I must *objectify* my own subjective act, so that the fact it is *my* act becomes irrelevant, and it is considered simply in its reality as the act of a certain human person that I am observing who happens to be me. Thus, the *primary* act of knowing is specified not by its subject, the knower, but by the object that is directly known; and for human knowing this is not an intellectual act but a sensible object. Hence self-consciousness *presupposes* the existence of sensible objects, at least the body of the self-conscious person involved in the interaction with other bodies essential to generate sensations. Otherwise, when I try to reflect on my act of knowing, it would be either a blank or an object that I know has only mind-dependent existence but is somehow derived from some sensible object known before directly and primarily.

Sensible objects, however, have quantity or extension. Hence a material thing, such as a sheet of paper, although it can be folded (“reflected”) over itself many times, can never be reduced to a point. No matter how many times it is folded, it always has at least two points that are not in contact.⁵¹ But when I know a sensible object I am at the same time indirectly and more or less explicitly aware that I am knowing that object. Thus to be self-conscious, so to speak, I have myself *all together* as at a point, since I reflect on my thinking self as thinking.⁵² I not only know, but I know that I know, and so on. Thus, in knowing that I am thinking about some sensible extended object, I become aware that I am somehow very different from such material objects of which I am primarily aware. They are extended objects, but my awareness of myself as knowing them is not of a spatially extended object but of an awareness that has no extension; it is “all together” in a synthetic unity. Thus I am primarily aware of objects whose materiality I also somehow share in my bodily existence, but I am also aware that in my totality as a thinking self I am not only material. This, however, as such, is a *negative* understanding. I can gain a positive understanding of myself as

spiritual only through the kind of reasoning exemplified systematically and scientifically in *De Anima* III, and more fully developed in Aquinas's commentary thereon.

Thus, to become directly aware of oneself as thinking, the Cartesian *Cogito*, is phenomenologically not our ordinary way of thinking in everyday life but requires a special kind of reflective cognitive act. Descartes, Kant, the Transcendental Thomists, and the Phenomenologists consider this reflection to be the basis of philosophy. The founder of Phenomenology, Edmund Husserl, spoke of it as the "philosophical attitude" in contrast to the "natural attitude" of daily life. Indeed we have all experienced moments when we, while very much occupied with the external world, suddenly become conscious of ourselves in distinction from that world. I know that I am knowing intellectually as well as sensitively. In doing both, I am aware I am doing two quite different things, one activity that is animal and bodily, but another that mysteriously transcends my animal operations of sensation. In this reflective knowing of myself in the world I experience a certain freedom that places me to a degree in control of my world and myself, and enables me to face questions about them both in relation to each other. I become able to consider different possible answers to these questions and different possible practical responses to them. Nevertheless, for Aristotle and Aquinas, the "natural attitude" is more fundamental than the reflective attitude and is prior in certitude. For them, to detach ourselves from the "natural attitude" by reflection is not factually possible, inasmuch as sensations are constant as long as we live, so that a "philosophical attitude" truly so detached would perforce be empty of content.

Only a mathematician like Descartes, lost in abstract reasoning and forgetting its derivation from sensible material reality, was likely to make such an error as is involved in his interpretation of the formula, *Cogito ergo sum*.⁵³ But at least he was right to claim that he knew with certitude that he was a thinking self, and therefore that he really existed as more than a dream. Dreaming pertains to sense cognition, so that animals also dream, whereas intellectual cognition belongs to waking

contact with reality.⁵⁴ But, for all Descartes' talk of clear and distinct ideas, precisely what it means to say that "I am thinking," or what I am who is thinking, is far from a clear or distinct concept.

Locke never doubted the existence of the self, but both Hume and Kant also denied that from phenomena we can know ourselves as substantial souls or persons.⁵⁵ All we know, it can be argued, is the stream of consciousness itself. In an Aristotelian epistemology, however, the *existence* of extramental sensible substances is what we first know. From this we come to recognize that we are ourselves such a substance with the remarkable and distinct properties of sensation and intellection that depend for their existence on our substantial selves. Thus, what we know of ourselves is, first, our body among other objects. From what our body receives from other objects and can do to them we come to know the self as a living, then a sensing, and finally a thinking body that can perform acts of free choice.

From our modern understanding, this argument can be supported by the fact, unknown to Aristotle and Aquinas, that the human brain is made up of a marvelously intricate set of neurons, through which messages pass from one part of the brain to another bearing information that can be related to other information. Yet precisely because the brain is material, and hence quantitatively extended, this network carrying information cannot bring it all to the single point, as it were, of selfconsciousness.

Remarkably, this argument of Aquinas from reflectivity has also been given mathematical support by the famous theorem of Kurt Gödel.⁵⁶ The Logical Positivists, and those Analytic Philosophers who believed that mathematics could be reduced to logic, supposed that any abstract system of thought could be reduced to a finite number of axioms from which all possible conclusions of a science could be logically deduced. Such a "formal system" might then be given a concrete interpretation, applying it to the physical world. Gödel demonstrated mathematically that no formal system capable of interpretation in simple arithmetic, having only a finite number of axioms, is able to

furnish a solution to all problems that can be raised in its own terms.⁵⁷ Yet neither can it be shown to be self-consistent as a system without applying it to simple arithmetic or to some other data known to be self-consistent from our sense experience of the real world. Because what is impossible in mathematics is also impossible in the physical world (but not necessarily the converse), it follows that, since computers are programmed according to a formal system, no computer can be constructed that can solve all problems that may in the future be raised in natural science. A new question may always be asked that to answer will require some new principle, omitted from the computer's programming.

Aristotle already noted this limitation of any axiomatic system when he said in the *Posterior Analytics* that in any science there are almost as many premises as conclusions.⁵⁸ One can always make a computer to help with each new problem, but each will require a new program that includes the new premise. Why is this? Any formal system adequate to arithmetic, no matter how abstractly it is formulated, applies to what in mathematics is called a "set," that is, a collection of discrete elements. Such a set, though considered at a high level of abstraction, still pertains to the category of quantity and thus always implies a material basis. Therefore the fact that human thought, though partially expressed in quantitative terms and dependent on them for its analogical concepts of immaterial things, nevertheless transcends the material and quantitative and can never be reduced to what any actual computer can do. Thus, the human intellectual power of self-reflection and self-consciousness can be only inadequately represented by any specific formal system.

Hence in *De Anima* III, Aristotle comes to the conclusion that intellection cannot be the act of the material body as such, but must be the act of an immaterial power.⁵⁹ Since, however, he also holds that intellection cannot take place without sensation, and sensation must be an act of a material organ, he must inquire what this organ is, and here the faulty chemical and physiological data of antiquity led him seriously astray,⁶⁰ just as faulty astronomical data had led him to accept the hypothesis of

unchanging celestial spheres in an eternal world. (In the scientific revolution of the seventeenth century, the exposure of these two great errors did the most to discredit Aristotle. In the heat of the controversies and the excitement over development of ideoscopic means at the time, no one took much notice or interest in the fact that the errors in question in no way implicated what Aristotle had empirically demonstrated in his foundational work, the *Physics*.⁶¹)

The only physical forms of energy that Aristotle knew were light and heat, and the medical doctors of his time assured him that when they exposed the brain during trepan surgery they found it cool to the touch. To the touch, however, the heart is the hottest part of the body.⁶² On this empirical evidence, Aristotle reasonably hypothesized that the heart must be the most energetic organ. He argued that since sensation is the highest power in animal organisms, the organ of internal sensation by which the data of the external sense organs is synthesized and stored must be the heart. Moreover, since the doctors also assured him that the surgically exposed brain gave no reaction to being touched, this seemed to support his conclusion that the heart, not the brain, was the prime mover of the body.

This erroneous conclusion seemed to be further confirmed by the famous experiment in which Aristotle observed the embryological development of the chicken by consecutively breaking a set of eggs laid on the same day.⁶³ Since Aristotle had no microscope, the first organ that he could observe in the chicken embryo was the beating primordial heart. Since the cessation of cardiac function was for the ancients the best medical sign of death, Aristotle concluded, again for empirical reasons, that, since animal life begins and ends with cardiac function, the heart must be the prime mover of the body. Yet, just as he had concluded that the *material* prime mover or movers of the universe must also be moved by a *spiritual* mover or movers, so he concluded about the material organ, the heart. Since in humans the highest power is not sense perception (the function of the heart) but intelligence, a power whose act is spiritual, that intelligence must be the spiritual prime mover of the body, with the heart as simply its instrument.

Before Aristotle, Plato and, after them both, the great biologist Galen (c. 130–c. 200 CE) believed that the heart, not the brain, was the primary organ; but the question remained moot until William Harvey, a contemporary of Galileo (and like Galileo a well-trained Aristotelian), in 1616 first showed that the true function of the heart was to circulate the blood. Ultimately, by the aid of the microscope, modern neurological techniques have made possible a better understanding of the brain's true function as the organ of internal sensation that synthesizes and stores the images received from the external senses. Thus it is the brain that is the primary material instrument of the spiritual human intelligence.

If the intelligence is an immaterial power that needs no proper organ yet does need the body as its instrument for the vital activities and sense cognition (“to provide its object,” as Aquinas says), the question of its precise relation to the body arises. The great Muslim commentator on Aristotle, Ibn Rushd (Averroes), noting the silence of the *De Anima* and the *Metaphysics* on this question, concluded that, for Aristotle, there is only a single “active intelligence” for all human persons.⁶⁴ Aquinas was convinced that this interpretation was entirely inconsistent with Aristotle's anti-Platonic and anti-dualistic conception of the human substance as a form-matter composite. In the unity of the human substance the correlative causality of soul and body demands that the soul's relation to a uniquely quantified body individuate that soul.⁶⁵

For Aquinas, therefore, each human person has a unique soul that constitutes the form of the human body as it is an essential component of the human substance. As such, the soul is the formal cause, not the efficient cause, of human life functions. Yet, by informing the body as a whole and each of its organs, it gives to them their specific powers as properties of the human substance. It is these active powers that are the efficient causes of the life functions of nutrition, growth, and reproduction. Furthermore, the human spiritual soul, as a formal cause of the total person, constitutes its spiritual powers of intelligence and free will as the highest and specifying properties of the human

substance. Modern biology shows that the brain is the organ of internal sensation (memory, imagination, etc.). Yet, since intellection depends on the sense data that these internal senses store and synthesize, the brain is the immediate instrument of the intelligence and will, but it does not itself perform these abstract, spiritual acts.

Why then was Aristotle so cryptic as to the question of whether each human person has a unique intelligence, or whether there is one *nous* for all human persons? He only says (at least in writings that survive):

Actual knowledge is the same as the thing [known]; *potential knowledge*, however, is prior in time [to *actual knowledge*] in an [individual], but, as a whole, it is not [prior] in time. But the [active intellect] is not at one time thinking and at another not thinking. When separated [from the body], it is *as such* just that [i.e. intellect], and only this [part of the soul] is immortal and eternal. But we do not remember in view of the fact that, although this [part of the soul] cannot be affected, the intellect which can be affected is destructible, and without it, [it] cannot think.⁶⁶

Probably his silence was due once more to his basic hypothesis that the universe is eternal, since this would also entail the existence at present of an infinite number of immortal human intelligences whose bodies had died in the infinite past. He could have escaped this conclusion if he had agreed with Plato in accepting the Pythagorean theory of reincarnation, but there is no indication that he did so. Aquinas, of course, rejected reincarnation as contrary to Christian revelation, but also as contrary to the unique relation of any human soul to its own body.

Of course, this leaves us with another difficult question. If the human soul is immaterial, it cannot be corrupted by the death of the body. It must, therefore, survive as a pure form. How is this consistent with the fact that matter and form have a correlative existence? Aquinas found a way to resolve this apparent contradiction once he had drawn from Aristotle's principles the

conclusion that, to be real, the essence of bodies as material-form composites requires the actualization of an existence distinct from that essence. Hence the immaterial form of the human soul when separated from the body by its death, although it no longer has its proper matter, still has the same existence (*esse*) that it formerly shared with and gave to its material body.⁶⁷ By contrast, after death that body exists only as a collection of various inanimate chemicals in the corpse and its sequela.

Consequently, Aquinas, while maintaining the survival of the human soul, also says that it is not a complete human person, nor even any longer a complete substance.⁶⁸ Yet it necessarily retains its transcendental relation to an appropriate matter,⁶⁹ and this fact supports, but does not prove, the Christian belief in the resurrection of the body to restore human personhood. But what kind of life after death could the separated soul possibly enjoy? Aquinas's attempt to answer this difficult question will be discussed later.⁷⁰

This demonstration of the existence of a spiritual human soul based on the empirical observation of human behavior is a special but extremely important application of the general argument for the existence of an immaterial cause or causes for the changes we observe in our world. It supports the argument for an immaterial First Cause, by recognizing in our human experience an analogue (although an imperfect one) to a nonmaterial Prime Mover of the material universe.

C. A UNIVERSE OF BOTH MATERIAL AND SPIRITUAL SUBSTANCES

1. The Existence of Contingent Pure Spirits

All mythologies and the traditional great world religions, even if they do not have a clear teaching about a unique Creator of the

universe *ex nihilo*, assume the existence of a world of superhuman spirits. The worldview of Secular Humanism tends to condemn such notions as mere superstitions eliminated by modern science, though under its hegemony various forms of occultism such as Theosophy and New Age that assert the existence of such spirits survive and multiply. Even some Christian theologians today reject the existence of angels as unnecessary, since if one accepts a First Cause as Creator, either on faith or reason, no intermediate intelligent causes for natural phenomena are required.⁷¹ Yet it does not accord with the methodology of science to explain observed phenomena by resort to a First Cause extrinsic to the universe before first seeking for secondary causes intrinsic to the universe. To be content to explain all observed effects simply as the acts of God is the fallacy called "occasionalism."⁷²

Moreover, since the foregoing argument for the spirituality of the human soul is based on the same principles as the proof for the existence of a First Cause, why should we not also ask whether a similar proof can be found for the existence of other spiritual beings subordinate to the First Cause? The existence of such contingent, created, but superhuman spirits in addition to the existence of human spiritual souls in no way contradicts the existence and necessity of the First Cause.

Therefore, just as scientific methodology ought to lead us, as I have argued, to ask whether there is a nonmaterial First Cause of the universe and whether the human intelligence as prime mover of the human body is spiritual, so it demands that we ask whether we observe effects in the material world that manifest the existence of spiritual intelligences other than humans, spiritual intelligences which have no dependence upon a body. No wonder then that prior to the development of modern science, common sense led the human race throughout the ages and in many cultures to ponder whether such pure spirits exist. The fact that most cultures have come to an affirmative answer to this question at least suggests that ordinary experiences somehow empirically manifest the existence of such spirits, though our scientific culture seems blind to this evidence.

Thus in Aristotle's *Metaphysics* XII, chapter 8, we find an elaborate discussion of the immaterial intelligences, 47 or 55 in number, that he concluded were required to explain how the heavenly spheres continue in perpetual motion. It would seem that this question belongs more properly to Aristotle's astronomy in the *De Caelo*. Leo Elders, S.V.D., in a study of the *De Caelo*,⁷³ holds that the several references to these movers in that work are inconsistent and show that Aristotle, although he always held with Plato that the material world depends on a spiritual realm, only gradually worked out the final theory that is preserved to us in the *Metaphysics*. Even if this was the case, the arguments given in the latter work are in purely physical terms, not metaphysical ones, and belong properly to natural science.⁷⁴ Logically the problem of the existence of such spirits, like that of the existence of the immaterial First Cause and of the immaterial human intelligence, should first be dealt with in natural science as still another special application of the general theorem about prime movers. First Philosophy, therefore, should presuppose such *existence* proofs, although, of course, it may have more to say about the *essence* of spiritual things than does natural science.

Aristotle's proof of spiritual intelligences without bodies, as we have it in *Metaphysics* XII,⁷⁵ is based on what he mistakenly believed were empirical data well established by the Babylonian astronomers over many centuries. The mathematical theories of astronomy developed in Plato's Academy did not simply reduce the cause of the rotation of the heavens about the earth to a single physical mover, the outer sphere of fixed stars, as is sometimes asserted. Instead, to account for the apparently autonomous motions of the planets (the Greek term means "wanderers"), the ancient theorists assigned to each of the spheres of the planets a certain autonomy of motion. These autonomous motions were then *coordinated* by the more uniform diurnal motion of the sun and fixed stars (or outer sphere) but were not simply reduced to its agency.

Aristotle accepted a modified version of these theories, and thought accordingly that this plurality of independent, though coordinated, motions of the celestial spheres logically led to a

demonstration of many immaterial movers distinct from the First Cause, though subordinated to it. Hence, just as the existence of the immaterial First Cause can be proved from any motion in the universe, so the existence of several immaterial prime movers subordinated to this First Cause can be proved from the relative autonomy that the planetary motions are observed to have.

Since such immaterial movers must be superior to the human spiritual intelligence, Aristotle called them by analogy “intelligences,” an analogy which Christian theology was later to transfer to the biblical angels or “messengers of God.” Some ancient commentators thought that these intelligences were the souls of the celestial spheres. But Aquinas points out⁷⁶ that, for Aristotle, the reason that the human body has differentiated parts is to provide material instruments or organs for the different powers of the human soul, while Aristotle also held that the celestial bodies are perfectly homogeneous and thus could not perform such services. Hence the intelligences must be pure spirits without bodies rather than souls (i.e., forms of bodies). Thus he would have contradicted himself if he claimed that the celestial bodies were ensouled, since without such organs they could not perform the activities required for sensing and thinking. Nor would these intelligences require some kind of “incorporeal matter” (whatever that might be!), as St. Bonaventure, St. Albert the Great, and other medievals supposed, in order to be members of a single species.⁷⁷ Aquinas, on the contrary, held, as we have seen, that, because angels are pure spiritual forms, each must be a complete species in itself.⁷⁸ Hence Aristotle must be understood as intending to demonstrate the existence of spiritual substances, analogous to the human soul in their ability to think and will, but so much more powerful in intelligence as not to require bodies. They are pure non-embodied spirits, subordinate to the spiritual First Cause.

Aquinas adds two *dialectical* arguments to show the plausibility of Aristotle’s argument.⁷⁹ The first is that the order of substances known directly to us is hierarchical, ranging from very simple things, such as atoms, to very complex things, such as the higher animals. In each generic section of this hierarchy there is a

similar range; for example, inanimate things range from atoms to complex chemical substances, the plant kingdom ranges from very simple plants to much more complex ones, and the animal kingdom from simple worms to apes. Why then, in the genus of intelligent beings, do we observe only the least type of intelligence, that of humans who are so dependent on a body to think? Is it not plausible that there is also a range of intelligent beings far beyond lowly humanity?

In a second dialectical argument Aquinas notes that, in the hierarchy of beings, we observe that as we ascend the scale of complexity the variety of species within a genus also increases. There are only a few species of elements, more species of compounds, still more species of living things, and among these still greater variety among the vertebrate animals. This makes sense, since the more complex the type of substance the more diversity of its parts becomes possible.⁸⁰ Hence, Aquinas concludes, *probably* the species of angels is greater than the species of all material things. This is supported also by the consideration that even though human beings are all of one species, our intelligence and freedom makes each of us highly unique. Hence the vast and ever growing human population anticipates, as it were, the still greater vastness of the population of pure spirits. So in the Aristotelian universe as Thomas himself re-envisioned it, the material substances studied by natural science and directly accessible to our observation constitute only a small fraction of the created universe compared with its far vaster and more diversified spiritual portion.

2. Does Modern Science Exclude Spiritual Substances?

Aristotle's reasons for positing the existence of pure spirits do not entirely depend on his now discredited astronomy. Freed of the specifics of that particular theory, the argument can be restated as follows. All causation in the material universe depends on the First Cause. But some lines of per se causation are observed to be independent of each other and therefore must be caused by

the First Cause through secondary causes, prime movers that are interior to the universe. The clear case is that of human free actions whose first causes are human intelligences subordinated in their secondary causality to the primary First Cause. Thus there are at least as many independent lines of causation in the universe as there are human intelligences. These human intelligences, however, can act on material bodies only by reason of their material embodiment.

We must ask then (1) whether there are other contingent *nonhuman* intelligences in the universe, and (2) whether they are or are not embodied. Just as the argument for human spiritual agency is based on observing that human beings are the first causes—subordinated to the First Cause—of more than one independent line of causation, the first question must be answered by observing whether in nature, apart from human agency, more than one independent line of causation must exist. Though modern science has a very different picture of the causes that form the universe as a unified system, it has retained Aristotle's concept of a system constituted by several coordinate yet relatively autonomous lines of causation. Apart from observations leading to the discovery of embodied intelligences on other planets in the universe, it is on this concept of a coordinated system that any scientific argument for the existence of disembodied nonhuman intelligences must depend.

Of course, there are scientists who picture the universe as a causal network so tightly connected as to rule out any autonomous subsystems. There are others who hold for many worlds enclosed in a kind of super-universe, and still others who propose that there are many worlds that have separated from our world and become wholly independent of each other.⁸¹

Yet none of these current proposals, often anticipated by older thinkers, have been scientifically established; and it is difficult to see how they could ever be so established. We can explore scientifically only the world of which we are a part, and for us to be able to observe this world requires that its parts and ourselves as observers have at least the *relative* independence that such observation requires. An observer must have some independence of what is to be observed, and when we observe

we have to be able to distinguish causes from their effects and also between different lines of causation. In fact, the progress of modern science has shown us that our universe, instead of being the neat little machine that Eudoxus, Aristotle, and Ptolemy projected, is a vast, largely chaotic collision of a relatively few large bodies scattered through vast “empty” spaces of gas and dust. The only place in this vast chaos where we are sure a high level of order of intelligent life has arisen is on our own tiny earth. Moreover, this state of affairs is the product of a cosmic and biological evolution which is not determined by any single cause, but by the coincidence of many causes subject to a very high degree of chance. At the Big Bang all natural forces were unified, but within a fraction of a second several independent kinds of natural forces have emerged, forces exerted independently by an increasing multitude of agents.

Thus, while it is possible that there could be a universe that was a material system so unified that it lacked any subsystems having relative autonomy, it would have little resemblance to the complex universe that science reveals. Does not this argument at least suggest that our universe as we observe it includes relatively independent prime movers other than human intelligences? It would then seem to follow, by analogy to the arguments I have given for an immaterial First Cause and for immaterial human souls, that such prime movers, if they are to be *prime* sources of these independent lines of causation, must also be spiritual beings who are part of the universe and subordinate to one transcendent First Cause.

Might these other spiritual prime movers, however, like our human spiritual souls, be embodied? This, of course, is what science fiction and serious scientists like Carl Sagan proposed to find out by sending radio messages into outer space.⁸² This possibility cannot and, for this discussion, need not be ruled out. Yet we must ask whether it is possible for matter to be unified in a manner significantly more complex than the human brain. Computer experts recognize that there may be an upper limit to the complexity of artificial intelligence machines.⁸³ Of course, those who believe in extraterrestrial intelligences generally are

materialists, or they are panpsychists who suppose that spiritual beings “emerge” from matter. But while spirit can cause matter, matter cannot cause spirit, because, as shown in chapter 3, material substances act through physical contact of their quantitative parts, while spiritual things are not quantitative. Hence spiritual substances can be brought into existence only by the First Cause, through creation *ex nihilo*, as will be shown in chapter 5. Thus a case of this type can be made on the basis of natural science for the *existence* of nonmaterial agents in the universe other than human intelligences. In a later chapter, I will discuss another line of argument for this conclusion, based on the fact of cosmic and biological evolution.

What then is the relative certitude of the three arguments I have given for: (1) the existence of an immaterial First Cause independent of and transcendent to the universe in its own existence, but the cause of the existence of the universe and of all the actions of the secondary causes within that universe; (2) the existence of spiritual human intelligences, subordinated to the First Cause, but dependent on their human bodies as forms to matters; (3) the existence, integral to the order of the universe, of pure spirits analogous to human intelligences, but independent of bodies, who are prime movers of the relatively independent lines of causation that we observe in the universe? I have given the arguments accepted by Thomists as certain for (1) and (2). If the premises of these two arguments are limited to natural science as the science of changeable being, they can only have that type of certitude proper to natural science, namely, “hypothetical certitude”—hypothetical, that is, not in the sense of mere probability, but in the sense of “factual certitude.” They are at least true for the universe we actually observe, but not necessarily for all possible universes. The argument for (1), on the contrary, can be shown—not indeed by natural science, but by First Philosophy—to be absolutely necessary: no universe is possible without the First Cause. The second conclusion about the existence of the spiritual human intelligence is, however, conditioned by the factual existence of human beings in this universe. The same must also be true of the third conclusion, *if* it could be factually established as a conclusion (which so far it has

not, and which I am not arguing here).

I personally am convinced that both the argument I have sketched here and the one that I will propose later do lead to a factually certain conclusion concerning the existence of pure spirits. These arguments are independent of the reports of apparitions of angels or other spirits, reports whose credibility is a matter for historical investigation, not for an argument from effects to cause. The existence of angels, pure spirits, of course, is supported by Christian tradition and faith,⁸⁴ as it is also by most of the world's great religions.

I am aware that most Thomists consider such purely rational arguments for pure spirits to be merely probable, and therefore any argument from natural science that I sketch in this book would require a much more extensive defense than I am attempting. Hence I simply present the possibility of such an argument as raising questions open to further exploration and of importance for First Philosophy. As Aquinas says, to suppose that our universe, dependent for its very existence on a transcendent spiritual First Cause and containing human intelligences (the weakest of all possible kinds of spiritual being), contains no spiritual beings of a higher order (that is to say, without bodies) strains plausibility. In any case, the speculations of Aquinas that I will develop in the next chapter on what a disembodied intelligence would essentially have to be *if it exists* have been central to the whole Platonic and Idealist tradition in philosophy, and has played an important role also in the Thomistic understanding of the spiritual essence of our embodied intelligence and its properties. They confront a task which exceeds natural science and pertains properly to First Philosophy.

D. NATURAL SCIENCE VALIDATES FIRST PHILOSOPHY

1. First Philosophy Presupposes All the Special Sciences

If then, as was just argued, natural science cannot be First Philosophy, since its subject does not include the immaterial beings that it proves must exist, might one of the other special sciences undertake this heavy task of exploring the nature of being as open to immaterial as well as to material existence? Could First Philosophy perhaps be a practical rather than a theoretical discipline? That central figure of modern philosophy, Immanuel Kant, so severely limited theoretical knowledge that he was compelled to leave many questions, such as the existence of God and the spirituality of the human person—traditionally included in the scope of metaphysics—to a purely practical solution, namely, that without such beliefs the popular respect for morality necessary for a stable social order would be imperiled.

The Marxists too, and some liberation theologians, have argued for a “unification of theory and practice” in which the ultimate test of truth is political effectiveness. For American pragmatism,⁸⁵ of course, the criterion of all objective truth is “Does it work?” In chapter 1, I argued that the Secular Humanism that originated in the Enlightenment, because it trusted in no objective truth except that of a “value free” natural science, was forced to leave to the fine arts or to some form of aestheticism the necessary task of constructing “values” to guide meaningful human living. In effect, this subordinated the objective truth of natural science to the practical construction of a worldview, since even the pursuit of natural science, arduous and disciplined as it is, requires some kind of ethical justification. Such positions obviously make anything like a First Philosophy not a theoretical but a practical discipline.

Aristotle, however, ruled out ethics, politics, and the arts or technologies as First Philosophy, precisely because they are practical disciplines; for he maintained that every practical discipline presupposes some theoretical discipline.⁸⁶ Ethics presupposes an adequate knowledge of human nature. The technologies use and therefore must presuppose some accurate

understanding of natural forces and materials. The fine arts involve the representation of natural objects and so derive their forms and expressive significance from them.⁸⁷ Ultimately, therefore, knowledge, to be practical, must somehow be in conformity with the objective truth of the world and of human nature given prior to our limited human control over nature.

Moreover, as Aristotle demonstrates in the *Nicomachean Ethics*,⁸⁸ ethical behavior requires freedom of choice, and this freedom is established as a human property in the *De Anima*, a part of natural science. Furthermore, the goal of human life is the contemplation of ultimate reality, the object of a First Philosophy that presupposes natural science. Thus also the technologies and fine arts are subordinate to ethics, since their purpose is to serve the good life and, if unethical, are destructive of human existence. Hence the project of Romanticism—to make the fine arts and aestheticism the ultimate wisdom—though attractive, is illusory. Since ethics and politics are dependent on natural science, so are the fine arts that are subordinated to ethics and politics.⁸⁹ Hence all these practical disciplines presuppose the theoretical discipline of natural science and therefore cannot be First Philosophy.

Thus we can eliminate the practical disciplines as candidates to be First Philosophy, and are brought back to the two kinds of theoretical discipline other than natural science that must be given more serious consideration, especially because it might seem that they too consider immaterial being. A chief preoccupation throughout the books of Aristotle's *Metaphysics* is the refutation of the Platonic exaltation of mathematics, and the last two books are devoted exclusively to this task. For Plato, the "mathematics,"⁹⁰ or abstract mathematical ideas, are the bridge from the material to the immaterial realm of being. However, as we have already seen, Aristotle, in the foundational part of natural science, demonstrates that the first property of any changeable object is quantity; and hence all changing things are extended, that is, are bodies.⁹¹ Descartes was to argue that the essence of material substance is extension (continuous quantity). Yet Aristotle had shown that this cannot be the case because the same identical substance can expand or contract or, in the case

of living things, grow. Instead, as demonstrated in the above discussion of the categories, quantity is the first property of bodies, not their essence.

Thus the mathematical sciences consider both continuous and discrete quantity in abstraction from any other physical properties of material things, and also from the essence of the substances that have quantity and other properties that presuppose that it is a quantified body. Nevertheless, mathematics is not about immaterial existents, but necessarily presupposes natural science and is about a property of material existents, namely, quantity, though only as quantity is abstractly conceived. Hence it cannot be First Philosophy.

Many modern thinkers, notably Gottlob Frege (1848–1925) and Bertrand Russell, have denied that mathematics is founded on physical reality and believe it is a purely formal science reducible to logic. I will attempt to answer this notion more fully later, but here it suffices to point out that if mathematics were logic, then for that very reason it could not be First Philosophy. The candidacy of logic or at least of semiotics to be First Philosophy is plausible, since, on the one hand, according to the Thomist commentator Cardinal Cajetan, logic is about purely objective (or mind-dependent) being and is in the same degree of abstraction as metaphysics;⁹² and, on the other hand, according to C. S. Peirce, the father of late-modern (or postmodern) semiotics, “logic in its broader sense is general semeiotic.”⁹³ Yet logic in the perspective of Aristotle or St. Thomas is presupposed to every field of systematic thought, including metaphysics, and is a science not of the real but of mind-dependent relations. The case of semiotics is more problematic, and I will not go into it here, save to note that the one essay in the field which has addressed the question directly, that of John Deely,⁹⁴ I do not see in any way contradicts the Aristotelian approach I am concerned to vindicate in this book.

Nevertheless, the Logical Positivists, British and American Analysts, some Semioticians, and the Deconstructionists⁹⁵ often seem to reduce the questions formerly assigned to metaphysics to the study of the language of the sciences or of ordinary

language. But the clarification of language or the exposure of its ambiguities, though necessary tasks for any science (not just philosophy), cannot be First Philosophy unless they also deal with a reality that is independent of and presupposed to any process of human verbal expression. Adam named the animals, says Genesis, but there first had to be animals to name. If Analytic Philosophy and the Deconstructionism that has followed on its wake limit us to “intertextuality,” all sciences of the real become impossible.⁹⁶ Hence we must admit that these disciplines are dependent on natural science and logic, and since neither of these is First Philosophy, they too cannot be human wisdom.

First Philosophy, dealing as it must with both material and immaterial reality, the former known to exist through sense experience and constituting the proper object of natural science, the latter known to exist as the conclusion of the foundational part of natural science, therefore, must be a science in its own right. To construct this First Philosophy was what Aristotle undertook in his *Metaphysics* and rightly named “First Philosophy,” or, since it deals with the ultimate immaterial causes of material reality, “Theology.”⁹⁷ We can conclude, therefore, that not only the practical disciplines but also the theoretical disciplines of mathematics and logic presuppose, though in different ways, the foundations of natural science and cannot, therefore, be First Philosophy or Wisdom.

2. Natural Science Is Not First Philosophy but Establishes Its Ground

From all these considerations it can be concluded that natural science, by demonstrating the existence of an immaterial cause of motion in the material universe, also demonstrates that, though it is *epistemologically* the first philosophy in the order of learning, it cannot be the *architectonic* discipline Aristotle titled First Philosophy. The subject of natural science is being, but only changeable being (*ens mobile*). Yet, in establishing its own foundations, natural science finds it necessary to explain the very

existence of changeable being by concluding, first (with necessity) to the existence of an immaterial First Cause; then (problematically) to the strictly immaterial nature of human intelligence; and finally (with some probability) to the existence of superhuman spirits. These are all known *a posteriori*, that is, as unobservable causes reasoned to from observed effects.

In comparing, as it must, the material things that are effects of the First Cause to that Cause, natural science must conclude that material things exist only *contingently*, since their existence depends wholly on the First Cause that alone exists necessarily. Thus the famous Thomistic “real distinction between essence and existence in creatures,” mentioned in the last chapter, is first manifested in natural science, although its implications for a full understanding of the Creator in whom essence and existence are claimed to be identical remains outside the scope of natural science. Within natural science, what must be kept in mind is that existence is proportional to essence, so that the question of “Does it exist?” always leads to or implicates the question “What kind of a thing is it?” since “whether” and “what” are correlative, like form to matter. As the form and matter of a changeable being condition each other, so do its existence (*esse*) and its essence. Its existence is an act by which its essence is real in a certain way, and its essence limits the manner in which it is real. Both a molecule of water and a human person “exist” as substances in our changeable world, but their activities are very different and a “thing *is* as it acts.” Substances that have more complex actions have more complex essences and correlated existences. To say, as some Existential Thomists have done, that Aristotle’s philosophy is one of “form” or of “substance,” but not one of *esse*, to be or exist, is seriously misleading, since when Aristotle speaks of form or of substance he means *existing* form or substance, not merely possible forms or substances. The act of being (*actus essendi, esse*) of a contingent being is, in the case of material beings, given to its matter through its actual form (*forma dat esse* was the Latin tag). This form has been made actual in the matter by the efficient cause of the being. In the case of a contingent but spiritual being, the actual form is identical with its substance.

Thus, implicitly at least, Aristotle is always treating of things in their actuality or *esse*, in their “being as being,” just as is Aquinas more explicitly. The difference between what they have to say concerns the further development of the original point of view, the normal course of development in philosophy.

Since not only the kind of existence that material things possess but also the kinds of existence that the human spiritual soul and pure spirits possess are all effects of the First Cause, whose own existence we know through these effects, they are *contingent*, that is, do not necessarily exist. The First Cause, however, as is especially clear from the third way of proving its existence, since it is uncaused, cannot have merely contingent but must have necessary existence—that is, its existence and its essence must be identical, while the essence and existence of all contingent things are really distinct. This raises questions that are not the proper task of natural science to answer, but must be left to First Philosophy once it becomes clear that not all existent things are material.

This long discussion, therefore, leads to the conclusion that although natural science is epistemologically the First Philosophy, it is not the First Philosophy that is the human wisdom we are looking for. Yet our demonstration of the existence of spiritual beings that are the ultimate causes of the effects studied in natural science answers question 1 about the subject of such a First Philosophy, namely, that there *really is* such a thing as being (*ens commune*) inclusive of both material and immaterial realities.

E. DIALOGUE WITH OTHER VIEWS OF NATURE

In every culture there must be, of course, certain dominant or influential (though perhaps conflicting) views about the natural world of our experience and about human participation in that world. I have presented the view of Aristotle in dialogue with modern science. But these two views characteristic of the history

of Western culture are only two among many. While it is impossible here to do justice to these other views, I will say something of the mythological worldviews that underlie all advanced cultures, and then the two major advanced civilizations of India and China in particular.

The mythologies of all cultures, but especially of those in which the mythological mode of tradition plays the principal role, situate humanity in the midst of a universe of friendly and unfriendly powers. Mythology takes the place of scientific explanations of phenomena, and, historically, scientific explanations often originate and terminate in myths. Thus, the origins of Greek science are mingled with mythology, so that to Thales is attributed both the prediction of the solar eclipse of 585 BCE and the saying that "All things are full of gods." The historical development of astronomy from the time of the Babylonians was intertwined with that of astrology, and even today the models used in scientific speculation, especially at the cutting edge of scientific advance (such as the Big Bang hypothesis, the notion of "possible worlds," the idea of the brain as a computer, the Freudian "censor," or Jungian "collective unconscious"), have a strangely mythological tone, since they are not subject to direct empirical verification. No wonder that today science so easily generates "science fiction" and then gives that fiction "virtual reality" in the simulated "special effects" made possible by advanced scientific technologies.

The most important cosmological myths have an etiological (causally explanatory) character, and relate how the world was created or ordered, how it will come to perfection, and how it will be destroyed or undergo a cycle of transformation and destruction. For example, in the mythologies of many cultures the universe originates in the hatching of a cosmic egg, or emerges from a vast ocean or river as a hill of dry ground. Or cosmic order results from the triumph of a sky-god and his hosts in a war over chaotic titanic forces. Using analogies from human life, these new, ordering forces are then pictured anthropomorphically as gods, spirits, or heroes. Therefore, in intercultural dialogue, it is essential first to ask about the myths of a culture. Especially significant are myths of the origin of the universe, the

differentiation of the various kinds of things that compose it, the forces whose conflicts or harmonies sustain it, and the pattern of its historical development and ultimate destiny.

Even in the most scientifically and philosophically advanced cultures such mythological cosmologies form a background to critical thought and to ethical and political norms.⁹⁸ For example, since Darwin, the notion that the universe is “evolving” toward a higher state of intelligence and human freedom is the background of most popular and elite thinking and political decisions, although it is more myth than a principle that is critically and firmly established. The myth of *Apocalypse Now* is better evidenced!

The current interest in environmentalism has made us more aware of how such mythical cosmologies, precisely because they are anthropomorphic, help us to feel at home in nature, so that we appreciate the ecological order instead of treating nature as mere alien material for artificial human constructions. Thus the mythological heritage of Native Americans remains of permanent value for our appreciation of the wonderfully varied landscape of our country. This linkage with the cosmos is also enhanced by liturgical sacramentalism. In the Jewish Scriptures, the tabernacle and the temple as sacred places and the rites conducted in them effectively symbolized the creation; and these symbols have been carried over in the Christian sacraments.⁹⁹ Thus the artifacts of civilization need not replace the pristine realities of nature, but can retain a symbolic reference to them, or, on the contrary, they can alienate us from our natural roots, as is all too evident in our antihuman urban congestion.

I have emphasized the unique contribution of Greece as it moved beyond a mythological worldview to develop pure mathematics and the critical methods of philosophy and natural science. Parallel developments took place in the great centers of civilization in India and China. While in Greek and Roman times there was some interchange between the culture of India and the West, it was not until the late eighteenth century that Western scholars began to explore Indian literature. They only gradually became aware that India’s ancient culture, rooted in the Vedas, was profound, rich, and varied. They learned also that the non-

Vedic worldviews of Jainism, and the slightly later Buddhism, have also addressed the problems of cosmological theory.

Jainism teaches that the universe consists of an infinite number of eternal, uncreated, and independent atomic substances that are either lifeless (*ajiva*), because in them consciousness is dormant, or living and conscious (*jiva*).¹⁰⁰ There are five categories of being: (1) space, (2) time, (3) a subtle fluid or energy that causes motion, (4) another subtle fluid or energy that causes rest, and (5) atomic matter. This matter is of five types: earth, air, fire, water, and vegetation. As it is moved or rests in varying arrangements, it produces changing bodies in space and time. It ranges from gross sensible matter to a subtle matter that fills all space and that stains sensible matter in an eight-degree spectrum, ranging from evil to good (*karma*).

Living things consist in a subtle form of matter but are stained by evil karmic matter that causes it to be united to the gross, evil matter of the body. It is this staining of the souls, of which there are an infinite number, by karmic matter that causes them to transmigrate from body to body until, by severe asceticism, they gradually free themselves from the darker stains and finally become perfectly transparent. Each of these transparent bubbles then rises to the top of the universe, pictured as the skull of the Cosmic Man. They remain there forever in complete isolation from each other with a consciousness free of any particular content that could cause suffering. Thus Jainism has a cosmology that explains the universe atomically, somewhat as did the Greek Democritus. But by its distinction between gross matter and souls as atoms of very subtle matter, Jainism accounts for the basic Indian belief in the cycle of transmigration. Thus Jainism does not make a clear distinction between the material and the spiritual, and is perhaps best viewed as a kind of panpsychism in which materiality is only a fallen condition of spiritual realities.

Buddhism's attitude to cosmological speculation is primarily negative, since it teaches that release from the suffering of transmigration is to be achieved principally by realizing the emptiness of all phenomenal existence, whether material or

spiritual.¹⁰¹ Thus, as for Jainism, for Buddhism the goal of cosmological speculation is release from the suffering of reincarnation by the emptying of consciousness. Contrary to Jainism, however, Buddhism denies the existence of individual souls. Essential to the Buddhist worldview, therefore, is its theory of “the wheel of dependent origination,” according to which all sensible phenomena and the stream of conscious ideas from which we derive the notion of an individual self (*atman*) are produced by five “aggregates” (*skandhas*): (1) bodily matter, (2) sensation, (3) perception, (4) desires, and (5) consciousness. These *skandhas* last only momentarily in a “life-stream” and then yield to a new aggregation of insubstantial impressions. Thus, for the Buddhists, natural science is concerned with an endless cycle of impermanent and empty events about which detailed inquiry can only increase our illusions concerning the permanent stability of the phenomenal world, and thus add to human suffering.

Among orthodox Hindus, the six *darshana* or philosophical systems based on the Vedas eventually came to dominate Hinduism and, under the influence of Buddhism, took its most radical form in the non-dualist (*Advaita*) *Vedanta* of Shankara (eighth century CE). *Vedanta* was associated with another darshana called the *Mimamsa* devoted to textual interpretation of the Vedas. Like Buddhism, *Advaita Vedanta* held that the “enlightened” souls come to understand that the phenomenal universe is illusory and are thereby freed from transmigration. Hence any further cosmological speculation is seen to be vain. Thus Shankara rejected the *Samkhya-Yoga* and *Nyaya-Vaishesika* systems that had provided two types of speculative cosmology that parallel Greek natural philosophy.¹⁰²

The cosmology of the *Samkhya-Yoga* system had deep roots in the Upanishads, but was attributed to a sage named Kapila (500s BCE), whose works are lost. It was given its systematic form by Panini (fl. c. 140 BCE). *Samkhya* teaches a dualism of matter (*prakriti*) and spirit (*purusha*). Spirit is said to be “the silent witness of change,” and hence is not an efficient but an exemplary, formal cause of the universe. It is also its final cause, since matter has an internal, teleological tendency to evolve in

order to more perfectly imitate spirit. Matter is substantial and possesses three intertwining qualities called *gunas*: *sattva* (from *sat*, the real or existent), *rajas* (from *raj*, motion or energy), and *tamas* (darkness or inertia). When these qualities are in balance, the universe is in a quiescent and undifferentiated phase (*pralaya*), but it becomes active and differentiated when the presence of spirit so arouses the quality of *rajas* that it overcomes the resistance of *tamas* and results in the dominance of *sattva*. Thus matter becomes more and more like spirit, never, however, becoming identical with it.

This process of differentiation of matter first produces cosmic intelligence, which then divides into an individual self-consciousness proper to each person. In each personal self a further differentiation takes place between mind (*manas*, seemingly equivalent to the Aristotelian “internal senses”) and the five external senses with their subtle objects. These objects are sound, the tangible, the visible, the flavored, and the odorous, to which correspond the sensible elements: ether, fire, water, earth that carries sound, and air that carries sound and touch. These are in turn paralleled by the five physical operations of speaking, procreating, excreting, grasping, and moving. Thus cosmic and individual intelligence and mind are all included in matter, and only when spirit is emancipated from reincarnation in matter in all its differentiations does it at last exist in its purity as the solitary Absolute. *Samkhya*, however, says nothing of a creator God. The *Yoga* system accepts the *Samkhya* cosmology, except that it adds to it a creator (*Ishvara*) as an efficient cause of the differentiation of matter. *Yoga*, however, is mainly devoted to the meditation techniques by which this separation of spirit from matter is to be effected.

The *Nyaya-Vaisheshika* pair of systems was attributed to Kanada (c. 200 BCE), but its standard systematization dates from about 300 CE. The name *Vaisheshika* means “property” or “peculiarity,” and indicates the realistic and pluralistic character of this system. It distinguishes a set of categories that includes substance (*dravya*), quality (*guna*), action (*karma*), and relation (*samavaya*, connectedness), plus the logical categories of genus

and species. Later *abhava*, nonexistence, was added to this list, and perhaps refers to what Aristotle meant by purely mental beings (*entia rationis*). The category of substance was subdivided into (1) earth, (2) water, (3) fire, (4) air, (5) ether, (6) time, (7) space, (8) soul (*atman*), and (9) mind (*manas*). The first four kinds of these substances consist in atoms too small to be visible, although three atoms taken together make extension (quantity). Soul and mind (internal senses) form the individual human being. Again, as in *Samkhya-Yoga*, release from reincarnation is to be gained when a self (*atman*) realizes it is independent of the material body. *Vaishesika*, like *Samkhya*, was originally atheistic, but later, like *Yoga*, it added a creator God to produce this plurality of substances. Thus, in both cases, Ishvara or God is not really a creator *ex nihilo* in the Judaic sense, but resembles the Platonic “Demiurge” that is only the efficient cause of the origin of plurality and differentiation of preexistent matter.

Thus *Samkhya* and *Vaishesika* have many points in common with Greek cosmology. *Samkhya* resembles Platonism in positing an ascending scale of being from gross matter to subtle matter in imitation of spirit as the exemplary and final cause but not the efficient cause of cosmic change. Only in this way does it seem to *Samkhya* and to Platonism that it is possible to save the First Principle of change from being itself subject to change. On the other hand, *Vaishesika* resembles Aristotelianism in its pluralism and its careful development of categories that are similar to, though not entirely the same as, Aristotle’s categories. Thus, for *Vaishesika*, “aether” is not, as for Aristotle, the matter of the inalterable celestial bodies but fills all of empty space, and thus more resembles the aether of nineteenth-century physics. The same is true in *Vaishesika* of “time” and “space,” which are more like substances than Aristotle’s relational accidents of “time” and “place.”

It would seem, therefore, that the *Samkhya* and *Vaishesika* cosmologies, and also the still less developed one of Jainism, belong more to the level of pre-Socratic thought (for example, in their concept of atoms) and of Platonism than the critical Aristotelian physics out of which modern science ultimately

developed. Three factors seem to account for this. First, the primary interest of Hinduism is not to study nature as such but rather to emancipate the human spirit from a world of change and suffering. Second, the reliance of these cosmologies on the Vedas as a record of spiritual experience accessible to all who strive to attain the absolute perhaps made these philosophers too easily content with their analyses of sensible experience. Third, the Greeks' development of pure mathematics and, as a result, their systematization of a more critical logic of science stimulated them to go beyond the level of cosmology that India achieved.

The philosophies of China and its satellites in Korea and Japan can be more briefly noted, because China, although it had a rich ethical tradition, was much less concerned about "metaphysical" questions than the West or India.¹⁰³ The central figure was Confucius (K'ung Fu-Tzu, 551–479 BCE) who in chapter 1 was mentioned among the world religious reformers. He revered the traditional High God of China (*Ti'en* or *Ti* or *Shang-Ti*, Lord) by the impersonal name of "Heaven" but discouraged speculation about the spiritual realm. His chief concern was to form personal character through education so as to promote social harmony. This education was served by the careful practice of traditional rituals and etiquette, and by the study of the Five Classics of Chinese literature. Confucianism was developed with an optimistic attitude toward human nature by Mencius (c. 372–c. 298 BCE) and with a more negative attitude by Hsün-Zu (c. 313–c. 238 BCE). Under the Han Dynasty in 136 BCE, Confucianism became the official state philosophy (or "religion") and the basis of education.

As the thought of Plato dominated the West, yet was always under criticism by the Aristotelians, so Confucianism was constantly criticized by the Daoists (Taoists). The origin of Daoism was attributed to Lao-Tzu, a contemporary of Confucius, and it was further developed by Chuang-Tzu (b. 389 BCE). In opposition to the Confucian emphasis on education, Daoists favored a search for a harmony between human life and the rhythms of nature, and were not adverse to the practice of astrology and various magical efforts to achieve physical immortality. Thus, throughout Chinese history, this dialogue

between the social traditionalism of Confucianism and the nature mysticism of Daoism kept each other in balance.

Related to these two principal tendencies were the Legalism of Lord Shang (d. 360 BCE), which sought social order by the enforcement of laws in contrast to Confucius's emphasis on the development of personal virtue, and Mohism. The latter was named after Mo-Tzu (d. c. 403 BCE), and tended in the Daoist direction. Yet Mohism also developed a remarkable system of logic, or more accurately semiotics, an interest already expressed by Confucius when he said that great attention should be given to the correct *naming* of things since to name is to find the essence of a thing. This elaborate study of language and dialectics, often called the School of Names, was used by Mo-Tzu to support a utilitarian ethics. With Chuang-Tzu it led to what has been called a "skeptical perspectivism," which urged the toleration and reconciliation of many points of view.¹⁰⁴

In this classical period there was also some interest in understanding the natural order by the so-called Yin-Yang School, but mainly as the pattern for ethical harmony. These thinkers sought to explain the world as a balance between active, masculine agency (*Yang*) and feminine passive receptivity (*Yin*) acting on five material principles: fire, wood, earth, metal, and water. This roughly parallels the Indian *Samkhya* and *Vaisheshika* cosmologies, as well as the Greek notions of matter and form, the four causes and the four elements. Nevertheless, Chinese cosmologists seem to have regarded the world as pluralistic, "ten thousand things," rather than as a systematic whole. They did not seek to explain the world through *causes* so much as to relate things by their *similarities*.

Thus Chinese logic was really more a hermeneutic than a system of demonstration. Nor did Chinese thinkers focus on metaphysical Being versus Not Being, as did the Greeks from Parmenides on, but rather on the *you* versus the *wu*, terms that are translated as "availability" or "possession" versus "unavailability" or "nonpossession" in the sense of the presence or absence of some object as significant for practical decision and action.

During the Han Dynasty, official Confucianism attempted to assimilate the other tendencies of Chinese thought to form a unified synthesis. In the first century CE, however, this synthesis was somewhat eclipsed by the influx of Buddhism from India, and later through the mission of the Buddhist sage, Bodhidharma (c. 475 CE). This Chinese Buddhism, however, was soon modified by Chinese practicality and took on the form of *Ch'an* (Japanese Zen). In this current, the T'ien Tai (Japanese Tendai) sect, led by Chih-i (538–597 CE), developed a system of the “Perfectly Harmonious Three Fold Truth” based on the *Lotus Sutra*. This Chinese interpretation of Buddhism teaches that, although the phenomenal world is “empty” or “non-existent,” yet it also has a true temporary existence that is simultaneous with its nonexistence. Hence, by the practice of constant silent meditation, Zen hopes to maintain this sense of emptiness in the midst of daily, practical life without opposing one to the other. In this way the practical Chinese could accept Buddhism without rejecting their pragmatic orientation.

Buddhist influence declined under the Song Dynasty (993–1059 CE) when a NeoConfucian ethics recovered dominance. Yet the more speculative and metaphysical questions that Buddhism had raised demanded to be assimilated to the Confucian perspective. Chu Shi (1130–1200 CE) founded what is called the School of Principle, which in the fourteenth century became the official interpretation of Confucianism. It taught that all things are explicable by *li* (Principle) that reflects a supreme principle, the Great Ultimate (*Daji*), and by *qi* (matter) that is given order by *li*. The ethical conclusion of this dualistic systematization was that persons must imitate *li* in themselves and their lives so as to control the disorderly impulses of their bodies as physical matter.

In opposition to this dualism, the School of Mind founded by Ch'eng Hao (1032–1085) taught that *li* or Principle was innately free of matter, so that everyone could discover the truth by which their lives could be guided by looking within themselves. Eventually, this idealist school adopted Ch'an meditative practices or returned to a Daoist reliance on spontaneous instinct. Thus, Neo-Confucianism experienced a debate between Realism

and Idealism parallel to that in Western thought. With the Manchu Dynasty (1644), a School of Practical Learning arose in opposition to idealism and subjectivism, culminating in the writings of Tai Chen in the eighteenth century. He insisted on the importance of a positivistic concern for facts and consequences in making ethical decisions. This positivistic Confucianism was soon confronted by Western thought and modern science, and at the beginning of the twentieth century China fell under the influence of the western Marxism that still dominates the country, although this too is undergoing adaptations to the native culture.

Even this brief comparison of the highly spiritual culture of India and the practical, ethical culture of China reveals many parallels between their worldviews and those of the Western Ecumene. It is also clear, however, that the Western achievements in natural science, the metaphysics that they imply, and the increasing control over nature by modern technology that science makes possible were never fostered in these two great cultural centers. Nevertheless, as the West has come into contact with Indian spirituality and the more practical, ethical, and social wisdom of China, it has begun to see its own limitations and to find in these two cultures an inspiration to recover spiritual and ethical elements in its own tradition that modernism neglected.

Centers for the study and practice of "Eastern Spirituality" are springing up throughout the United States and Europe. This opening of the West to the East proclaims to modern science how necessary it is to face the problem of the seeming dualism between matter and spiritual intelligence that today's science still attempts to ignore. From an Aristotelian perspective, on the other hand, it is clear that Eastern cultures as they accept Western technology must now deal with the modern science that developed out of Greek cosmology. Yet in doing so these non-Western peoples must critically rethink the foundations of modern science so as not to succumb to its materialism and reductionism. A tragic aspect of the confrontation of East and West is that Western technological dominance may undermine this ancient wisdom before it has had the opportunity to make its full contribution to humanity. A Western scholar who has studied the traditional schools of India in which this wisdom has been handed

on through the centuries found them dying.¹⁰⁵

The Existence and Essence of Metascience

A. THE EXISTENCE AND VALIDITY OF AN AUTONOMOUS METASCIENCE

In previous chapters I attempted to provide a multidisciplinary and multicultural context for the achievement of a genuine human wisdom, and in particular to show that a careful analysis of the foundational part of natural science makes clear that natural science *is not* this wisdom but *is* the necessary path to it. In this chapter I will try to bring all this together to provide an adequate defense for a science of First Philosophy validly constituting that human wisdom. Therefore I ask the patience of the reader with the repetition of previous arguments that will be necessary to summarize all the elements of this defense.

In the last chapter the foundations of natural science were analyzed to show that natural science cannot explain the world of change without ultimately concluding that it is the effect of an immaterial First Cause that exceeds the scope of natural science's own principles and method. It was shown that this is true also of the other practical and theoretical sciences because they must be grounded in natural science. Therefore, since

natural science cannot serve as First Philosophy, neither can they. Thus the first of the four scientific questions about First Philosophy, namely, “Does a First Philosophy exist?” seems adequately answered in the sense that there exists a proper subject for such a science formally distinct from that of natural science and the other sciences derived from natural science. It must be a science grounded in our knowledge of material being since that is the formal object of human intelligence, within which immaterial being is only *potentially* included, but whose scope can be extended beyond material being to immaterial being once it has been proved that the ultimate cause of material things cannot be material. From this point on, however, I drop the terms “Metaphysics” and “First Philosophy,” in spite of the great tradition behind them, both because of the ambiguities that I have described in the modern use of the term “philosophy” and because of the medieval confusions about the adjective “First” produced by Scotus’s reading of Aristotle. This will entail some awkwardness in ascribing (except in quotations) to other authors who speak of “metaphysics” the term “Metascience,” which they do not use, but I hope this warning to the reader will suffice. Today the prefix “meta,” as in “meta-mathematics” or “meta-linguistics,” is common enough to indicate a reflection over the principles and methods of a discipline that presupposes the details of that discipline itself. Consequently, it should be clear that “Metascience” presupposes the other special species. Some ambiguity remains, of course, due to the fact that the term “science” commonly brings to mind natural science rather than any of the other disciplines. Perhaps this is not too confusing, since my contention is that natural science has an epistemological priority to the other sciences. In any case, I use the term “science” in the broad Aristotelian sense of any discipline that is critical, systematic, and attains at least some certain conclusions.

This brings us to the second scientific question about Metascience. Granted that a proper subject exists for such an autonomous science (the answer to scientific question 1), “exactly what is this subject essentially?” (question 2). “Immaterial” is a purely negative notion of this subject, but for Metascience to be a

science it must seek a positive knowledge of the essence of its own subject; and from that essence as their cause it must demonstrate the subject's properties (questions 3 and 4). Does this mean that the subject of Metascience is about immaterial being, or does its subject include both material and immaterial being, as it would seem an architectonic science must do? Does the subject of Metascience also include the First Cause that utterly transcends other kinds of being? And further, how can such a "science of everything" leave any room for the autonomy of natural science, mathematics, ethics, and logic?

B. WHAT IS THE PROPER SUBJECT OF METASCIENCE?

1. The "Analogy" of Being

Since immaterial beings are only known to exist as the cause of material beings, their essences must be knowable through their effects. Effects must somehow resemble their cause, since a cause can only give to its effects what it itself already possesses. Yet "Being as Being," if it is taken to include all reality, both material and immaterial, at first seems an utterly empty notion. John Duns Scotus argued that since "being" can be said of anything that in any way exists, in the sense that whatever exists is not nothing, "being" as it is the subject of Metascience should be understood in the precise same sense univocally of everything that exists.¹ He held that Being in this univocal sense is the most universal concept we possess and is presupposed to all our other concepts. Hence Metascience, as the science of Being as Being, is epistemologically first among the sciences.

It might seem that this would make "Being" a generic concept of which every kind of being would be a species. Scotus did not, however, consider "Being" a genus, but instead distinguished

between degrees (modes) of Being. Thus he held that God is Infinite Being and creatures are finite being, though they are both Being in exactly the same sense. In this Scotus was true to the Augustinian tradition of the Franciscan Order, and ultimately to St. Augustine's Platonic background, since for Plato all things emanate from the One in descending degrees of intensity of being, as rays emanating from the sun grow dimmer and dimmer.

Yet it seems evident that the subject of this Metascience cannot be known simply negatively, since Being that is merely "not-nothing" is meaningless except as a negative of "something" that is positive. For Scotus, therefore, Being must have meant primarily all that is really *possible*. Hence, in proving the existence of God, he prefers to proceed from the possibility that God exists rather than from the changeable beings that by our senses we know actually exist. He insisted on this way of proving God's existence, because what is possible is necessarily so, while what we know from our senses as actually existing is only contingent and thus only hypothetically necessary. While he accepted Aristotle's insistence that we know reality only by the aid of our senses, he held that this restriction is either due to original sin or simply for the sake of harmony among the spiritual and bodily faculties. This limitation does not prevent us, he says, from directly grasping the univocal notion of Being as Being as it actually includes all really possible being.²

For Aristotle and Aquinas, however, as was said in the discussion of the four scientific questions in chapter 4, we cannot know what is possible except from what is actual. Is not Aquinas, therefore, on firmer grounds in following the view developed in the last chapter when he begins from our knowledge of changeable being and moves through the proof that such being is the effect of a First Immaterial Cause? It is, of course, true that this changeable being known through the senses with *factual* necessity is contingent, but although it is contingent, it does certainly in fact exist, and such necessity is sufficient for a logically necessary demonstration of the existence of the First Cause. That the existence of the First Cause has an absolute, not merely a factual existence, that is, that it exists necessarily, can then be shown in Metascience. In this way Scotus's daring but

dubious attempt to show that the existence of an infinite Being is possible can be avoided.

The efforts of Suarez and later Leibnitz and Christian Wolff to follow Scotus in making the subject of Metascience also extend to all possible being prior to proving the existence of the First Cause also left them open to the charge of accepting Anselm of Canterbury's (1033–1109) famous "ontological proof" of God's existence.³ Anselm attempted to show that from the fact that we can conceive of a "Perfect Being" that such a Being must exist, otherwise it would not be perfect. Aquinas pointed out that the fallacy of such an argument lies in the false assumption that we not only think about a Perfect Being by negating the imperfections found in contingent beings, but that we can know what a Perfect Being would be positively. Thus, we know that God's existence is possible only when we have first proved that in fact he exists. Kant, however, tried to reduce all proofs of God's existence to Anselm's proof, and then to show that all such proofs are based on the same fallacy.⁴ But Aristotle's demonstration and Aquinas's expansion of it in the Five Ways does not rest on this fallacious assumption.⁵

A special difficulty not found in the special sciences arises in the case of Metascience. Natural science is primarily about all substances that can be classified in the category of substance, descending from the broadest genus down to the species of changeable things. The name of a genus applies to all its species in exactly the same sense (univocally). For example, vertebrate and invertebrate animals are very different, yet they are all called animals, living substances that have sensation, in exactly the same sense. Secondly, natural science is about the properties of these substances, but again these properties can be classified in the nine Aristotelian categories of accidents, and in each category the genera and species will have univocal names. Similarly in mathematics, in geometry words like "point," "line," "plane," "solid," and their various species are univocal. It is especially this univocity of its language that makes mathematics so clear. Hence in every science we seek to find as univocal a terminology as possible in order to get precision and avoid

confusion.

It is only when we try to find names that apply to both substances and their accidents, or to more than one of the categories of accidents, that our terms become “equivocal,” that is, have more than one sense, so that we must be careful to make proper distinctions between their different uses. Thus, the terms “change” used for both substantial and accidental change, and “property” used both for “place” and for “time” are equivocal, yet not *merely* equivocal, since the terms in question are not simply unrelated sounds but refer to things that have a real relation to each other and can be named analogically. Accidents exist in substances and qualify them, and the property of place is related to that of time. Hence the use of the same word to signify different but related things is a form of equivocation that is called “analogy.” It is important, however, as Ralph McInerny has shown, to note that, properly speaking, “analogy” has to do only with the use of words or terms,⁶ and as such pertains to logic, and hence will be more fully discussed in chapter 9. We use analogical terms to talk about related realities, but the realities and their relations are not properly “analogical”; any reality is what it is, and not several different things. It is only the processes of human thought and the inadequacy of human language in which we express thought that leads us to understand something we do not understand through what we know better, and consequently to express it by analogical terms.

Yet in an improper sense we can speak of the “analogy of being,” insofar as these human limitations force us to use analogical language to call different but related beings by the same name. The reality before us, however, is that of many kinds of being that exist in very different ways, and that can be included under the single name of “Being” only by reason of their relations to each other, not because they can be reduced to a single genus—nor even, as Scotus claimed, to degrees or intensities of a single kind of perfection. To suppose that the difference between the necessary First Cause and its contingent effects is only a matter of degree, even when it is said to be “infinite,” cannot be decided at the level of the establishment of the subject of Metascience, but this will be taken up later when the question of

the nature of the First Cause is addressed positively. Thus, in contrast to any Platonic reduction of all beings to a single notion of Being, the Aristotelian Thomistic view of the subject of Metascience is aimed at preserving the uniqueness of every existing being while maintaining their intricate interrelatedness.

There has also been considerable controversy on whether “Being” (*ens commune*) as the subject of Metascience is known conceptually or by a judgment. Yet it should be clear that its employment as the subject of Metascience requires that question 1, “Does it exist?” be answered, and thus that the judgment made that “Being” as *ens commune* exists means that all the items included under that term exist, have ultimate actuality, their *actus essendi*. The truth of this judgment is evident once the existence of immaterial beings has been established in the way already shown in chapter 4, but only then. The subject of Metascience, therefore, is not known simply by the intuition of a concept but by a judgment of existence. Yet the judgment that “Being is” or “has esse” would be meaningless unless the subject of the judgment “Being” in the sense of *ens commune* were somehow known conceptually, even although only analogically. It is precisely the work of judgmental predication to actualize or clarify what is only potential or implicit in the subject of that judgment.

Thus when we make the judgment “water is H₂O,” we are defining or making clear what “water” is and answering question 2, “What is it?” We could not make that judgment unless we first knew that “water is (exists),” and thus had answered question 1. Yet, as I have said before, this implies that, in answering question 1, we have at least some vague notion of what “water” is simply in knowing that it exists. In answering both questions 1 and 2, therefore, we are taking two steps in clarifying our knowledge of some object.⁷ Similarly, to judge that “Being as such” (*ens commune*) as it is the subject of Metascience “is” clarifies the meaning of the concept “Being as such” by making explicit that precisely what all the kinds of being that are included in “Being as such” have analogically in common is the actuality of esse. They do not, however, have esse as if they were species in a genus, nor, as Scotus thought, simply by the degree in which they are

remote from non-being, but analogically, that is, in ways that are in some respect or other similar, yet more different than alike. By this way of conceiving, Aristotle and Aquinas save both the real diversity of the substances that make up our universe, yet leave room for their many relationships. Hence it is an exaggeration to assert, as some do, that, according to Aquinas, the subject of Metascience is *esse*, “to be,” as if all real things have in themselves some common reality called *esse*. That would return us to the Scotistic univocation. It is only the analogical community of all these beings that permits them to be considered in the one Metascience.

Thus Metascience has no data of its own, but compares and relates the findings of the special sciences, since its subject is too diverse to be reduced to a single genus or to degrees within a single common essence. Existents are often only minimally like each other, as different as a man from an oyster or an oyster from a quasar, and (if we have proved they exist) angels from material bodies, and above all the Creator from the creation. Each kind of being is a being in a unique way, and only in the First Cause is every possible way of being positively realized. Therefore, to talk about all these diverse but related realities, we must use the analogical term “being,” and are justified in speaking, although improperly, of the “analogy of being.” We must keep in mind, however, that there is no such thing “as Being” distinct from all these diverse beings. *Ens commune*, the subject of Metascience, is “common” only in that all these different kinds of beings are variously related to each other.

Although material and immaterial things are so different that they cannot be simply reduced to a single genus or to modes of a single kind of being, it is not fallacious to reason from what we know by observation of material things to conclude something about their immaterial causes. Aquinas points out that reasoning that extends to immaterial entities is of three kinds and can be expressed in analogical terms in three ways.⁸

First, as already shown, such reasoning must be based on relations of cause and effect. Only if we reason from material effects to immaterial causes can we be sure that our conclusions are existential or real.

Second, since a cause is equal to or greater than its effects, we must extrapolate from the observed effects in our material world to concepts of immaterial reality that exceed anything we know directly. Thus we should attribute to immaterial substances only the positive properties of material things. Moreover, these properties must first exist in their immaterial causes in a greater perfection than in their material effects, because they are not limited by the material conditions to which they are necessarily subject in these effects. If there are pure spirits, they are far more intelligent than we are and far more powerful, because their intelligences are not limited by dependence on bodies.

Third, we must be careful not to think that our conceptions of these more perfect things are adequate. Immaterial things far exceed our capacity to understand them essentially, since what we know of them is minimal compared to the reality. Some writers argue that immaterial reality, if it exists at all, must be so different from material reality that nothing meaningful can be said about it. This argument, however, is refuted by the fact that we can demonstrate the existence of immaterial things from their observable material effects, and it would be contradictory to say that a cause in no way resembles its effects, since that amounts to saying that it gives what it does not have.

These three ways of reasoning—by *causality*, *eminence*, and *negation*—enable Metascience to arrive at a true, though very modest, idea of the totality of reality far greater than our limited powers of direct observation reveal. Thus Metascience is valid, but is especially to be called “philosophy,” the love of wisdom, rather than wisdom itself. Yet Aristotle rightly says that, although our knowledge of divine things is minimal, it is worth more than all our knowledge of lesser things that we can know so much better.⁹ Thus by the natural science proof of the existence of *ens commune* (Common Being) that includes both the totality of material things as effects and things that are not material as their causes, we can proceed to a more positive knowledge of the totality of the real. But we must always reason from what we sensibly experience to what we cannot experience or express *except* in analogical terms.

Thus the proper subject of Metascience is “Being” taken in all its many different but related senses. As previously mentioned, Thomists have often compared this formal subject to that of the other speculative sciences by using the notion of “three degrees of abstraction” proposed by the great Thomistic commentator Thomas de Vio, Cardinal Cajetan.¹⁰ According to this schema, natural science is of the first degree of abstraction simply by the fact that all science is of universals; mathematics is of the second degree by abstracting quantity from material substance and its other properties; while logic and Metascience are of the third degree of abstraction since they wholly transcend the conditions of matter. This is correct provided that it is not understood as if these “degrees” were three steps in one process, since in fact the three processes are of different types.¹¹

Moreover, while mathematical abstraction (the only type Aristotle calls by that name¹²) excludes all of material being except its quantity, metascientific “abstraction” *includes* all reality, material and immaterial, but in a totality whose unity is merely relational. Since this book follows Aristotle’s epistemology, as did Aquinas, I will henceforth use “Being” (as such) with a capital as an analogical term, grounded in existence by the relation of cause and effect, and able to be used to understand something of the essential natures of immaterial entities. Thus we can proceed from the demonstration of the existence of Being as it includes both material and immaterial beings to a consideration of the essences of immaterial beings in relation to material beings.

The question of whether God, as First Cause, is included in the subject of Metascience is a famous question. Avicenna was thought to deny this to be so, but later Averroes, Duns Scotus, and Suarez held (though in different ways) that God is included in the metascientific concept of Being.¹³ Aquinas explicitly denies that God is included in Being as Being in the sense of *ens commune*, since he is the cause and principle of *ens commune*, not a part of it.¹⁴ The question of how creatures can be said to “participate” in God’s being will be discussed later. Thus, it is better to say that to know the First Cause is the *aim* or *goal* of Metascience, but is not included in its subject.

2. The Descriptive Definition of the Generic Subject of Metascience

Granted that, while the special sciences generally have univocal subjects, Metascience can only have an analogical one, how are we to define this subject matter essentially? From the time of the Greek Aristotelian commentators there have been heated arguments about what this proper subject of Metascience might be. Platonizing commentators supposed that, since Metascience concerns immaterial things, it is primarily a theology (*theos*, “divine,” and *logos*, “science of ”), although one based on reason not faith. Others consider it to be an ontology (*ontos*, “being”; *logos*, “word”— the term was invented in the eighteenth century by Christian Wolff) treating of Being as Being. Giovanni Reale has shown, however, that Aristotle’s *Metaphysics* is at the same time a theology, an ontology, a study of the causes or etiology (*aitai*, causes), and an epistemology (*episteme*, scientific knowledge).¹⁵

In the twentieth century, Martin Heidegger revived the discussion by raising the question “Why does anything at all exist?” He dramatically called this question “a leap through which man thrusts away all the previous security, whether real or imagined, of his life”:

[It] opens up its own source, the original source or origin (*Ursprung*), the finding of one’s own ground. It is because the question “Why are there essents rather than nothing?” breaks open the ground of all authentic questions and is thus the origin (*Ursprung*) of them all so that we must recognize it as the most fundamental of all questions.¹⁶

What, indeed, does “to exist” (Latin *esse*, “to be,” the act of existing) signify? From the outset, Aristotle and Aquinas, in opposing Plato, separated themselves from any form of idealism by saying that “to be” first of all means to be independent of the

human mind. Berkeley's famous assertion that *esse est percipi*, "to be is to be perceived," is thus radically inconsistent with Aristotle's view that the proper object of the human intelligence is the essence of material things that existed before we did and will exist after we are gone.¹⁷ One might of course argue that perhaps someone else knew them before I did and no doubt will know them after I am gone. But as they clearly exist independent of my mind, there is no sufficient reason to suppose that they depend on your mind or on any human mind whatsoever.¹⁸ Thus for Aristotle the purely mind-dependent relations that are the proper object of logic are "beings" only in a secondary sense that we reserve for the discussion of that discipline later.

Mind-independence, however, is not the only note of the analogical term "Being." As we have seen in the last chapter, in establishing the foundations of natural science in the *Physics* Aristotle demonstrated that the nine categories of accidents depend for their existence on *substance*, which alone is independently existing being. Hence the "Being" that is the proper subject of Metascience, although it can also be said of accidents that have a kind of being dependent on substances, is *principally* said of substances, material or immaterial, that are mind-independent primary existents. It is said of accidents, whether they are properties or mere accidents, only secondarily. Moreover, contrary to Scotus, Leibnitz, and others, the subject of Metascience cannot be possible being. For something to exist (Latin *esse*, Greek *einai*), whether it is caused or uncaused, it must be not only "outside nothing" but also "outside any cause." The purely possible, if it does not exist in a cause that actually exists, does not exist at all. It is only a mind-dependent construct that, for all one knows, may even be selfcontradictory, as we saw to be the case for Ptolemy's belief that the sun may orbit the earth.¹⁹ Since it is nothing it cannot be the subject of any science.

Since, however, there are many kinds of "to be" that are only analogically alike, if the term "Being" is to have specific content, we must determine which kind of being is best known to us, and then look for its relations of likeness and unlikeness to other modes of "to be." We have also seen that the kind of being that

for us is the principal analogate through which we must know other kinds of being by causal connections is *ens mobile*, “becoming being,” not static being. We know material things only as we interact with them and change them and are changed by them. We come to know them essentially only by watching their uniform behavior. In the first phase of its history, modern science largely ignored the fact that any scientist-observer is part of what she or he observes. With Einstein and quantum physics it has become apparent that this is never entirely true. We are part of the universe and can know it only as it interacts with us.²⁰ Yet surely it is unreasonable to suppose that material things change only when we think about them, an odd notion entertained by some writers on quantum physics.²¹

How then can “all that which is” be defined? Obviously “to be,” since it is the most general feature of all reality, cannot be defined by classifying it under some broader term and distinguishing it from other things. But, as we have already seen, Aristotle in the *Posterior Analytics* and *Physics* proposed a more profound way of defining than merely by classification, namely, through a causal analysis in terms of the four “causes” (Greek *aitiai*): material, formal, efficient, and final. He did this by showing that the proper subject of natural science, namely, changeable being (*ens mobile*), is intelligible only if every changeable thing is constituted from an actual principle by reason of which it is what it is. Yet precisely because it is changeable it is also constituted by a correlative potential principle by which it is capable of becoming something else. This analysis establishes the existence of actual causes (formal causes) and potential causes (material causes) as the intrinsic components defining any changing thing.

Aristotle, by also showing that nothing can move itself because it cannot give itself the new actuality it does not yet have, proved that change would be impossible unless extrinsic efficient causes (the ordinary English meaning of “cause”) and final causes also exist. As shown already,²² by final cause Aristotle did not mean either some conscious purpose in things or some other occult type of efficient causality, as some suppose. He simply meant that, *since* science is about uniform changes

that result in relatively stable states of affairs, it *primarily* studies those natural changes that are repeated and therefore predetermined in their effects. This predetermination of natural efficient causes, their “directedness,” is what Aristotle meant by final causation (teleology or teleonomy), and this is necessarily a part of scientific explanation.²³

Therefore, this same method of analysis as that which the *Physics* applies to material beings can be applied to *ens commune*, the totality of contingent known or knowable things that exist, whether material or immaterial, but only by reasoning from effect to cause. Thus we must conclude that in the case of existing material things there must be not only a composition of matter and form to constitute their essences, but also a composition of essence and existence as really distinct actuality and potentiality to account for their factual (not merely their “possible”) existence.

If material things were not thus composed of essence and existence as distinct principles analogous to their composition from matter and form they would exist necessarily. Hence they would be unchangeable even as regards local motion. By analogy, the same must be true of immaterial things that are the causes of material things. If pure spirits exist, as both Aristotle and Aquinas believed, they are not mortal (since they have no bodies). Thus, once they exist, they exist permanently. But this existence and its conservation are the effect of the First Cause, and hence, as argued in chapter 4, is only a hypothetical or conditional existence.

Not only the kind of existence that material things possess, but also the kinds of existence that human spiritual souls and pure spirits (if they exist) possess, are all effects of the First Cause whose own existence we know through these effects. These existences are *contingent*, that is to say, do not exist necessarily.

Thus only the absolutely first immaterial Uncaused Cause has an existence that is identical with its essence, and hence is absolutely necessary. All beings other than the First Cause are *contingent*, that is, they do not exist necessarily, or, to put it another way, they are constituted from existential acts really

distinct from their essences, a distinction that remains in their existential state. *Esse* is the *actus essendi*, an act by which an essence is part of our real world.

This is the famous Thomistic “real distinction” between essence and existence in creatures and their identity in the First Cause,²⁴ mentioned in the previous two chapters. This distinction was vigorously rejected by many medieval and baroque scholastics. Scotus and Suarez, as mentioned in chapter 4, did not hold, as did Aristotle and Aquinas, that matter is pure potency in a strict sense, but assigned to it a certain degree of positive being; Scotus held that God could have created prime matter with any further form, since prime matter has a minimal actuality of its own.²⁵ Hence, for Scotus and Suarez, the analogy between the matter-form relation and the essence-existence relation had to mean that essence has a positive entity of its own apart from existence, such that one can speak of the *esse essentiae* and the *esse existentiae* of things. Thus existence would be added to an essence that already had its own *esse*. These authors could not admit this real distinction, because it seemed to them that this meant that created things would not be absolutely contingent but would have a certain innate necessity, a notion absolutely repugnant theologically, especially to Scotus, who wished above all to emphasize the absolute freedom of the Creator. Consequently, these authors rejected the Thomistic view. Scotus held that essence and existence are only *formally* distinct in thought, although he did not deny that this distinction was somehow founded in reality.²⁶ For Suarez, this foundation was simply the fact that the existence of the thing is the result of the efficient causality of the Creator.²⁷

If, with Aquinas, we hold that there is a real, not simply a formal distinction of essence and existence in contingent beings, does the subject of Metascience include or exclude the First Cause? To this query Aquinas answers that the First Cause, as the absolutely Prime Mover in whom alone essence and existence are identical, is not included in the subject of Metascience since this First Cause infinitely exceeds realities whose existence it causes. Nevertheless, some understanding of

the First Cause is possible within Metascience, not indeed as part of its subject, but as the principle or cause of the subject of Metascience. Hence the First Cause is not its subject, but its aim or goal. We make use of what we can know of its subject, namely, contingent Being as Being (*ens commune*), to arrive by reasoning from effects to cause at some knowledge of their Creator. It is this knowledge of the Creator that is most truly the human wisdom that we seek.

Therefore the subject of Metascience is defined (or better, described, since it is an analogical term that cannot be classified in a genus) as:

all existent substances, whether material or immaterial, as they are contingent, that is, composed of an essence (the potential) really distinct from their existence (the actual) and considered precisely as existing in various modes that are related as causes or effects of each other in subordination to the First Uncaused Cause as their ultimate principle.

Note that, in this definition, the subject of Metascience is not (as, I will show later in this chapter, some Thomists seem to claim) *esse*, the “to be,” or act of being (*actus essendi*), or *ens ut participium* (being as a participle, be-ing), but “Being as Being,” that is, primarily all existing substances as they are actual in their substantial, independent existence, and secondarily the properties of these substances as they exist in their proper substances. This means that the *formality* under which this subject of Metascience (the substances taken together analogically, *ens commune*) is known is *esse*, because *esse* is their ultimate act and perfection. Yet the subject of Metascience is not merely this formality, as such, but what is known through that formality, namely, the totality of existing substances and their properties in their analogical relations.

Thus, when it is said that this subject is “Being as Being,” the term “Being” is used in two different senses: “Being” as subject of the judgment “Being is” (and as subject of Metascience) is Being as substance (*ens ut nomen*, Being taken as a noun), while

“Being” taken as predicate and the formality under which Metascience studies substances is “Being” as the ultimate act of existence (*esse, ens ut participium*, be-ing as a participle—that is, as be-ing, a verbal term indicating an action) in distinction from the essence of the subject. In all contingent substances these are distinct. Hence, just as the subject of natural science is *ens mobile*, changeable being, that is, real substances that change, studied precisely under the formality of change; and the subject of mathematics is real substances considered precisely under their formality of having the property of quantity abstracted from their other properties; so the subject of Metascience is all that is real, *habens esse*, namely, all material and immaterial substances along with their properties under that formality of *esse*. Since the *esse* of each and every real thing is their ultimate act without which they would neither exist nor be intelligible (“possible”), all our knowledge and each of our sciences is accessible to us only through the *esse* of things. Yet it is only Metascience, human wisdom, that has as its proper task to consider *all* things under the formality of their interrelated yet marvelously diverse and dynamic existences.

Thus Metascience must be an “ontology,” because its proper subject is Being, that is, the totality of contingent beings considered under the formality of what is analogically common to them all, *esse*. It must, however, also be a “theology” because, though the First Cause is not part of the subject of Metascience, it is its goal. Further, it is an “epistemology” because it treats of Truth as it is a property of Being as such and thus provides a critique of all the special sciences. Finally, it is (to use another modern term) an “axiology” (study of values, from Greek *axios*, “worth”) because it also treats of Goodness as a property of Being.

C. ARE OTHER WORLDVIEWS METASCIENTIFIC?

I have pointed out that the notion of a Metascience makes sense only in the context of Aristotle's system and to those who accept that system in its foundational terms, principles, and theorems. Yet, of course, it is common to speak of the "Metascience" of many types of worldview. To what extent is the term Metascience or metaphysics meaningful when used outside its Aristotelian context? There are four senses in which, it seems to me, the term serves a purpose.

First, there is the sense in which something like a Metascience has often been defined as "the study of ultimate questions." For example, it is in this sense that John Paul II used it in his encyclical *Fides et Ratio* where he says that philosophies, though different in method and perspective, have a responsibility to go beyond mere superficialities and face ultimate questions. It is in this sense also that Plato was a great metascientist, and so were Hindu thinkers like Shankara and Ramanuja, and Chinese thinkers like Lao Tzu and Mo-Tzu. In this sense Kant, though he attacked traditional Metascience in the Wolffian form that he knew it, was a great metascientist. It was by reviving this question that Martin Heidegger, in spite of his obscurity and political scandal, became the most influential philosopher of the twentieth century. Thus every thinker who seeks to get to the bottom of thought about the world and human life is in that sense a "metascientist."

A second sense in which something like a Metascience is relevant is to denote systems of thought that try to answer the question "Is ultimate reality spiritual not material?" In this sense, the majority of the great thinkers of the world have made some room in their thought for a nonmaterial Absolute or a God, but not all. Some important philosophers have been materialists, like the Stoics or Marxists, yet they have not been merely superficial thinkers. Indeed, they have tried to show that materialism is the honest answer to these ultimate questions. One could, therefore, by a certain stretch of the term, speak of Stoic or Marxist "Metascience" or "ontology." In a sense, Idealism in all its many forms, like the very different idealisms of Berkeley or Hegel, support a Metascience, because Idealism posits a nonmaterial mind or Mind, such as the Transcendent Subject. One must even admit that the various occultists and theosophists, whose serious

intellectual claims are minimal, have the right to speak of their fancies as “Metascience,” in that they posit the existence of a spiritual realm. Yet insofar as these idealist systems deny or minimize the reality of the material world, they are not the metascientists in the Aristotelian way of understanding the term, which is the name for a science that explicitly recognizes and studies both material and immaterial realities under a common formality of reality, to wit, *esse*.

Still a third sense of the term “metascientific” refers to systems that claim some kind of knowledge *a priori* in relation to sense knowledge as the basis of philosophy, without prejudging whether there is a spiritual world or not. Again Plato, Descartes, Kant, and the great Idealists are also metascientists in this sense.

Fourth, one could say that to compare and discuss in dialogue any worldview and value system is a metascientific task, since it requires a dialogue between those that in some sense defend some kind of Metascience and those that are opposed to all such systems. One can imagine a meaningful dialogue between the logical positivist Rudolf Carnap, who considered Metascience “meaningless nonsense,” and the “process” philosopher Alfred North Whitehead, who proposed an acknowledgedly hypothetical Metascience. Any discussion about what is “meaningful” and what is not can profoundly deal with ultimate questions, if only both sides will admit that it is worthwhile discussing what is the “meaning of meaning.” Perhaps this could include even Deconstructionists. Thus the very notions of interdisciplinarity and intercultural dialogue or “ecumenism” depend on an exploration of the presuppositions of different intellectual perspectives.

I have, however, based my exposition of a Metascience on the thought of Aristotle and Aquinas, precisely because they offer us a well-thought-out defense of the validity of a Metascience that asks ultimate questions in the context of an empirical argument for the existence of a spiritual realm. Even an anti-foundationalist or deconstructionist who honestly doubts that any privileged “foundations” can be found for thought must confess that this anti-foundational conviction is itself “foundational” in the sense that it must be debated in any attempt at dialogue. Thus those dialogue partners who wish to question the Aristotelian Thomist argument

for the existence of immaterial being must do so either with empirical counterevidence, a criticism of the logic, or a defense of their own position on the basis of a nonempirical epistemology. Of course, since Duns Scotus in the Late Middle Ages and Francisco Suarez in the sixteenth century, and especially since René Descartes in the seventeenth century, it has been denied that Aquinas's Aristotelianism is a valid approach to these fundamental questions. In direct contradiction to Aristotle, Descartes held that physics (natural science) is derived from Metascience.²⁸

Admirers of Aquinas's thought today are among the most ardent current defenders of the validity of Metascience. Yet some Thomists also claim that St. Thomas's Metascience (metaphysics) is radically different from Aristotle's. Since my own opinion is that the understanding of the Metascience developed by these two thinkers is essentially the same and is founded on the conclusions of foundational natural science, I will devote considerable space in the rest of this chapter to these difficulties.

D. OBJECTIONS TO THE NATURAL SCIENCE APPROACH TO METASCIENCE

1. Thomist Objections

In chapter 2, I listed eight current interpretations of Aquinas: (1) Essentialist or Conceptualist, (2) Platonizing, (3) Transcendental, (4) Existential, (5) Phenomenological, (6) Analytic,²⁹ (7) Semiotic, and (8) Aristotelian Thomisms. Of these, the Analytic and Semiotic views have up to now little concerned themselves with the question of the subject, or, more properly, as I have shown previously, the *object* of Metascience. The Platonizing and Transcendental Thomists differ so much epistemologically from the Existential and Aristotelian positions that I will leave

discussion of them to chapter 8, which treats of epistemology. The writers taking the Analytic position have not yet written much on my present problem, though what has so far been written from a Semiotic standpoint³⁰ seems to be in general agreement with my line of argument. The Phenomenological view seems to be reconcilable either to an Existential or to an Aristotelian position. Therefore, here I need discuss only the objections of the Conceptualist or Essentialist and Existential Thomists to what I am calling the Aristotelian interpretation.³¹ I am not concerned with the much-debated questions about whether Aquinas's reading of Aristotle is historically correct. In calling the view I favor the "Aristotelian approach," I claim nothing more than that Aquinas himself attributes it to Aristotle. Nor am I primarily interested in defending Aquinas himself or settling arguments as to what he personally thought, except as this bears on what my concern is. My concern is only to show the validity of Metascience in view of its present bad repute. Hence I refer to historical and textual questions only when this is necessary to explain the objective arguments.

The Conceptualist or Essentialist position is now generally considered outmoded, and my friend Lawrence Dewan, O.P., would not accept any such label for the views he has recently expressed in criticism of my position.³² Yet, since he avoids the kind of arguments used by the Existentialists influenced by Étienne Gilson against the Essentialists, I will treat his arguments as an updated example of the Essentialist approach. I will pass over his argument *ex silentio*, in which he points out that even in the texts on which the Aristotelian position relies, Aquinas does not seem explicitly to state that position but generally discusses all philosophical questions as a metascientist. I have already pointed out in chapter 2 that St. Thomas, like medievals generally, had no reason to defend the validity of Metascience (metaphysics) against materialism. Hence nothing can be concluded from the fact that Aquinas usually simply assumes the validity of Metascience, or from his habit of discussing questions from the broadest possible perspective, the metascientific attitude.

Dewan relies chiefly on two important philosophical arguments. (1) Metaphysics, as Aquinas certainly maintains, proves the first principles of all the other sciences, including those of natural science. Therefore, the establishment of the object of metaphysics must be independent of any demonstration from within natural science of the existence of immaterial causes.³³ (2) The proper object of the human intelligence, as Aquinas also certainly maintains, is *ens*, being. Being *universally considered* is the object of metaphysics, not of the special sciences, each of which deals only with a special kind of being. For example, natural science deals not with Being as Being but only with *ens mobile*, being as changeable.

As to the first of Dewan's arguments, it should be recalled that Aquinas himself takes up much the same argument as an objection in the *Super Boetium De Trinitate*, q. 5, a. 1, and provides an answer:

Objection 9: That science on which others depend must be prior to them. Now all other sciences depend on divine science, because it is its business to prove their principles. Therefore Boethius should have placed divine science before the others.

Reply: Although divine science is by nature the first of all the sciences, with respect to us the other sciences come before it. For, as Avicenna says, the position of this science is that it be learned after the natural sciences,³⁴ which explain many things used by metaphysics, such as generation, corruption, motion, and the like. It should also be learned after mathematics, because to know the separate substances metaphysics has to know the number and disposition of the heavenly spheres, and this is impossible without astronomy, which presupposes the whole of mathematics. Other sciences, such as music, ethics, and the like, contribute to its fullness of perfection. [Aquinas's paraphrase of Avicenna ends here and he continues his own comment.] Nor is there necessarily a vicious circle because metaphysics presupposes conclusions proved in the other sciences while it itself proves their

principles. For the principles that another science (such as natural philosophy) takes from First Philosophy do not prove the points which the first philosopher takes from the natural philosopher, but they are proved through other self-evident principles. Similarly, since the first philosopher does not prove the principles he gives the natural philosopher by principles he receives from him, but by other self-evident principles, there is no vicious circle in their definitions. Moreover, the sensible effects on which the demonstrations of natural science are based are more evident to us in the beginning. But when we come to know the first causes through them, these causes will reveal to us the reason for the effects, from which they were proved by a demonstration *quia* [i.e., of the fact but not of the cause of the fact, i.e., a demonstration *a posteriori* not *a priori*]. Thus there is no difficulty in calling metaphysics “First Philosophy,” yet admitting that it presupposes conclusions of natural science, because these are better known to us *in via inventionis*, although metaphysics reflects on all the lower sciences *in via resolutionis*.³⁵

I have argued in chapter 4 that such first principles as that of non-contradiction and of causality are shown *in via inventionis* to be directly evident principles only as principles of natural science restricted to its scope as a science of the sensible. Only when natural science has proved that immaterial being exists can these principles be extended analogically to become universal principles common to all the sciences. Thus, if taken in this universal sense, they are first principles of all the sciences and are proved by Metascience *in via resolutionis*. It remains true, therefore, that as Aristotle and Aquinas say,

If there is no substance other than those that exist in a way that natural substances do, with which the philosophy of nature deals, the philosophy of nature will be the first discipline. But if there is some immobile substance this will not be natural substance, and therefore the philosophy that considers this kind of substance will be First Philosophy.³⁶

So the first argument of Dewan fails because it assumes that natural science is based on principles that are known in their metascientific extension, when in fact he has not shown that Metascience is needed to know these principles. Since for Aquinas, just as for Aristotle, every science is based on *evident* first principles, why does natural science need a Metascience to makes its own first principles evident, especially since, for Aquinas, natural science is more directly based on sense experience than any other science?³⁷

Dewan's second argument concerns the proper object of the human intelligence. He says,

Thomas never says to my knowledge, and never would say, in my judgment, that the proper object of the human intellect is *ens mobile*. When he needs to underline the humble beginnings of human intellection, he uses such a formula as "*ens vel verum, consideratum in rebus materialibus*," that is "a being or 'the true,' considered in material things" (*Summa theologiae* I, q. 87, a. 3, ad 1). This is a formula that, while indicating the mode of being that is the connatural object of the human intellect, preserves the metaphysical starting point from confusion with the notions proper to physical science.³⁸

In chapter 3, section A.1, I discussed the material and formal objects of human intelligence and the difference between its formal object *quod* and *quo*, and I need not repeat this here. I showed that it is true that what is intelligible to us in real objects (*objectum formale quod*) must always be their actuality or being. Otherwise we would be studying some supposedly possible essence, although we cannot know that an essence is possible without first knowing of some real instance of such a being or of its causes. Thus it is correct to say that every science is about being and what is true of it. But metascientific being in the sense of Being as it extends to immaterial as well as material beings is not immediately evident to us. Hence we cannot begin our thinking as metascientists, as Dewan claims. It is only through following the order of the sciences presented by Aquinas in his

commentary on Boethius's *De Trinitate* that the terms used in the principles of the different sciences become clear enough to us through a judgment that the first principles proper to each science can be said to be evident simply from their terms. This is supremely true of Metascience, which enjoys the highest degree of immateriality and thus of intelligibility in itself, but is most obscure to us in our human way of knowing.

Dewan's real concern appears in the second part of his article where he quotes the beautiful text of Aquinas's *Sententia Libri Ethicorum* VI, lect. 5, n. 1181, which shows why Metascience is the architectonic science (the very point to which the present book is dedicated), and again cites Aquinas:

As that one is wise in some art who is most sure in that art, so the science that is wisdom in the most absolute sense is the most certain among all the sciences, in that it attains to the first principles of [all] beings which in themselves are most knowable, although some of them, namely immaterial [beings] are less known *quoad nos*. But the most universal principles are also most known *quoad nos*, as they are what pertains to Being as Being, whose cognition pertains to wisdom, as is said in [Aristotle, *Metaphysics* IV, chaps. 6–8, and Aquinas, *Sententia super Metaphysicam* IV, lect. 7, nn. 700–719].

On this Dewan says,

Though some of these principles are less known to us than other things, nevertheless this claim is well founded, inasmuch as the most universal principles, pertaining to being as being, are both best known in themselves and *best known to us* [my italics and my distinction: best known to us in their restricted physical form, but not in the extended metaphysical form in which they are best known in themselves]. And these pertain to metaphysics. Obviously, if the first principles, as first known, were at first limited to corporeal being as corporeal, they would not be known as they pertain to metaphysics. Thomas sees the principles, precisely as known first of all and to all, as

having the properly metaphysical character. This does not make the beginner a finished metaphysician, but it does mean that the principles of metaphysics are precisely those very first-known principles, not some newly constructed conception of being resulting from the study of physics. If we did not start with metaphysical principles, no particular science would ever provide them.³⁹

On the contrary, I understand Aquinas as meaning that certain first principles, such as that of non-contradiction and of causality, are first and best known to us in natural science in a restricted and hypothetical form as true for our actual universe. In their universal and necessary form, however, they are known metascientifically as applying to all Being, material and immaterial.

Dewan refers to *Summa theologiae* I-II, q. 89, a. 6, ad 3, in which Aquinas indicates that in its earliest truly human acts the child must have some knowledge of the ultimate end in view of which every moral decision must be made, and of course in fact this end is union with God, to which Dewan remarks: “Already, when one undertakes one’s first moral act, one has knowledge of God. *However, it does not have scientific perfection*” (italics added).⁴⁰ Thomists, however, have generally recognized that this does not mean that to perform a moral act anyone, including a child, must have an *explicit, formal* knowledge that union with God is in fact the true ultimate end that alone constitutes human happiness. But this presents no difficulty for the Aristotelian approach to Metascience of which Dewan disapproves. St. Thomas teaches we have “a natural desire to see God,” but that this desire demands the perfect beatitude possible only in the order of grace not evident to reason. Indeed, it is not evident to reason that such beatitude is even possible for finite beings. All that reason can show is that we are *capax Dei*, since intelligence, whether human or angelic, has dynamic openness to receive truth. Indeed, Dewan’s qualification (“However, it does not have scientific perfection”) nullifies his argument, since the qualification admits that the “knowledge of God” to which he refers is merely

implicit and virtual. Therefore we must still ask by what stages of thought one comes to a scientific, critical knowledge of the object of Metascience, as distinct from that of any of the special sciences. Dewan, as far as I read him, provides no answer.

The Existential Thomists, like the Essentialists, argue that a valid Metascience need not presuppose the demonstration of the existence of immaterial substances. They reach the same conclusion as Dewan, but by a different route. They do not accept as Aquinas's own the view that he states without criticism in his commentary on Aristotle's *Metaphysics*:

For the ancients did not think any substance existed other than corporeal mobile substance about which the natural scientist is concerned. And therefore it was believed that only natural scientists treated of the totality of nature and consequently of being, even of the first beings. But this is false since there is a certain science that is superior to natural science, for nature, that is, those natural things that have an intrinsic principle of motion, is itself only one genus of universal being. *For not all being is of this kind, since it is proved in Physics VIII that there exists some immobile being* [italics added]. This immobile being is superior to and nobler than the mobile being that natural science studies. And since the consideration of *ens commune* pertains to that [superior] science, to which [also] pertains the consideration of the first being, it will also be for it to consider its common principles. For natural science is a part of philosophy, but it is not First Philosophy which considers *ens commune*, and whatever pertains to this kind of being.⁴¹

Gilson adopted the Existential approach because he was convinced of the originality of Aquinas on the object of Metascience as *esse* or existential act, as against Aristotle's conception of Metascience.⁴² Thus he wrote,

In fact, everything goes as if, when he [Aristotle] speaks of

being, he never thought of existence. He does not reject it; he completely overlooks it. We should, therefore look elsewhere for what he considers as actual reality. "Among the many actual meanings of being," Aristotle says, "the first is the one where it means *that which is* and where it signifies the substance" [*Metaphysics* VII, chap. 1, 1028a13]. In other words, the *is* of the thing is the *what* of the thing, not the fact that it exists, but that which the thing is and which makes it a substance. This by no means signifies that Aristotle is not interested in the existence or non-existence of what he is talking about. On the contrary, everybody knows that, in his philosophy, the first question to be asked about any possible subject of investigation is, does it exist? But the answer is a short and final one. Once evidenced by sense or concluded by rational argumentation, existence is tacitly dismissed. For, indeed, if the thing does not exist, there is nothing more to say; if, on the contrary, it exists, we should certainly say something about it, but solely about that which it is, not about its existence, which can now be taken for granted. This is why existence, a mere prerequisite to being, plays no part in its structure. The true Aristotelian name for being is substance, which is itself identical with what being is [*ibid.*, 1028b2–8].⁴³

Would it not be more correct to read Aristotle as saying that "being primarily is *existing* substance"? So that for him (and for Aquinas) to say that Metascience is about "Being as Being" is to say that it is primarily about existing substance, rather than simply about its act of *esse*. How can one speak of the act of something without saying *what* that something is that is made actual by its *esse*? Thus Gilson, in spite of his important study of Scotus whom he compares unfavorably to Aquinas, comes, like Dewan, perilously close to the position that David Burrell describes as follows:

So Scotus presents us with a First Philosophy which acts as a foundation science, elucidating the elementary component of any other kind of knowledge. The component is the most

common notion of all hence the ground of predication; it is the most simple and hence the most certain notion and by rights it is the first known of all.⁴⁴

What is relevant in this historical thesis for our philosophical purposes here is only that it raises the question of what exactly it means to say that Metascience deals with “to be” (*esse*), as Gilson and his school so much insist. Once question 1, “Does it exist?” is answered affirmatively, what more in fact remains to be said about that existent than to ask and answer questions 2 through 4 about its essence and its properties? Gilson obviously thinks that much remains to be said, but he does not tell us what that might be, or what questions he would ask about *esse* that are not questions about what kind of a being is actualized by this *esse*.

Surely Metascience could not be called a wisdom, or even a science, if it amounted to nothing more than enthusiastic declarations that “Being is Being”! Certainly it is true, as Aquinas shows, that existence is the *act* of essence. As act is causally *correlative* to the potency of essence, *esse* causes the essence to be and the essence as the correlative potency of *esse* causally limits *esse*. When Gilson asserts that “the true Aristotelian name for being is substance, which is itself identical with what being is,” he seems to forget that for Aristotle “substance is that which has independent existence.” Hence it is quite correct to say that the study of “to be” is the study of substance as such, Being *qua* Being—along with any proper accidents it may have which are dependent on it for their existence, and hence are Being in various different senses.

In the First Cause alone *esse* is identical with its nature or essence, because it is that very nature or essence to exist necessarily. Every effect of the First Cause, by reason of the contingency of its nature or essence, must receive its existence from an efficient cause other than itself, either directly from the First Cause or mediately through causes that can cause only when caused. Hence the existence of all beings other than their Creator is really distinct from their essences, yet this existence,

esse, or actuality, is nothing other than the various acts of their correlative essences. Hence nothing more can be known about an existent being as it is analogically included in Common Being, the subject of Metascience, than its essence and its proper efficient cause. Thus it is puzzling that Gilson should complain because Aristotle, after finding an answer to the question “Does it exist?” occupied himself with exploring what that existent substance was, and what caused it to be what it was, rather than trying to further explore an undefined esse that can have no meaning apart from the essences of which it is the act.

Indeed, it is the contingency of the essence of changeable things with its consequent real distinction from its esse that is the basis of Aristotle’s demonstration that the efficient cause of that existence must ultimately be immaterial. Thus, far from neglecting esse, the use of the demonstration of immaterial causes for material effects manifests its primary importance. Moreover, a Metascience established in this manner will not content itself with declaring the primacy of esse, but by exploring every kind (essence) of being in its different ways of being in act, and the various relations between these ways of being to each other, it will seek to enrich the initial zero of “Being as Being” by giving it positive but diverse content.⁴⁵

George Klubertanz, S.J.,⁴⁶ Leo Sweeney,⁴⁷ and many others have also followed the Gilsonian version of Existential Thomism. It also ultimately gained the support of Jacques Maritain, although he saw it more as a difference of vocabulary than a difference of doctrine compared with the classical commentary tradition represented by Cajetan and Poinsoot.⁴⁸ Maritain’s position, however, has an interesting relation to that of the Transcendental Thomists, and in chapter 8 I will discuss its epistemological significance for Maritain’s important insights on “connatural knowledge.” Since, however, the most thorough recent exposition of the Gilsonian view is that of John F. Wippel,⁴⁹ it is his formulation that I will discuss here.

Some Existentials reject the Aristotelian approach to Metascience outright because they think that the demonstration in *Physics* VIII of the Prime Mover in fact proves nothing more than

the existence of an ensouled outer celestial sphere, not God as the First Cause.⁵⁰ The Aristotelian approach, as we have seen, requires nothing more for the establishment of the validity and independence of Metascience than a proof that *some* being is immaterial. The positive essence of this immaterial being is for Metascience to explore. Wippel is willing to grant that this proof may be valid.⁵¹ Yet he raises difficulties about it, minimizes its importance, and contends that Aquinas provided a better way of establishing Metascience.⁵² He and others of this school generally rely on Gilson's reading of the history of medieval thought, according to which Aquinas's commentaries on Aristotle do not reflect his own views. On this dubious ground they seek, as Wippel puts it, to "reconstruct" a better view from texts that more certainly express Aquinas's personal views.⁵³

Wippel sums up his reconstruction of this supposedly superior and more authentically Thomistic view on the object of Metascience as follows:

That by reason of which something is recognized as enjoying being need not be identified with that by reason of which it enjoys this or that kind of being. Therefore, we may investigate one and the same physical and changing thing from different perspectives. We may study it insofar as it is material and mobile, or insofar as it is living, or insofar as it is quantified. But we may also study it insofar as it enjoys reality at all, i.e., insofar as it is a being. . . . Is this not to make metaphysics a science of the merely possible? Not at all. To examine something from the standpoint of being is to continue to apply to it the intelligible content contained in our primitive understanding of being as "that which is." As a result of separation we continue to recognize whatever we study in metaphysics as enjoying being, or as an instance of "that which is." We do not abstract from this inclusion of existence in our primitive understanding of being when we apply separation to it. We rather judge that the intelligible content in virtue of which we recognize any thing as being ("that which is") is not to be restricted to or identified with that intelligible

content which we recognize it as being of this or that kind. Otherwise being could be one in kind.⁵⁴

But just what is this “intelligible content” of “that which is,” other than the actuality of the different kinds of being that are analogically included in it, but kinds that are more different than alike? To avoid the circularity we have seen in Dewan’s arguments, however, Wippel insists that:

[This] is not Thomas’ distinction and composition of essence and an intrinsic existence principle (act of being) which is discovered through separation. Through separation one simply recognizes the legitimacy of investigating any thing in terms of its reality or as a being (“that which is”) rather than from any other perspective. Investigation of the relationship between essence and existence (*esse*) can come later in the order of discovery, and presupposes that one has already discovered being as being.⁵⁵

Yet he does not say what the difference is between recognizing that material things are of different kinds (essences) yet have *esse* in common, and saying that their essence and existence are really distinct. The distinction that Wippel makes is between (1) a “primitive” awareness of being acquired simply by recognizing that, although sensible things differ greatly in kind or essence, they have existence in common,⁵⁶ and (2) a fully developed grasp of the meaning of *esse* that is required for it to serve as the object of Metascience. This latter awareness of *esse* must be known not by the first operation of the human intelligence, simple apprehension, but by the second, judgment. Thus Aquinas in his *Super Boetium De Trinitate*, q. 5, a. 3, contrasts the way that the object of metaphysics (Metascience) is known with the ways in which the objects of natural science and mathematics are known.

We conclude that there are three kinds of distinction in the

operation of the intellect. There is one through the operation of the intellect joining and dividing [*componentis et dividendis*] which is properly called *separation*; and this belongs to divine science or metaphysics. There is another through the operation by which the quiddities [essences] of things are conceived which is the *abstraction* of form from sensible matter; and this belongs to mathematics. And there is a third through the same operation which is the *abstraction* of the universal from a particular; and this belongs to physics and to all the sciences in general, because science disregards accidental features and treats of necessary matters.⁵⁷

Louis B. Geiger, O.P., first brought this text of Aquinas about the judgment of separation that is somehow involved in establishing the object of Metascience into prominence in 1947.⁵⁸ He read it as supporting the natural science approach to Metascience, thinking that it gave a better view of Aquinas's position on the distinction of the sciences than the classical view of Cajetan that distinguished them by "three degrees of abstraction." For Wippel and other Existential Thomists, however, this text is read as the chief textual support for their own position.

What point is Aquinas really making in this text? The reason for the distinctions he makes is that an abstraction cannot be valid unless what is abstracted can be separated in existence from that from which it is separated. This is the case in the first way in natural science, which only separates essences from accidents, and in a second way in mathematics, which separates the accident of quantity from the other accidents, since it is prior to them in existence. On the contrary, however, although the *esse* of things that is the intelligibility under which things are studied in Metascience is really distinct from their essences, it cannot be separated from them in extramental reality. This is so because *esse* is nothing but the very actuality of things, their *actus essendi*. Thus *esse* cannot be validly known by abstraction but only by a judgment that the object of the science does in fact exist.

It should be noted, however—and this is often overlooked in

citing this text—that Aquinas is not claiming that the objects of the sciences other than Metascience are validated *simply* by a first operation of the mind. The first principle of *any* real science, not just that of Metascience, must be asserted by a *judgment* of separation that judges, on the basis of evidence (ultimately the evidence of the senses), that this object exists. Natural science and mathematics can judge that their objects somehow have real existence, because these are known by a legitimate abstraction from objects known to be real. Thus we can truly judge that the object of natural science—namely, changeable being—really exists, although that science considers it apart from both its accidental properties that are to be demonstrated of it and its mere accidents. Similarly, we truly judge that the object of mathematics exists because we consider quantity as it really exists in material substances, though we study it in abstraction as the first property of these substances. The object of Metascience, however, since it is the very actuality of all that exists, Being as Being, cannot be validly abstracted since nothing real would remain.

Thus, for Being in this inclusive, metascientific sense to play its role as the first principle of an independent science, it must, like the subject of any science, be truly judged to exist. And if it is to be the first principle of an independent science, it must somehow be evidently judged to be true simply from its terms. This does not mean that the first principles of every valid science (especially metaphysical principles, as Dewan claims) are immediately evident to every one. Mathematics is an independent science with first principles evidently true from their terms, but its axioms are not immediately evident to every student. It was the great achievement of the Greeks among all the world cultures to be able to formulate them precisely. The terms of first principles must be made evident by a process of abstraction or in some other manner, and their reality must be grounded in some direct or indirect evidence. That is why St. Thomas, in his commentary on Boethius's *De Trinitate*, devotes so much attention to the "order of the sciences." Hence as regards Metascience, the ultimate science, we must ask how we can judge that the formula "Being as Being," in the sense proper to Metascience as an

independent science, expresses a subject matter that really exists, rather than an empty verbalism as so many modern philosophers claim.

Does Wippel answer this question? He first says:

Just what does separation contribute to metaphysics or to our discovery of its subject? It would be considerably easier for us to answer this question if Thomas had devoted a full article to separation itself. Since he did not do so, we must base our interpretation on the few remarks he makes about it in [*Super Boetium De Trinitate*,] q. 5, a. 3.⁵⁹

I have previously granted that we have an “awareness” of being that enables us to answer question 1, “Does it exist?” and that this answer already confusedly contains the answer to question 2, “What is it?” Hence this awareness can be called “primitive,” in contrast to an explicit answer about essence that answers question 2 and thus makes clear that the “to be” of any contingent thing is not identical with the kind of thing it is. Thus, as Wippel says, we know that the act of *esse* is other than the essence it actualizes, since we observe that different essences all have *esse* in common. We cannot, however, on this basis alone assert that this *esse* that is common to different kinds of material things is other than the *actus essendi* of material things.

Though some Existential Thomists have argued that natural science is only about the appearances of changeable things and not about their ontological being as such, this could be true only if they were considered merely as *possible* rather than as real. Wippel is firm in denying that metaphysics is about the merely possible.⁶⁰ In any case, there cannot be a real science about the merely possible since possibility can be known only through what is actual. All real sciences first ask the question “Does it exist?” and whatever they say about “What is it that exists?” it is being as it has *esse* that is being considered.

Therefore, in order to get beyond this primitive awareness of *esse*, Wippel has to argue that the judgment of separation specific to metaphysics renders this awareness “unrestricted” to

merely material being, or as Wippel sometimes says, “neutral” to material and immaterial being alike. Yet if the object of Metascience (metaphysics) is *ens commune*, it cannot be “neutral” to material and immaterial being since, as Wippel certainly admits, it positively includes them both. The statement that *ens commune* is “neutral” brings us much too close to the Scotistic univocal concept of being as “that which is merely not nothing.” More correctly, Wippel also says that metaphysical Being is “unrestricted” to the material. But how can we judge this to be the case if the only being that we know is material being? While it is true that *ens* potentially, or if you like, virtually, contains whatever is or can be known, our direct knowledge of it based on the senses tells us only about the material and sensible things directly experienced by us.

Thus the judgment of separation of “being” from the “kinds” of being, as Wippel describes it in the foregoing summation, can be made only on the basis of our sense experience of real material beings, which all in common have being but only a being restricted to materiality. How can we make the further step of extending the term “being” in that limited sense to immaterial beings, and thus establish that the object of Metascience exists, which is the first principle of all properly metascientific truth? In all his discussions of the existence of immaterial beings, Aquinas insists that they are known to be included in *ens commune* only by demonstrations from their material effects. Once their existence has been demonstrated *a posteriori* as the cause of material effects, it then becomes evident that the term “Being” can be extended without restriction to include whatever is common to both material and immaterial beings in a single judgment that Being as Being (in that extended sense) truly *is*—that it has *esse*. In this way, as Aquinas explicitly states in the texts I have cited, the subject of Metascience is validated, while it is not validated by the reconstruction that Wippel on the basis of a “few remarks” conjectures to be Aquinas’s way. Thus the negative judgment of separation on which this allegedly superior way depends is evidently true only if its terms have first been established by natural science as real and not merely nominal.

For that reason, however, the subject of Metascience must

indeed be “unrestricted” with regard to any kind of real being. It is insufficient, however, merely to assert that it is “unrestricted” without further validly judging on the basis of pertinent evidence that immaterial being as well as material being does in fact exist. It is in this precise sense that the term “separation” is needed to establish the object of Metascience. We can validly judge that the universal essence of changeable beings can be abstracted from their concrete condition of existence without losing their existence. And we can judge that mathematical beings can be abstracted from the other properties of really existing changeable quantified beings without losing their existence. But how can we judge— without abstraction—that *esse* as the object of Metascience includes both material and immaterial beings without it losing its status as the *actus essendi*? Without that status it would, contrary to Wippel’s claim, be reduced to mere possibility, a figment of the mind, as modern materialists claim that it is.

Thus, as with Dewan’s remarks, I find nothing in Wippel’s careful exposition of the Existentialist thesis, or in that of others of this school, that answers that inescapable question. I grant with them that the object of metaphysics (Metascience) is known only by a judgment of separation, but for that judgment to be valid, somehow it must first be known that immaterial substances really exist. Wipple says:

One judges that being, in order to be realized as such, need not be material, or changing, or quantified, or living, or for that matter spiritual. Hence one establishes the negatively or neutrally immaterial character of being, and prepares to focus on being as such or as being rather than on being as restricted to this or that given kind.⁶¹

One may indeed *make* this judgment, but what *validates* it? Wipple, in his lengthy chapter on “The Discovery of the Object of Metaphysics,” casts no further light on this inescapable question. It is true, as he says, that the intelligibility of two material beings known to us to have *esse* is not the same as the intelligibilities of their different essences. This, however, does not validate the

judgment that this *esse* also includes the totally different *esse* of immaterial things, whose existence we know only by a demonstration through their material effects. Therefore, as John Knasas also notes,⁶² Wippel's argument from *separatio* leaves us completely in the dark.

Therefore Joseph Owens took another Existential approach to our question.⁶³ Owens was an expert on Aristotle's *Metaphysics*, and his solution to our question is stoutly defended and developed by John Knasas in his work cited above. Knasas, for his own part, maintains that the arguments for a First Immaterial Cause in Aristotle's *Physics* VIII and an immaterial human soul in *De Anima* III are (at least as Aquinas reads them) already metaphysical (metascientific) arguments.⁶⁴ Owens and Knasas cannot accept as adequate the position of Wippel, Sweeney, and others, nor the Aristotelian approach, because, as Knasas puts it,

Unlike *separatio* Thomists Owens makes no problematic claim that intelligibilities able to be apart from matter can be derived simply from the material. Unlike some Thomistic natural philosophers, he likewise makes no doubtful claims that matter/ form principles succeed in demonstrating immaterial realities. Finally, unlike Transcendental Thomists, Owens is under no pressure to take an *apriori* route to the immaterial with all of its tragic Kantian consequences. Owens is content to allow the judgmental grasp of *esse* in sensible things to specify the entry into *Metaphysics*.⁶⁵

Therefore Owens and Knasas, though they also hold that the object of a Metascience is known by a judgment of separation that frees it from all immateriality, deny that this judgment is necessary to begin that science. For them all that is required in establishing the validity of a Metascience independent of natural science is to recognize that the material beings that we directly know from sense experience are beings that *have* the act of existence (*habens esse*). Therefore the demonstration of the existence of immaterial beings can be left as a task for

Metascience to perform in the due course of its argumentation.

One would like to know, just as one would for Wippel, how Owens shows that his project is Thomistic or feasible, yet Knasas admits that, although Owens has written extensively on this subject, "As far as I know, Owens offers no such direct textual proof for his position."⁶⁶ Consequently, Knasas seeks to provide such a proof. He begins by referring to Aquinas's description in the *Summa theologiae* I, q. 44, a. 2, c., of the three historical steps by which the object of a Metascience was historically established. Knasas interprets these three steps not as degrees of immateriality but of "increasing profundity" in understanding the intelligibility of things as having *esse*. He understands these deepening insights to have been: (1) the materialism of the pre-Socratics, (2) the approach to Metascience through natural science of Plato and Aristotle, and (3) the approach through *habens esse* that he accredits to Aquinas and which is that of Owens.

This interpretation is highly questionable since the mention of Plato and Aristotle at stage (2) does not say that Aristotle (nor Plato) got no deeper in their thinking than that stage. It seems to me that Aquinas mentions them there only to indicate that as Greek thought moved from the first to the second stage a division arose between Plato's theory of Ideas and Aristotle's theory of the celestial spheres. Aquinas certainly cannot be saying that Aristotle got no further, since he knows perfectly well that Aristotle held that celestial spheres are moved by immaterial intelligences and hence that he arrived at immaterial being. Moreover, Aquinas does not claim the third stage as his own discovery, but simply speaks of "some who understood."

Though Knasas thinks that this text "catches Aquinas in presenting metaphysics simply in terms of *habens esse*,"⁶⁷ yet he raises the question whether knowing that material things have *esse* guarantees that this same *esse* can be considered without materiality, as it must be for a Metascience to be a science other than natural science. He has to answer this difficulty, since he has himself raised it as an objection to the position of Wippel and others who share his views. Knasas resorts to the text so much

favored by Wippel on the “judgment of separation.” Knasas understands this, however, to mean that the first operation of intelligence attains the essence of material being, but that the second operation, namely, judgment, attains its existence. He then cites texts of Aquinas to show that in every science, when a judgment has been made that separates a universal essence from what is accidental to it, the intelligence by a reflex act then judges that this essence exists concretely together with those accidents, yet is utterly different than they are.

Therefore Knasas asks if it is similarly possible for the *esse* of material things that differ in essence to be judged to be common to them yet free of their common materiality. He quotes Owens as showing that not only real material things have *esse*. Objects that have only mental existence also have *esse*, though a cognitional, not a real, *esse*. Thus he argues that it is possible to arrive at a judgment that the *esse* that a material object has in real existence can be considered as common to that same object as it exists intentionally and immaterially in the knower. Therefore *esse* so understood is neutral to materiality and immateriality, and can serve as the object of Metascience. He grants that this is not *ens commune*, as this is understood by most Thomists to be the object of Metascience, since that is a concept positively including all types of being not neutral to them. Yet Owens and Knasas are content to leave the task of developing the understanding of *ens commune* to Metascience itself after it has established the existence of immaterial substances.

This solution, like the other solutions of the Existential Thomists, in spite of Knasas’s valiant efforts to defend it, is wholly unsatisfactory, even to other Existentials. Thus Wippel says of Owens’s view:

This approach fails to do justice to Thomas’s understanding of the subject of a science, knowledge of which is required for one to begin the science. It also contradicts a principle Thomas accepts from Aristotle to the effect that no science can establish the existence of its own subject.⁶⁸

Furthermore, Owens's approach, even with Knasas's attempts to strengthen it, neglects a fundamental point that applies also to the approach of Wippel and others: *esse* and essence are *correlative* causes, related as form to matter, and act to potency. Hence, though they are really distinct, one cannot be separated or known apart from the other. To say that "something has *esse*" means nothing unless we understand it in relation to the essence of that which has this "*esse*." It is untenable to suppose, as does Wippel, that what material beings of different kind have in common is simply a neutral *esse*. It has to be at least some generic essence that is correlative to and limits that *esse*. The broadest genus that we can judge from direct experience to have *esse* is *ens mobile* that is restricted to matter and motion. But though Knasas recognizes this error of Wippel, he makes a similar error when he asserts that for the material things that are the only ones we know directly to "have *esse*" is sufficient grounds for beginning a metaphysics as a science distinct from natural science. The *esse* that material things have is the ultimate act and perfection of *material things*, and as such its study falls within the scope of natural science and leaves nothing over as the object for an independent Metascience. The point at issue John Deely has succinctly summarized as follows:

Authors in this line fail to notice that their arguments work only insofar as their focus leads to the postulation of an immaterial source for the *esse* of material beings, which is to beg the question of the validity of metaphysical knowledge as both Aristotle and Aquinas posed it: until we know that there is more to reality than the existence of material substances, we have no basis for a philosophical doctrine of being that goes *beyond* physics. From this point of view, an "immaterial source of *esse*" is no different than a "source of motion itself unmoved": "metaphysical knowledge" is not what *leads to* the conclusion, but rather what *follows from* it.⁶⁹

Thus what is common to all these conflicting Existential

arguments is the assumption that any consideration of *esse* must be metaphysical. In fact, as shown in chapter 3, every real science must first answer question 1 about its subject, “Does it exist?” before it can proceed to the other questions about it. Hence science deals primarily with the intelligibility of the *acts* of its object, and considers its potential aspects only in relation to its acts—first of all its *actus essendi*, or *esse*. Yet Owens says that, while Aquinas holds that being is accidental to an essence,

Can this interpretation. . . be called in any sense genuine Aristotelianism? At least there is no hint in the text of Aristotle that being *per accidens* and being as the true express basically but one way of being. Nor is there any notion in the Stagirite’s [Aristotle’s] doctrine that a further actuality is required for all forms, substantial as well as accidental. Still less is there any teaching in Aristotle that the being that answers the question *an est* is accidental to a thing. Rather, it is the general aspect of being that necessarily accompanies every definable thing. The definition gives the answer to the question *quid est* but you cannot know the *quid est* without thereby knowing the *an est*. If a thing can be defined it is by that very fact known as a being in the sense corresponding to the *an est* for Aristotle. . . . The definition would not be immediately known, but only mediately as the result of a reasoning process. So where the defining elements are not immediately known as such, the being that corresponds to the *an est* has to be known as such, the being that corresponds to the *an est* has to be known before the answer to the *quid est* can be attained. . . . In no case, then, can the *quid est* be known before the *an est*. For Aristotle, consequently, the *an est* does not signify any accidental or contingent existence. For St. Thomas, on the other hand, it denotes an accidental predicate. For Aristotle, the answer to the question *quid est* necessarily includes the answer to the question *an est*. . . . For St. Thomas, on the contrary, the *an est* is asking precisely “Does the thing exist?” The being that answers such a question is accordingly an accidental predicate, whether it is

the existence actually exercised by the thing in reality or whether it is the composition by the intellect in forming a proposition. That then is the first sense of being for St. Thomas. It is being in the sense of actually exercised existence. As such it is described as accidental to the thing.⁷⁰

Again this seems an apologetic attempt to find Aquinas superior to Aristotle. Aquinas may be somewhat more explicit than Aristotle on this point, but certainly they are in agreement that material things as such do not exist necessarily, since some material things at least come into existence and cease to exist. Hence for Aristotle, just as for Aquinas, existence is accidental to their essence, and any proposition that asserted otherwise would be false. For Aristotle, just as for Aquinas, the *an est* is asking precisely “Does the thing exist?” since this must be affirmed by a judgment (second operation of the intelligence) before it can be defined.⁷¹

Aquinas would agree that “[t]he definition would not be immediately known, but only mediately” by analyzing and perhaps further observing the confused understanding of the thing known to exist, not, as Owens says, “as the result of a reasoning process.” For example, nothing can be known about a kangaroo until we observe a specimen and know that it exists as some kind of an animal, or at least a material object. To classify it specifically, however, is not done by reasoning (that is, demonstration), but by observation and comparison.⁷² When Aristotle requires that we affirm the *an est* before we can affirm the *quid est* he is requiring, just as Aquinas does, that this is necessary for the latter proposition to be true, either as an accidental predicate in the case of what does not exist necessarily or as an essential predicate in the case of what exists necessarily, if there are such things.

Existential Thomists (as is true for most of the other types of Thomism, each in their own way) are suspicious of Aristotelian Thomism, because they fear it imperils the independent certitude of a metaphysics. They think that by making the foundational part of natural science the condition for a valid Metascience they are

grounding it in a modern science that yields only probabilities and today is liable to postmodern deconstruction. They fail to see that the Aristotelian position does not expect from natural science more than to prove the existence of some causes that are not material. It leaves to Metascience the positive discussion of the nature of these causes. Moreover, the proofs that natural science provides of immaterial existents are entirely independent of any of the details of natural science that are subject to revision because they are only probable. These proofs rest only on (1) the foundational part of natural science (the cenoscopic part) that is an analysis of our direct sense knowledge prior to the use of artificial observation or experimentation and (2) the argument that our human intelligence as it is presupposed to all science cannot be reduced to a merely material process.

2. Objections from Modern Science

The real question, of course, is not what Aquinas held the subject of Metascience to be or how it is to be discovered and validated, but whether in view of modern scientific knowledge his position remains true. Though so many Thomists want to bypass this question, while at the same time accepting Aquinas's Aristotelian epistemology, it must be frankly faced. The purely logical coherence of Aquinas's demonstration of the existence of immaterial substances has never been refuted but has been shown to be valid by the modern methods of symbolic logic.⁷³ The premise of the argument that asserts the impossibility of an infinite regress in efficient causes whose efficiency depends on another agent can be refuted only at the expense of denying, as Hume did, the principle of causality on which all natural science depends.

Therefore any realistic attack on this demonstration must center on the other premise, namely, "Nothing moves itself." Scotus had already attacked this principle because it seemed empirically refuted by our freedom of the will to move itself.⁷⁴ Suarez also thought that vital activities in general seem to provide

an exception to this principle.⁷⁵ As we saw in chapter 4, however, modern biology has shown in detail how living things are self-moving only in the sense that a central organ moves the other organs but must itself be furnished an input of energy. The freedom of the will also is true self-movement, but, as a spiritual power, it still presupposes activation by the First Cause. Indeed, we are able to understand vital and free activity only by analogy to physical activity from which this principle is derived. If such reasoning is fallacious, then the kind of self-movement possible to contingent things becomes unintelligible.

Similar questions are now raised by modern science about Aquinas's natural science proof of the existence of immaterial movers that would require a much more detailed analysis of the state of modern science than I can give here. An excellent account can be found in the recent work of my colleague and fellow Dominican William A. Wallace, *The Modeling of Nature*.⁷⁶ He shows in great historical and analytical detail that post-Galilean science, for all its marvelous achievements, rests on epistemological and logical foundations seriously in need of revision. What is required is not, as some suppose, a "philosophical" (i.e., metascientific) critique of these foundations, but a critique *from within* natural science itself that recovers the insights lost in that famous "paradigm shift" from Aristotle's dynamic approach to nature to a Platonic dependence on static mathematical models.

This does not mean, however, that we can ignore modern science in discussing this proof that our universe depends on an immaterial cause or causes. That this question pertains to natural science and not, as so many Thomists claim, simply to a Metascience has been made startlingly evident, as mentioned before, by the puzzlement of current cosmologists in the face of their own hypothesis that the universe began with a Big Bang. That it is a "scientific" and not merely a "philosophical" (i.e., metascientific) issue is evident from discussions going on among scientists. Such questions are today brought to the fore by the data detailed in John D. Barrow and Frank J. Tipler's *The Anthropic Cosmological Principle*. They argue that if the universe

were only a little different than it is in fact, human life or scientific intelligence could never have evolved or survived on our planet. Roger Penrose, in *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*, while defending the materialistic reductionism of current science, explores the mind-body problem and concludes that the mind does not act like a computer and hence is difficult to explain materialistically unless we expand the notion of "material" reality.⁷⁷

Still more recently Michael J. Behe, in *Darwin's Black Box: The Biochemical Challenge to Evolution*, has shown that the more we know of life processes the more inadequate seem our present theories of how life, and above all human life, evolved. Life exhibits an "irreducible complexity" utterly inexplicable by natural selection alone, if natural selection is reducible to chance.⁷⁸ Such books by scientists make clear that natural science must in its own line of inquiry deal with questions whose answers seem to be presupposed to its own efforts at explaining empirical reality. To hope that someday we can explain the Big Bang by the laws of physics is reasonable, but it is not so reasonable to boast that science will be able someday to explain why this universe is governed by these laws rather than by others.⁷⁹

In post-Galilean thought, the most influential attack on the possibility of an objective proof for the existence of God was that proposed by Immanuel Kant. Although what Kant attacked was really the *a priori* "ontological proof" that Aquinas had also repudiated,⁸⁰ it is still taken for granted by many authors that Kant showed that all theoretical demonstrations of God's existence are fallacious. Because of difficulties in finding plausible physical interpretations of experimentally successful mathematical models, many modern scientists have been influenced by Kantian idealism and often, without knowing it, have accepted some of its assumptions. Yet most scientists are convinced that science, properly researched, can attain a genuine though incomplete understanding of physical reality in its mind-independent character. Hence it is not necessary here to discuss such attacks on the validity of Metascience that presuppose an idealist

epistemology, but only those that, like modern science, are based on a conviction that an objective understanding of reality confirmed by empirical observation is feasible.

Yet even though most practicing scientists are realists, Kantian Transcendental Idealism has succeeded in significantly coloring the foundational thinking of modern science. One of its chief effects has been the exclusive acceptance of the “hypotheticodeductive” method as the “scientific method,” but without adequate attention being given to the place of this method within the “semiotic spiral” of experience,⁸¹ which does not begin with hypothetical deductions to be tested but rather with *abductions* in which ideas are gotten from sense experience in contact with mind-independent aspects of the physical environment in the first place. Kant held that our knowledge of the physical world consists in mind-dependent constructs (synthetic *a priori* propositions) that are both self-consistent and fitted to the data of sense experience, but not *drawn from* that data. For him, such knowledge can only be certain because he thought these mental constructs are based on necessary categories innate to all human minds.⁸² Modern science has largely abandoned the Kantian innate categories of explanation. In place of such innate categories it substitutes hypothetical mental constructs (theories, models) to be evaluated by how well *a priori* deductions from them can be fitted to the empirical data. Hence, since it is always possible that other theories may fit the data equally well or better, these theories can only be more or less probable. Logically speaking, even though false conclusions cannot be deduced from true premises, true conclusions *can* be deduced from false premises.

For Aristotle also, much of natural science is only probable;⁸³ but science uses merely probable arguments as a dialectic that can guide research to the discovery of principles that are certain, because they are intellectual insights based directly on sense experience. Thus the principle that “Nothing moves itself” is not a hypothesis having a degree of probability, but a certitude directly evident from an analysis of our basic sense experiences. Hence we can use the principle of causality, “Nothing that changes can

change itself,” as a foundational principle of natural science that we are sure can never be validly contradicted by hypotheses of however great apparent probability.

A probable proposition, no matter how highly probable, cannot strictly contradict a truly certain proposition, while the reverse can occur and render the apparent high probability of a proposition null. For example, the theory of mechanical aether had a high degree of probability—until the Michelson-Morley experiments in 1887 conclusively invalidated it and opened the way to Einstein’s theory of special relativity.

Nevertheless, it is important to consider the principal hypotheses about cosmology that have played or are likely to play a role in natural science, so that their relation to the principle that “Nothing moves itself ” and the demonstration based on it is correctly understood. Natural science is properly about changing things, of which motion is the basic change, and thus any system in motion has the property of time. Hence the chief alternative hypotheses are that (1) the universe as a system of bodies in motion is infinite in time, or (2) it is finite in time. The first of these hypotheses posits a “steady-state” universe in which there is at least some continuity of motion.

It was this first hypothesis that Aristotle adopted and on which he built his astronomy. He supposed that the basic natural and perpetual motion in the universe was the rotation of the outermost sphere of the fixed stars that coordinated the natural independent perpetual motions of the other celestial spheres containing the sun, moon, and planets. For these cyclical motions to be permanent, the rotating spheres had to be free of any alterations in quantity or quality, including changes resulting from friction.

Hence Aristotle was led to the hypothesis, eventually falsified by Galileo’s telescopic observation of the sunspots, that the heavenly regions are composed of a form of matter subject to motion but not to any other kind of change.⁸⁴ This kind of matter or “aether,” therefore, would have to be fundamentally different from the alterable matter within the lunar sphere surrounding and including the earth that is familiar to us. Galileo’s falsification of this hypothesis of Aristotle, not his defense of Copernicus’s heliocentrism, was the real “revolution” that initiated modern

science. In fact, Copernicus's theory was not adequately verified until long after Galileo, by the observation of the stellar parallax in 1838!

Aquinas held that Aristotle never intended to propose an eternal universe except as an hypothesis and argued that neither it nor its opposite can ever be established by natural science.⁸⁵ If that motion depends ultimately on an immaterial First Cause, then that cause, unlimited as it is by any potentiality and existing as pure act, is infinite in power. It *could* make an eternal universe and keep it in motion forever. On the other hand, since the First Cause acts freely,⁸⁶ it is not necessary that it produce any particular universe among all the possible ones. Thus God could have created an eternal universe (though because of the medieval interpretation of the book of Genesis, and not natural science, Aquinas held that He did not); but this eternal universe would still manifest God's existence because it could not create itself or sustain itself in perpetual motion.

Today, Aristotle's model of an eternal universe is unacceptable to natural science, not because of any certitude that the universe had a beginning in time, but because it seems highly probable that all matter is subject to the second law of thermodynamics, or entropy, which eliminates the notion of perpetual motion machines, which is what a self-moved eternal universe would have to be. According to the second law of thermodynamics, although the total amount of energy in the universe is conserved, in each exchange of energy there is a decrease in its power to perform work, that is, an overall increase in entropy. Because of friction and other factors, some of the energy is reduced to heat, the lowest form of energy. Hence the universe as a totality inevitably cools and will at last suffer "entropic doom" in which all ordered systems break down and only random motion at approximately absolute zero remains. According to quantum physics, even at maximum entropy there will be random quantum fluctuations, but the probability of these producing anything more interesting will also approach zero.

This outcome would take place even on the hypothesis (which the most recent data makes improbable) that the Big Crunch

might finally reverse the expansion of space caused by the Big Bang. Even if that were to happen, the energy driving such cycles would gradually dissipate.⁸⁷ Against this hypothesis stands also the objection that a Big Crunch would eliminate all present structures, and thus make it impossible for us ever to empirically verify the existence of the previous cycle. Nevertheless for some time the “steady-state” hypothesis in a form proposed in the last century by Fred Hoyle, as we noted in chapter 4, seemed quite plausible. Yet it required a constant slow “creation” of matter and energy contrary to the conservation laws in order to maintain motion in a perpetual universe. Hoyle made no attempt to explain such “creation” by any cause that was part of the material universe. Thus, even in Hoyle’s theory, the need for an agent external to the universe required by the principle of “Nothing moves itself ” would still hold.⁸⁸ Hence the current trend of scientific thought favors the second alternative, according to which the universe had a beginning before which no matter or energy and hence no time existed.

The Big Bang theory makes the universe only about 15 billion years old, in a state of constant expansion, and as a whole subject to inevitably increasing entropy. In such a system, increase of complexity even to the point of intelligent life is a possibility (but not a necessity, and perhaps of very low probability) in a local region of negative entropy (negentropy). Eventually, however, this local complexity must be smoothed out in the increasing entropy of the whole universe. This hypothesis, although it can by no means yet be said to be verified as certain, is supported by a great amount of evidence, especially the expansion of space shown first by Hubble’s discovery of the recession of the galaxies from each other, and then by the detection of the “background radiation” probably left by the Big Bang. If we accept this hypothesis then time and motion had a beginning and it becomes evident that, since it could not cause itself, this universe must have a cause that is not part of the material universe and indeed not material at all.

Scientists have responded to this puzzle chiefly in one of three ways. First, some have said that the universe is just a fact that

science cannot explain; it “just happened.” This is not very satisfactory if the task of science is to explain natural phenomena. Second, some scientists therefore attempt to explain the origin of the universe by hypothesizing that in the beginning there was only a vacuum in which there were, as quantum theory predicts, random “quantum fluctuations” which developed into the Big Bang. To imagine that the universe arose from quantum fluctuations in nothing, however, is absurd since natural laws do not have disembodied existence but are properties of matter. To posit a law of quantum dynamics according to which such quantum fluctuations must occur requires that this law be based on the observed properties of matter and energy, and matter and energy are not nothing but just that changeable being whose initial existence demands to be somehow explained.

Stephen Hawking and James Hartle in 1980 proposed another cosmic model for a universe without a “singularity” or beginning in time, yet having only a finite temporal past.⁸⁹ It was a mathematical model in which time, like space, would be “finite but unbounded.” The chief difficulty with this theory, however, is that it treats time like a mathematical line all parts of which are actual, that exist simultaneously. But time is the measure of a motion by a more uniform motion, as it was defined above in the discussion of the categories. Since these are based on our foundational experiences presupposed to all other types of observation, they are more certain than any mathematical physical theory. Hence it is contradictory to think of all parts of a motion and its temporal measurement as simultaneous like the parts of a line.⁹⁰ In over twenty years since the Hawking-Hartle theory was proposed it has received no empirical verification.

Thus the Big Bang model of a universe finite in time also logically demands that the universe as a system of bodies in motion be explained by the existence of an immaterial mover or movers that created matter and energy with the requisite initial conditions consistent with what we observe the universe to be today. Hence, for modern science, the demonstration of the existence of an Immaterial Unmoved Mover raises far less difficulties than did Aristotle’s steady-state model. Therefore,

modern science in no way undermines the validity of a Metascience of material and immaterial being. Instead, when modern science is empirically grounded and properly thought through to its foundations (so that natural science can be free from alien mechanistic or idealistic “philosophical” prejudices that have been imposed on it historically), it will magnificently provide the only firm rock on which a valid Metascience can be built.

Some who say that the scientific method necessarily excludes arguments that go beyond “naturalism” (that is, materialism) raise a final epistemological objection to the foregoing. Others find in Bell’s Theorem, which seems to show that action at distance occurs, proof that physical reality is fundamentally “nonlocal,” and hence utterly different than the world as we ordinarily experience it. A discussion of these questions will be postponed until chapter 9.

Part 2

**The Properties of All
Reality**

Unity, Plurality, and Efficient Causality

A. THE TRANSCENDENTALS

For Aristotle and Aquinas alike, the actual body of any science consists in the answers to the third and fourth scientific questions about the properties of the subject and the causes of these properties in the definition or essence of the subject. The first two questions, namely, whether the subject exists and what is its essence, must have been previously answered. After answering these four questions about its generic subject, a science must then proceed to try to answer the same four questions about the subdivisions of the generic subject, down to its ultimate species. In part 1 of this book it was shown that the existing generic subject of Metascience, though it has only analogical unity, can be given a descriptive real definition as follows:

The “generic,” that is, analogical, subject of Metascience is Being (*ens commune*) as including all existent substances, whether material or immaterial, precisely as they are contingent, that is, as they are composed of an essence that potentially exists and its really distinct act of existence (*esse*) by which it in fact exists, and in relation to which actual totality the causal relations at play at any given place and time are the true determinants of “possible being” (i.e., of what is really, as distinct from what we may erroneously think or imagine to be, possible). These beings exist in various

ways that are analogically one as causes or effects of each other in subordination to the First Uncaused Cause that is their ultimate principle, to understand which, within the limits of human reason, is the goal of Metascience.

Therefore, on the basis of this real definition of its “generic” subject, Metascience ought to proceed to provide a causal demonstration of the common properties of material and immaterial substances. Being, since it can only be defined analogically, cannot have properties in the strict sense since it includes all finite realities, both substances and their properties. Being as such has “properties” convertible or coextensive with itself (distinct from the categories of accident) only in the sense of modes that are not really separable from it, but which are distinguished from each other in our thinking about and experience of Being. In this way our thought is able to make explicit in the analogous concept of Being both intrinsic and relational aspects that might otherwise be obscure. It is in this sense that One, True, Good, for example, can be demonstrated to be real aspects of every real thing, but in different and only analogical senses.

Hence such analogically common “properties” of Being must transcend the univocal categories of properties that pertain only to material things. The medieval scholastics listed five such analogical terms that they called “the transcendentals”: *res*, *aliquid*, *unum*, *verum*, *bonum* (thing, something, one, true, good).¹ Sometimes *pulchrum* (beauty) is added to these five, but, as will be shown in chapter 10, beauty can be reduced to a particular goodness of truth, truth as it is enjoyable. Later scholastics also spoke of “supertranscendental terms,” such as “non-being” and “impossibles,” that are in fact purely concepts of mind-dependent objects (*entia rationis*).² Such terms are important nonetheless (in fact, more important than has traditionally been realized³), because the human mind learns by contrasting the positive against the negative—in this case the mind-dependent to the mind-independent so as to know the positive better. The concern here, however, is only with real Being and its transcendental “properties.”

The first two transcendentals, “thing” and “something,” actually signify the two aspects of *ens commune* that compose it, namely, existence (*res*, the existing thing) and essence (*aliquid*, an existing thing of a particular kind); hence they are elements of the definition of Being rather than its properties. It is the task of Metascience to “define” and demonstrate that the other three transcendentals—Unity, Truth,

and Goodness—are, in this improper sense, properties of Being, and hence in diverse analogical ways verifiable of all beings. This means that everything that is real (*aliquid et res*, as we might say) is somehow one, true, and good. For example, as horrible as a cancerous tumor is, yet it has a certain *unity* as a growth that is studied by a biologist who seeks to know the *truth* about it, and this truth is desirable for the *good* of scientific understanding and the medical search for a cure.

In treating of the transcendentals, I will proceed as follows. In this chapter 6, and in chapters 8 and 10, respectively, I will describe the One and Many, the True and False, and the Good and Bad, as to what these analogical concepts illumine in the metascientific concept of Being as such and why they are its necessary attributes. Then, in the intervening chapters 7, 9, and 11, each of these three analogical transcendental terms will be further explicated as they apply in different special senses to the principal sciences, namely, the theoretical sciences of nature and of mathematics and the practical sciences of ethics and politics and, also, the “arts,” both technologies and the fine arts (the “sciences of making”). In these latter three chapters, I hope to show how Metascience can serve fruitful interdisciplinary and multicultural discourse.

B. THE DEMONSTRATION THAT BEING AS SUCH IS ONE

1. Transcendental “Unity” and Its Contrary “Plurality”

In his *Metaphysics*, Aristotle treats explicitly only of Unity (X, chaps. 1–2), because this transcendental is *intrinsic* to Being, while Truth and Goodness are *relational* with respect to rational creatures who know or will some kind of being. This transcendental Unity and its contrary, Plurality, are associated with one of the four causes in particular, namely, the efficient cause, because one efficient cause can produce a plurality of things, though a plurality of causes cannot produce a single thing unless they are subordinated to some one superior cause. Moreover, without efficient causation only the First Cause, which is absolutely One, could exist.

Nominally, the One is the indivisible, the Many the divisible. We observe something to be “one” in the following ways: (1) It is one if it is continuous in quantity, and not a mere aggregate. (2) It is one if it has a single shape and exhibits a simple kind of change, since we know every material thing through its changes. (3) It is one if it has a single essence, that is, pertains to one species. (4) It is one if it is an individual being.⁴ All substances have this fourth kind of unity, though in varying degrees. Since it is only substances that have independent existence, it is substances that are primarily signified by “Being,” and that have completeness or Unity in the fullest senses. The properties of substances, although they contribute to its completeness and unity, derive their own unity from the substance in which they exist as their cause. Any material body has unity in all four of the above senses, but purely immaterial substances have unity only in senses 3 and 4, not in the first two senses (since they are not bodily).

Our fundamental notion of Unity is derived from the unit by which we measure anything, whether a part of a continuous body by which we measure the whole or as the principle of number by which we count a plurality. It is an error to think, as Plato did and as Avicenna was to do, that Unity as such is a substance, that is, the Idea of the One—since the only absolute unity is the First Cause that transcends the category of substance. One is an attribute of substance, but also of everything in the other nine categories; that is, we can speak of “one quality” or “one time” or “one place.”⁵

This nominal *negative* notion of Unity denies that something is divided into two or more things of the same kind. We contrast it to the concept of the Many based on our sense experience of two (or more) parts of a quantitative substance; for example, a baby discovers that one toe is not another toe. Thus the notion of the Many follows directly on the proof in natural science that the fundamental property of a changeable thing is to be in the category of quantity, defined as “the property of a material substance by which that substance has parts, each of which, if separated, would be another material substance.” The notion of “many” is still more clearly seen once we have also demonstrated from the axiom that “Nothing changes itself” that at least two substances that are not identical with each other have real existence.

Many of the problems in science have to do with determining just what kind of a unity an observed entity has. Thus, the atom was first conceived by Rutherford after the analogy of the solar system, with the

nucleus as the sun and the electrons as planets. Yet it soon became clear that, while the solar system is a system of independent bodies, each atom seems to exist independently only as a complete whole, that is, it is not a mere aggregate of substances but is itself one substance.

The relation between the sun and its planets is not a necessary one, since the sun could exist without the planets and they without the sun. Gravity has kept them in relation to each other after their formation, but has made them, not into one body, but a system of related bodies. In the case of the atom, by contrast, it seems that the particles that make it up are such that they naturally exist in a complete whole of a particular atomic species, and thus form a single body. This is clearly the case in living organisms, where the whole dies without the parts, and the parts without the whole soon die too. Yet the term “One” is not merely negative, since a true substance is indivisible inasmuch as its parts are necessarily so related to each other that it could not exist as a complete whole without them. Thus Unity, understood positively, indicates completeness, wholeness, perfection, totality. Hence Unity is related to the Many as form is to matter and act is to potentiality.

Aristotle devotes the rest of book X, chapters 3–10, to contrasting the indivisibility of the One to the divisibility of the Many, and of the Same to the Different. He shows from logic that there are four kinds of opposition between terms: (1) privation, e.g., colorless vs. red; (2) contrariety, e.g., white vs. black; (3) relation, e.g., cause and effect; and (4) contradiction, e.g., being vs. non-being. One and Many are contraries, because they are both measures and involve privation. One is the unit by which the Many are measured, while the Many are deprived of the indivisibility of the One. Such contrariety is the maximum form of opposition and exists between two things that are generically alike. Consequently sometimes, but not always, there can be an intermediary between contraries; for example, gray is a color intermediate between white and black. Yet in the case of the One and the Many there is no intermediary, yet they are not the same but different. The importance of these distinctions is that many semantic confusions arise in dialogue when people think there is no middle between extremes when there is one, or *vice versa*.

Aristotle also notes that two things can be “distinct” yet not “different,” since “difference” implies that, while being the same in some respect, they are different in another; while two things can be distinct without having anything in common.⁶ He contrasts the case of the difference of male and female with the difference of things that can be

destroyed and those that cannot. In the former case the difference is not in essence (species) but in matter (their bodies) only. In the latter case there is an essential difference between the destructible and indestructible. Thus, the One and the Many are contraries without an intermediary, yet they belong to the genus of the measurable. They are used in different senses as signifying entities that belong to different categories. Yet it is from the experience of realities in the category of quantity that we get the primary analogate for these different meanings.

2. The Demonstration of Unity as Intrinsic to Every Being

How then can Unity taken positively be demonstrated as a *quasi*-property of Being that is implicitly included in “Being” yet makes something explicit about what the term “Being” analogically signifies? To demonstrate anything requires a middle term. What then is the middle term between Being and Unity that proves Being is One rather than Many? According to the foregoing analysis of contingent being as really composed of essence and existential act, for something to be, it must have whatever is necessary for it to be an essence having *esse*, actual existence. This actuality unites all that is essential to it, since existence is to essence as form to matter, and form unites the parts of its matter. Keeping in mind this analogate of form to matter we can construct the following demonstrative syllogism:

Every being that has its ultimate *act* is in that respect *one*.
Whatever has Being (*esse*) is a being that has its ultimate *act*.
Whatever has Being (*esse*) is in that respect *one*.

Here the middle term of the needed demonstration is *ultimate act* (*esse*, to be), its “completeness,” “perfection,” “plenitude,” “totality,” or “wholeness,” taken as analogous to “form” in the same way as essence is analogous to matter. Thus all the various kinds of being that are included in the analogous metaphysical concept of Being as essence are completed by their existential act that renders them real, and for that reason are unified or have the property of completeness. Being is One because, as Being, it includes all that is contingently real as in an analogous whole. Any particular contingent being is “one” in some special way, because it has wholeness or perfection in its special way that negates its division into Many.

Plurality as such, therefore, is some lack of this totality or ultimate

unifying act. This might seem odd, since we think of *many* things as more total than a *few* things. But what “plurality” indicates is not many or fewer things, but things’ lack of unity or relation to each other. Plurality, in the sense of many rather than few, is really that of “complexity,” “plenitude,” as unified. Thus, those who complain that Aristotle’s metaphysics takes “form” or “substance” rather than *esse* as its subject miss the point that *esse* or *actus essendi* is analogous to the form of material substances, the only kind of form we directly know. Only what possesses this ultimate existential act can be said to be one.

Thus the negative notion of Unity implies a positive one also, namely, the fact that although a material substance is divided into parts, this division is superficial compared to its substantial oneness. Thus the baby sees its toes as divided negatively from each other, but also experiences them positively as parts of itself as a unified living body. Also, in seeing that there could be no change without a distinction of an agent substance from a recipient substance, one sees as well the positive character of the agent substance that acts as a unified whole to transform a recipient substance as a whole. When this change in something is finished by the action of some efficient cause, the result is its wholeness or perfection (Latin *per-facere* means “to make complete”).

The notion of Unity as positive because it is the negation of division is also signified by the term “simplicity.” Note, however, that things are simple in two very different ways. A thing may be simple because it is low in the scale of beings, as an atom is far simpler (or, in modern terms, “contains less information”) than a living being. On the other hand, something may be simple yet high on the scale of beings because, although it is actually very complex, it is also very perfectly unified. Thus a plant may be a relatively simple organism compared with an animal that has a complex anatomy, yet the animal by reason of its brain and central nervous system may be much more unified in its operations. This is why we can say that the First Cause is infinitely “simple”: although as First it has the infinite plenitude of being, yet it is also absolutely one without any interior differences that would be due to lack of being. Between the various kinds of being that constitute the Many there must be differences, yet also something of the Same (similarities), at least that they are all included analogically in Common Being.

Unity as a quasi-property of the subject of Metascience is, like that subject, analogously diversified into many kinds of being; and it is this diversity that we must next explore. This requires us first to examine

the way in which material things are unified and then the ways in which spiritual things are unified. Since immaterial things are knowable to us only as the cause of material effects, their very different kind of unity can be known only as analogous to that of material things.

C. UNITY AND PLURALITY OF CONTINGENT MATERIAL BEINGS

1. Substantial Unity and the Plurality of Properties

In current thought the issue of the One and the Many has been the concern of a discipline called “general systems theory,” which one of its pioneers, the biologist Ludwig Bertalanffy, as early as 1936 proposed in *General Systems Theory: Foundations, Development, Applications*. Bertalanffy, influenced by Jan C. Smuts’s earlier “Holism,” reacted against the reductionism prevalent among some scientists. Reductionists believe they have explained something when they have taken it apart and reduced it to its smallest elements. They resemble a boy who takes a clock apart without thinking how he is to put it back together again. Bertalanffy pointed out that it is just as important to understand the interrelation of the elements from which something is composed as to recognize their distinction. This understanding of the whole is the aim of general systems theory. I would also note that if “general” is taken in its widest sense, this study belongs here in Metascience, although Bertalanffy himself restricted it to material systems and natural science.

In understanding systems of bodies or their quantitative parts, natural science proceeds by first eliminating from its sense observations what is merely individual, since “Science is of the universal.” What remains from this type of abstraction are the many properties of a substance. Among these properties, natural science seeks the one that furnishes the best causal explanation of the others. For example, in atoms the electromagnetic charge on the nucleus explains the other properties of that atom and locates it in the periodic table. From this unification of a substance’s many properties by its chief property, it becomes possible to give it a more or less adequate essential definition. Then the thing defined can be located in the

category of substance by its proximate genus and species according as it differs from the substances most similar to it. Thus we have a genuine, though not perfect, understanding of an atom of carbon or radium by which it can be classified by genus and species among the inanimate elementary chemical substances.

In this way natural science arrives at an understanding of changeable material beings in their substantial unity as manifested by the hierarchical unity of their categorial properties. Today, such procedures have enabled scientists to establish taxonomies (Greek *taxis*, ordering, and *nomos*, law or rule) of the species of inanimate substances (atoms and molecules) and of living substances (plants, animals, the human species). A number of difficulties can be raised about this rough, general classification (see appendix 2, "Category of Substance"), such as how we are to understand, say, the subatomic particles. Since such questions are still controversial in natural science, it is not necessary to attempt to resolve them here, although something more will be said about them in the next chapter. Dialogue concerning them, however, ought to proceed by raising these general considerations about Unity and Plurality and the precise sense in which an atom is and is not one, since this question is liable to great semantic confusion.

According to the theory of the categories in natural science discussed in chapter 3, section C, quantity is the first accident of a substance, so that the quantitative properties of a substance are of special significance in determining its substantial unity. Every material substance is quantitatively a continuous whole, that is, its parts are connected but potentially divisible. By properties of the category of quality, every substance must be either qualitatively homogeneous or heterogeneous in its parts. Yet atoms and molecules as well as animate substances are heterogeneous, and these parts are differentiated by different qualities; for example, the quarks that compose the proton and the neutron have active qualities (with the arbitrary names of "flavor," "charm," "strangeness" and "color") that account for their different behaviors.

Thus, every material substantial whole is a hierarchical system of many differentiated parts. The term "hierarchic" here means that the parts are ordered in terms of what they contribute to the stability and permanence of a given substance. For example, the nucleus of an atom is more important to its stability and permanence than its orbital electrons, some of which may be lacking at a particular time in its history. The whole material universe is also a hierarchic system of

many relatively independent bodily substances. Such systems of substances, however, are not themselves substances, but are unified by causal relations of which the most basic, according to current science, is gravitational attraction. Without gravity the universe of bodies would expand infinitely and, so to speak, “evaporate.” On a much smaller scale, our solar system could not exist without the sun holding the planets, planetoids, and meteors together by its massive gravitational attraction.

Thus, for natural science, the Unity of Being means: (1) the substantial unity of a specific essence with many differentiated parts and other properties or (2) the relational unity of many substances having independent existence yet forming the system of the universe and its sub-systems. From these considerations we can establish the senses of “whole” and “part” that are proper to natural science, and are then extended analogically to the other sciences. Thus, we know the different ways in which “The whole is greater than the part, and the part less than the whole,” and also in which “The whole is equal to the sum of its parts” and “The whole is greater than its parts.” The last is true in the sense that substantial unity is superior to the unity of the properties of a substance, and also in the sense that the universe as a system of substances has a final cause superior to any of the substances themselves.

I am acquainted with a group of phenomena that I recognize as a certain tree outside my window. I recognize it by its size (quantity) and its shape, color, and so forth (qualities), and by its location on the ground and in the air (place), rooted in the soil and lifting its branches (position), in my backyard (environment). I recall seeing it for many seasons of change (time), and have watched it grow, put out leaves and new twigs, and resist the winds and its insect, animal, and human enemies (action). I have seen it bent by the wind that blew away its dead leaves, and see it has received the scars inflicted on it by its enemies and by the human pruning of its branches (reception). It resembles the other trees in the yard yet differs from them in certain ways and it interacts causally with them (relation). These varied phenomena can be classified in the nine categories of accidents. They uniquely identify this tree for me, and I recognize it as an individual existent distinct from the other trees, the earth in which it is implanted, and the air that surrounds it, and from myself who am looking at it (substance). Hence I see it to be a relatively independent living being or organism, a plant, a tree with leaves about seven inches across, with five or seven pointed lobes with finetoothed edges, and that every

autumn it yields prickly, hard burs. Hence, if I were a botanist, I could fit it taxonomically into the category of millions of substances by its genus and species as a *Liquidambar styraciflua*, a “sweet gum tree.”

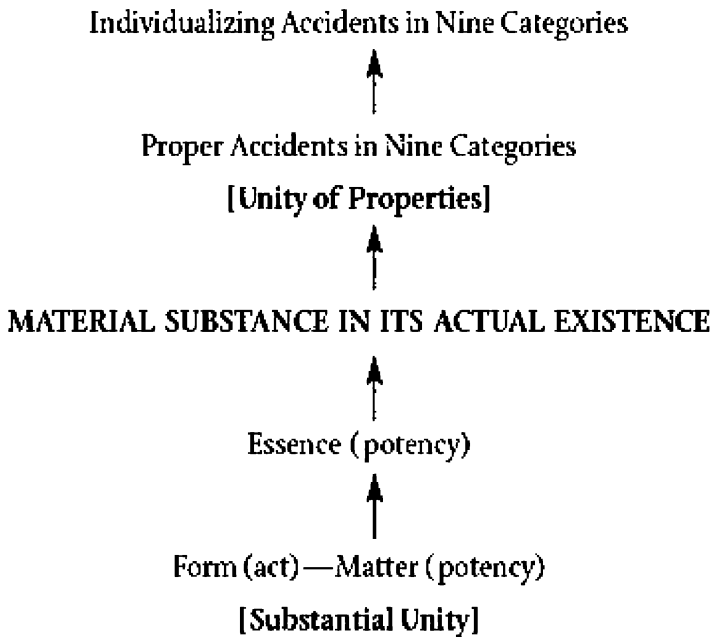
I first of all knew that it belongs to a world of changeable things, since I only saw it as the sunlight illumined it and it reflected that light through my window and did something to my eyes. Even as I look, it blows in the wind; and I note the autumn color of its leaves unlike the way they looked in summer green. I can even remember when it was a smaller tree. From experience of other like trees, I know that it grew from a tiny seed and annually produces an annoying deposit of withered leaves and bristling burs, and someday will die and be cut down and burnt. These experiences enable me to distinguish quite easily, though imperfectly, between its appearance at this moment in the category of time and its many states.

I can also recognize it as this individual tree distinguished from any other tree and the properties that enable me to call it a “sweet gum tree,” and not one of the sycamores near it in the environment of my backyard. While these various accidents, some individual and others specifying properties, are many, yet I have no reason to doubt and sufficient reason to be convinced that this is an existing though changeable individual substance whose essential character enables me to recognize it as a sweet gum tree that is one real thing or substance having its own identity in existence. A botanist, of course, could provide a much more accurate analysis of the reality that I perceive by my senses and recognize intellectually, but his scientific knowledge would not be different in kind from my less systematic and complete knowledge of my favorite trees. In fact, the botanist had to begin his researches from experiences of tree similar to my own, and must ground all that he discovers in this original knowledge (cenoscopic knowledge) that is not wholly distorted either by his instruments and experiments or by his theories that attempt to explain why it has the parts it is observed to have (ideoscopic knowledge).

Thus the plurality of phenomena provided by this tree has the four types of unity distinguished by Aristotle: (1) It has aggregative or collective unity of merely accidental characteristics that mark this as a recognizable individual thing. (2) These parts exhibit causal interrelationships. For example, its roots furnish it with water, and its leaves with solar energy. These manifest that (3) it is a single relatively independent existent or substance. Causally speaking, its substantial unity is the most fundamental and the prime analogate of other kinds of unity, because of its existential character as a substance on which

other realities depend for their existence. Finally, (4) the unity of the plurality of interrelated properties is explicable from their connection in the one substance. Hence their unity is as an effect of the unity of the substance and is analogous to it. They also constitute signs to human intelligence of both the existence and the essence of a substance in its fundamental unity. These principles of substances have reality only as they correlatively constitute a substance.⁷ This is shown in diagram 4.

Diagram 4.
Correlatively Constitutive Principles of Substance



Note: A diagram for immaterial substances would be similar, but would omit the composition of form and matter and the individualizing accidents following on the matter. The properties of immaterial substances pertain only to those in the categories of quality, action, reception, and relation.

The notion of the essence of a substance, however, presents a problem as to just how to conceive substantial unity. One might suppose, as Democritus did,⁸ that a material substance, since it has the intrinsic property of quantity and thus has at least two parts, must be homogeneous, that is, having parts that are all alike. Democritean atoms were indivisible and continuous, so that no physical force could

separate their parts. All other phenomena in the world were then explained by various arrangements of these ultimate substances. Thus all other apparent substances—humans, animals, plants, minerals—were actually aggregates of atoms and had only an aggregative or collective unity.

This atomic theory of Democritus, as Aristotle pointed out,⁹ disagrees with our sense experience of the changing world. Such unchangeable atoms could not change each other since agent and recipient must differ; nor could they themselves change in any way except rearrangement in place. Then that “place” would have to be a totally empty void, yet would have to have dimensions, that is, the property of quantity. This quantity then would be a property of “nothing,” a self-contradictory notion. But if, as Aristotle showed, a body is located not by its place in “nothing” but by its relation to the bodies that surround it, then for Democritus’s theory the universe would have to have its atoms packed tight. However, if they were packed tight and could not change shape, they could not make way for other atoms to move, in which case nothing would ever change.

Much later, in the seventeenth century CE, Descartes tried to revive Democritus’s atomic theory but was forced by the absurdity of the notion of empty space to abandon the idea that the atoms were unalterable. He therefore replaced the void with a kind of fluid in which the atoms changed shape and were moving in vortices, like little whirlpools in a pond.¹⁰ Ignoring Aristotle’s criticisms of Democritus, scientists in the nineteenth century tried to escape the problem of the void by positing the existence of a very thin homogeneous material medium or “aether” (quite unlike Aristotle’s hypothetical unalterable celestial aether) with dimensive properties and differing from the atoms themselves only in its low density. The Michelson-Morley experiments in 1887 tried to detect the effect of such an aether on the speed of light but seemed to show instead that no such mechanical aether exists. If it did exist, then it would be a substance of an entirely different kind than the atoms, since if this aether were itself also constituted from atoms, an infinite regress in explanation would result.

When today scientists speak of a “vacuum” they do not really mean the kind of void that was essential to Democritus’s atomic theory. By a “vacuum” they are speaking of a purely mathematical entity or, if they are speaking physically, a spatial region or “field” relatively free of massive matter. A recent collection of essays by scientists on *The Philosophy of Vacuum*¹¹ makes very clear that, whatever “empty

space” is, it is not “empty.” Instead it teems with waves or particles or both. Thus the notion of some kind of nonmechanical “aether” having at least “gravitational curvature” and subject to “quantum fluctuations” is a necessary aspect of any modern description of physical reality. The whole universe seems filled at least with gravitational forces and electromagnetic radiation. Quantum mechanics holds that some kind of “virtual” activity must be going on everywhere, even if material objects as ordinarily conceived are not present.¹² Thus, the notion that there is “empty” space between the nucleus and its orbital electrons in an atom, or between atoms in a molecule, or between molecules in the interstellar or intergalactic “voids,” is a misconception. As a nuclear physicist, Sten Odenwald writes:

True, the cosmos consists overwhelmingly of vacuum. Yet vacuum is proving not to be empty at all. . . . [S]ince the 1920’s physicists have recognized that on a microscopic scale, the vacuum itself is alive with activity. . . . With Aristotle smiling at us down the centuries, we now see the vacuum as much more than a vacancy.¹³

Some physicists do indeed think of the whole universe as an ocean of “possibilities” constituted by the laws of quantum physics, out of which the elementary particles and the atoms and molecules they constitute emerge and into which they are reabsorbed. At least, they emerge when we observe them! Yet to think that the universe is a single “substance” fails to explain the evident stability of atoms, molecules, and macro-objects with their specific properties. These stable entities should be recognized as independently existent substances constituting a pluralistic, heterogeneous cosmic plenum. Thus we can conclude that any material substance, by reason of its primary property of quantity, is a continuous body. An atom or molecule is not a set of particles located in empty space but a continuous heterogeneous body with parts that are in contact and intimately connected with each other by various interactions so as to form a true stable unit. Thus, there are vacuums inside and between these massive, inertial substances only in the relative sense that these regions are largely free of massive, inertial matter. Yet all these regions are still constituted from substances that are material in the Aristotelian sense that they have some actuality but also the capacity to be changed.

It seems, however, that we must admit that there may be entities

that are *quasibstances* that, although like a true substance they can exist independently, exist only in a transitory state and lack the inherent stability possessed by true substances such as atoms, molecules, and living organisms. The elementary particles of modern physics have only a transitory existence when they are expelled by collisions or excitations from atoms of which they were a stable part, but then are quickly reabsorbed into other atoms. Those particles are said to have only “virtual” existence. Another example of such a quasi-substance, taken from biology, is the sperm which leaves the body of a male organism and has a transitory independent existence as an instrument of that organism in its reproductive activity. While the ovum does not so obviously separate from the female body, it too has a transitory independent existence within one of the Fallopian tubes and uterus. While Aristotle does not discuss the notion of a “quasi-substance,” Aquinas alludes to such a possibility in showing that the human spiritual soul survives after death, yet no longer constitutes a total person.¹⁴

It would indeed be contradictory to say that an entity only partially exists, since even a minimal actuality is not nothing. But it does not seem contradictory to suppose that some substances are defective in their substantiality, that is, they lack the complete unity and stability necessary for them to maintain their own independent existence that defines a true substance.

Especially since the time of Locke at the end of the seventeenth century, the very notion of “substance” has suffered discredit. But Locke questioned the whole concept of substance because he understood it to be a mere X about which nothing could be known except that it was a “substrate” to its observable properties.¹⁵ The result was a *phenomenalism* according to which we know nothing but sense data. This notion had its origin in Locke’s failure to make a clear distinction between sense data and abstract intellectual concepts. For him the “idea” of “tree” is only a blurred image of many trees produced by the mind’s reflection on its sense impressions of many trees. He did not adequately analyze human language to see the essential distinction between the reference of proper names and universal concepts. Thus, he did not take into account that our sense data is first intelligible to us by an essential classification of observed properties. Then, from the interconnection (unity) of these intelligible properties, we understand a substance to be their unifying cause.

Hence substance does not signify a mere blank “substrate” but the

origin of the properties in which they are virtually contained as effects in their cause, and which accounts for the unity of these properties. Locke's error, however, has so influenced British Empiricism that Alfred North Whitehead felt it necessary to "fill in" the blank X of substance by giving it an inner psychic life (*panpsychism*).¹⁶ Continental philosophy has had a similar problem about "substance" because for Kant this was a concept of a "permanent substratum of change in time" imposed by the mind on sense data, rather than an existent objectively accessible to human knowledge.¹⁷

In chapter 4 I argued that what the intelligence knows by the senses are not simply phenomenal data but the real existing object that acts on the senses, a changeable being (since "as a thing acts so it is"). It is only on further analysis that we distinguish the accidents of that existent from its substantiality. The difference between dreaming and waking awareness is precisely that in the waking state we know the extramentally real existent primarily as substance, only secondarily as sensibly manifest. Thus substances are manifest in our primary knowledge that tangible things exist, although touch tells us little about what kind of thing anything is. In other words, since phenomena depend on substantial existence to be known as real, we do not know them independently from substance.

Thus the notion of Locke and Kant, that it is the phenomena that we know and from which we must either infer or project a substantial substrate, does not correspond to human experience in which what first "appears" is not sense data but existing things having sensible aspects. Phenomenology has been an attempt to return to experience, but unfortunately it tries to arrive at essential knowledge by "bracketing" existence, rather than holding onto the existent substance and then seeking its essentials by abstracting not from existence but, as scientists do, from *irrelevant features* of the existent that arise from mere chance. For example, phenomenologists try to *imagine* essences freed of irrelevancies, while scientists eliminate these irrelevancies by repeated observations and controlled experiments that are not mental but real.¹⁸

2. The Unity of a Species and the Individuation of Its Members

Since the properties of substances are real but dependent beings, it

must be asked whether some substances have the same properties. For example, why is it that the quality of a specific chemical valence in a sample of H₂O has a unity or universality such that all samples supposed to be H₂O possess this identical quality or cannot be pure H₂O? If this question is extended to include all the categories, even substance, we have the old medieval problem of the “universal” debated by realists, nominalists, and conceptualists, then and today. Yet who can deny that natural science classifies observable kinds of things in certain categories, and thus in practice recognizes they have scientifically knowable “essences” even if it does not use that language? For example, current science classifies the elements in the periodic table, defines the molecules by their chemical formulae, and provides a fairly satisfactory taxonomy of the species of living organisms. Metascience compares this type of unity to other types of unity and focuses on the kind of unity possessed by substances as its primary subject, while treating the unity of properties whose existence depends on the substances as its secondary subject, explaining them as effects of the substances that are their causes.

The two extreme solutions to the problem of universal concepts are Platonic Realism and Radical Nominalism. Plato held that the universal Idea of Two is more real than the duality of physical pairs (two hands, two eyes, etc.) that “participate” in this real Idea of Duality. Against this lofty supposition, Radical Nominalism protested that “Two” as an Idea is a mere figment of the mind, since everything that exists is an individual. The Nominalists seemed to have common sense on their side, except that they could not explain how mathematics, or indeed any science, is able to make assertions about classes of individual things, such as asserting that $2 + 2 = 4$. Hence Aristotle insisted that “science is of the universal.”¹⁹ The scientist studies H₂O in its universality, not the water in this glass, but water wherever found.

The Moderate Nominalism or Conceptualism proposed by William of Ockham insisted that nothing is real that is not individual. Yet he had somehow to explain the fact that the sciences use abstract, universal terms. The Moderate Nominalist reconciliation of these two facts was to claim that in scientific classification we apply a single term (*nomen*, name) to many individual things, not because there is some reality called a universal in which they participate as really existing in them, but only because these individuals have *similar* properties or substantial essences. The difficulty with this solution, of course, is how to explain what precisely is meant by “similar.” Similarity seems to be in

the category of real relations; but Ockham denied the reality of relations, since a relation is not an individual thing, but precisely something between two individual things.²⁰

Thomas Aquinas, on the other hand, although he too held that only individuals really exist, also maintained that natural science and mathematics would not be valid if their classifications were based on nothing but vaguely defined “similarities.” Thus, the fact that the sciences have defined essences common to many individual things must be granted, even though it may not be easy to explain that fact. It is a problem for Metascience to explain how this combination of universality and singularity (individuality) is not contradictory.

Aquinas’s solution to this much-debated problem was to say that the relation of similarity between things of the same species is a real relation based on the fact that each of the related things really has some characteristic that is essentially the *same* (not merely “similar”) as the others (e.g., there are many samples of H₂O, or all 5s are equal). Yet, in the real things themselves, this common essence is individuated by the other characteristics proper to each individual.²¹ For example, some human individuals are very intelligent, others less so, because of good or less good nervous systems. We can, therefore, without distorting the truth or cramming the data into a mental pigeonhole, use a single term to signify these essential similarities in an abstract way that signifies the essence but leaves out all that individualizes it in its actual existence. We need not, however, bracket this existence, since our abstract consideration of the existing individual leaves out only its merely accidental, superficial aspects. In knowing you as a human being, I can ignore your racial complexion. The state of abstraction as such is a merely mind-dependent relation produced by the mind to enable it to classify these realities according to what is really significant for understanding them.

Ockham knew of this solution of Aquinas, but he rejected it on the grounds that to say, as Aquinas did, an essence is neither universal nor singular, but exists in the mind as universal but in the thing as singular, was contrary to the fact that everything real is individual, that is, singular. This misses the point that, for Aquinas, the real is that which exists. Thus there are no existent essences that are not individuated in their extramental (mind-independent) reality, but if we consider that these essences are really distinguished from their existences, there is no contradiction in saying that these essences are neither individual nor universal, as experience shows us is actually the

case. When a mathematician declares that $2 + 2 = 4$, it is not contradictory to say that the first 2 is absolutely equal to the second 2 by reason of their identical essence, yet they are somehow two 2s, not the same 2; nor are they merely somewhat like (similar) to each other, since they are absolutely equal. It is irrelevant to the aims of mathematics to say that the former two units are oranges and the latter two are apples. Again, in natural science, it is not contradictory to say that water, wherever found, is recognizably H_2O , although it is located in many places geographically and has various temperatures and impurities. The chemist first has to establish it is water, and is only then concerned about its impurities.

This controversy is still current in the work both of Husserl, who sometimes defended a moderate realism, and Nelson Goodman, who leaned toward a moderate nominalism.²² On the basis of Aquinas's widely accepted solution, we will leave further details of this problem to the next chapter (in the discussion of logic, since for Aquinas the problem of universals pertains properly to logic, not to any science of real being, since nothing but individual substances and the First Cause exist, although there are real relations of sameness between things of the same species).

The existence of the Many must be due, however, to the existence of the One, the First Cause; and, as we have seen, the most evident proof of the existence of the First Cause is through motion and efficient causality. Merely static relations could not constitute a changing universe as a system. The universe is a dynamic system in which the many substances that constitute it interact with one another as agents and recipients in efficient causality, and all ultimately depend on the efficient causality of the First Cause both for their coming into existence and their capacity to act and receive. This again is why the treatment of the first transcendental, Unity and Plurality, must be closely related to efficient causality. Yet there are those who attempt to retain a dynamic view of the world while so exaggerating its unity and minimizing its plurality that the efficient interaction of its many substances is lost in some type of monism reducing all reality to a single principle.

D. THE UNITY OF CONTINGENT SPIRITUAL SUBSTANCES

1. *The Embodied Human Spirit*

After surveying the various meanings of the One and the Many in natural science with respect to material substances that can be directly observed, it is now necessary to pass from this to the One and the Many as indirectly verified in nonmaterial substances. We have seen that natural science may prove the existence of such immaterial substances as ultimate causes of change in material substances. Since we can directly observe only material substances, if unobservable immaterial substances exist, we can know them rationally only by analogy to their effects, and hence we can know their unity and plurality only by analogy to the unity and plurality of material things discussed in the first section of this chapter.

Doubts about whether the human person has a spiritual soul are not new. Even the ancient cultures that strongly believed in an afterlife often thought of it as simply the continuation of a physical life in another world. This is exemplified in Egyptian culture with its practice of burying its pharaohs as mummies surrounded by luxurious accoutrements of a worldly splendor. The Hebrew scriptures for the most part remain skeptical about what human survival of death might be like, and it was only with the Pharisees and the teaching of Jesus that a resurrected life spiritually transformed entered into Jewish thought, and even today seems to play only a secondary role in Judaism.

Among the Greeks, the Epicureans denied a future life, and the Stoics portrayed death as an absorption into Nature. Platonism and Neoplatonism, of course, made human spirituality central to their thought, maintaining that the human soul was eternal and occupied the body only temporarily. Yet the tendency of Neoplatonism was to seek the ultimate destiny of the soul in a unification with the One in which human individuality would be lost. Christian theologians and the medieval scholastics, therefore, were strongly influenced by this Platonic “dualism” in which the spiritual soul is the true nature of humanity, but the biblical doctrine of resurrection always prevented them from denying that the body must somehow share in the destiny of the spiritual soul.

Islamic thinkers, under late Jewish and Christian influences, also fully accepted the notion of resurrection and disputed how literally were to be understood the delights of Paradise as presented in the Qur’an. The Arabic philosophers generally understood these statements

metaphorically and inclined to a Neoplatonic view of the human soul that made difficulties for them with Islamic orthodoxy.²³

Before the rise of the seventeenth-century Enlightenment, no major culture is known to have doubted the existence of many nonmaterial substances other than a Supreme Being. Although materialism had its proponents in the Stoic school in the West, in India in the Cavarka school, and in China in Neo-Confucianism, as well as in modern thought in philosophers like Thomas Hobbes and Karl Marx, belief persisted not only in the survival of the ancestors—even if, as with the Jews, they had only a shadowy existence in Sheol—but also in a world of spirits, angels, or lesser gods. It has seemed obvious to the majority of humanity both that the universe would not exist without a Supreme Spirit and that humans somehow share in spirituality. Furthermore, in the great gap between the Infinite Spirit and the minimal spirit that is the human soul in a material body there must also exist other more powerful spiritual beings.²⁴ Indeed, this belief survives in our secularized culture, sometimes in the science fiction fantasies about superhuman beings on other planets. It is of course true, as we have already seen, that these worldviews do not always make a sharp distinction between the material and immaterial, or even between the visible and invisible, since they suppose that spirits have tenuous humanoid bodies that sometimes become visible. Also in some cultures, such as those of India, the reality of the material world is put in question and considered less real than the world of spirits.

It is not the task of Metascience to establish the existence of immaterial substances since, as I have argued in chapter 4, it presupposes that natural science has proved the existence of an immaterial First Cause, immaterial human souls, and the possibility of immaterial pure spirits. Yet Metascience does have the task of answering in a more positive manner problems about the essences or natures of these spiritual substances. It is puzzling that in Aristotle's *Metaphysics* XII we find no references to the demonstration of the immateriality of the human intelligence in his *De Anima* III. In chapter 4 I expressed a similar puzzlement over the fact that while Aristotle makes some vague references to the existence of pure spirits in his *De Caelo*, he left the proof of their existence to *Metaphysics* XII, and I could only suggest that perhaps this was due to the probability, accepted by many scholars, that the *De Caelo* was an early work. The same explanation cannot apply to the lack of reference in the *Metaphysics* to the proof in the *De Anima* of the immateriality of the

human soul, although Aristotle certainly presupposes this conclusion throughout that work. Thus we are left with the fact that the *Metaphysics* as it has survived is a very late work and is in many respects imperfectly edited and incomplete.

As regards the nature of the human intellect, therefore, the chief problems that need to be addressed are: (1) How can a spiritual soul that is a simple form still have many powers? (2) Is the reincarnation of the soul taught by Plato and by Hinduism, Buddhism, and other religions really impossible? (3) How can this human soul, once separated from the body, since it lacks an organ of internal sensation to supply data to its intellect, continue to perform spiritual functions?

As to the first of these questions, the Platonists and in particular the medieval Franciscan school taught that the immateriality of the soul means that its simplicity excludes the possibility of powers distinct from the soul itself except, perhaps, by a “formal” distinction such as Scotus proposed.²⁵ By a “formal distinction” Scotus meant that, since we have distinct concepts of “intelligence,” “will,” “sense,” and so on, in the human soul, this must reflect some plurality or distinction in the soul. Yet, since for Scotus a real distinction meant that the two terms could, at least by the power of God, exist separately, any “real” distinction between the soul and its powers would contradict its simplicity and thus endanger its immortality. Thomists, however, do not hold that two terms must be able to exist separately for them to be really distinct, since for Aquinas, unlike Scotus, matter cannot exist separated from form, yet matter and form are really distinct. Thomists maintain the soul’s simplicity by emphasizing the necessarily analogical character proper to Metascience of our knowledge of immaterial reality. Hence the soul is simple in the sense that it lacks quantitative parts, but not in the sense that its spiritual powers are not really distinct from the spiritual soul of which they are properties. Therefore, the separation of the material body from the spiritual soul and its properties does not cause their death, since they survive together as a quasi-substance with its connatural properties. The human soul in its spirituality, therefore, is simpler than its quantified body, but less simple than the pure spirits, and infinitely less simple than is the First Cause, whose absolute simplicity it truly but very remotely imitates.

The second question about the human soul concerns whether it is possible that, once separated from the body by death, the soul can be eventually reincarnated in another body. That the soul does again and again assume new bodies after the deaths of previous ones is an ancient belief that pervades all of Hindu and Buddhist thought, and has

become an important part of New Age thinking in our own country.²⁶ One of the first great Christian theologians, Origen, attempted to fit this doctrine of reincarnation (metempsychosis, transmigration) into Christian faith in his pioneering systematic theological treatise *De Principiis*.²⁷ He probably later abandoned it, and certainly the Church soon condemned the teaching of reincarnation as utterly inconsistent with the doctrine both of the Incarnation and of the Resurrection. Furthermore, reincarnation is usually associated with the idea that the human soul is eternal and descends into the body in endless cycles as a punishment for some kind of sin. Hence it is also often connected with the notion that eventually all souls will be saved, at least for each cycle of time. Such views are inconsistent with Jewish, Christian, and Islamic faith.

Aquinas rejected reincarnation for these theological reasons, but also on purely rational grounds. He considered reincarnation to be totally inconsistent with the non-dualistic anthropology common to his own thought and that of Aristotle. If the soul, even though spiritual itself, is the form of the body, as required by natural science, then this form is individuated by its relation to a particular body that, as material, is individuated (distinguished) from other bodies by its quantity. Since the individuated human body is a unique member of the human species, its correlative soul must also be unique and proportionate to that body and no other.²⁸

Modern biology shows that each human being is genetically unique. Even in the case of identical twins and clones, the genetic factors in the cytoplasm of the original embryo from which the second of the pair was separated is not equally divided between the clones. Moreover, twinning is an embryological accident and not the result of what is teleonomically natural to human reproduction. Since the immaterial soul is not itself the product of the biological parents but must be attributed immediately to the First Cause, each human person is uniquely related to God both in body and in soul.

It would seem, then, that reincarnation is consistent only with a dualistic conception of the human person, in which the spiritual soul preexists the body and is united to it only extrinsically and temporarily. The Pythagoreans had the phrase *soma sema*, “the body is the tomb” of the soul, and in the Platonic tradition the soul is said to put on and take off the body like a garment. Such views are possible only if it is supposed that the contemplative life of the soul consists in the recovery of some kind of inner knowledge retained from a previous existence,

but is wholly inconsistent with Aristotle's view that all intellection naturally depends on the reception of data from the sense organs of the body.

The third question about the nature of the life of the separated human soul is a difficult one. It will be easier to discuss if we first have considered the nature of those spirits who require no body and whose existence is consistent with natural science.

2. The Hierarchy of Contingent Pure Spirits

a. The Community of Spirits

I argued in chapter 4, section C.1, that some purely spiritual agents intermediate between the First Cause and embodied human spiritual souls might exist as movers of the independent lines of causality that science finds in the physical part of the universe. Hence the question must be asked whether it is probable that these spirits, if they exist, are even more numerous than these particular physical effects. In the face of Aristotle's caution, Aquinas responded that, though the available astronomical evidence seemed to require only fifty-five intelligences to move the celestial spheres, it was probable that the number of species of these spirits far exceeds that of material species.²⁹ Thus our universe is primarily a system in which the number of spiritual substances far exceeds the number of material substances. He found support for this hypothesis in the biblical references to the "host [army] of heaven" (Lk 2:13) and to the "countless numbers" (Rv 5:11) pictured in the heavenly court.³⁰

Yet Aquinas also proposed a dialectical argument to give rational support to this supposition. In the material universe we note that there are more species of the more complex substances than of the simpler—for example, more species of living things than of inanimate ones. This is reasonable, since with increasing complexity of parts, a greater variety of combination of traits becomes possible. Yet, oddly, when it comes to the most complex of substances in the visible universe, namely, our human race that is endowed with spiritual intelligence, we find only a single species of human being. Is it not strange that only the weakest kind of intelligence may exist in the universe? To the contrary, the observed fact that the more complex the kind of substance the more numerous its species in the material realm suggests the unobserved possibility that, besides the few pure spirits needed to

move the celestial spheres, a vast number of such spirits exists, each a species in itself, far exceeding the number of material species.³¹

Moreover, if we accept, as Aquinas did, the conclusion of Aristotle's *Nicomachean Ethics* that the highest activity of intelligent human beings is the contemplation of truth, we also need to apply this thesis analogically to pure spirits. Thus, it would seem that the activities of these spirits cannot be restricted to guiding physical processes. This astronomical task must be for them only a very secondary one that is probably relegated to their lowest ranks, just as manual labor is not the main occupation of the most intelligent human beings. Hence, although the existence of pure spirits is demonstrated from their regulation of the material universe, this gives little notion of their actual numbers. If only fifty-five are occupied with moving the spheres, are there not many more occupied with contemplation?

After arguing for the existence of vast numbers of pure spirits in addition to human spiritual souls, Aquinas goes well beyond Aristotle in discussing their essences and properties.³² It is no wonder that among the medievals he was called the "Angelic Doctor." For Aquinas—arguing by analogy, and chiefly only as dialectical speculation—pure spirits, though they do not require material bodies and are not composed of matter and form, are nevertheless composed of a really distinct essence and existence. Although immortal, since only material things can die, they are contingent and dependent on the First Cause for their existence and actions. Our understanding of their properties must be based on their analogy to ourselves. This shows us that, as pure spirits, it is possible for them to have properties in certain of the nine categories, namely, quality, relation, action, and reception. Quantity, place, position, environment, and time are not possible for them, since these properties all imply bodily existence.

Yet, since the spiritual human soul can move its material body, pure spirits can act on the material world just as we can. They can be in place virtually, that is, they can act on bodies in place, position, and environment, perhaps even over large (yet not infinite) regions, although they themselves do not occupy any dimensive place. If this were not the case, how can our spiritual will move our material bodies? The more powerful a pure spirit the greater the region it can act in during a given time. Moreover, since the pure spirits can cause motion, they are also virtually (that is, by their effects) in time. Furthermore, since they think and will as we can do, and since these acts are not identical with their essence, they can have a certain kind of succession

in their thoughts. This succession amounts to a sort of discrete “time.” Aquinas calls it “aeviternity,” which is a notion analogous to the quanta of time that modern quantum theory posits.³³

The principal activity of spiritual beings is contemplation, and the principal object of their contemplation, as for us, is God, the First Cause, as reflected in the order and beauty of his creation, including especially its spiritual realm. Since, however, pure spirits do not depend on sensations for knowledge, their thinking is based on innate ideas, in much the manner that Plato and Descartes attributed to human intellectual cognition. They also, like us, have free will. But, unlike us, they cannot change their commitment to their ultimate goal in life because their superior intelligence presents that choice to them with such clarity that they will never have any reason that they have not already taken into account to change their choices.³⁴ We humans, on the contrary, can change our ultimate goal in life for better or worse, because our bodily condition varies so much that the advantages and disadvantages of our choices appear in different lights at different times.³⁵ Thus, the intelligences that have wisely chosen God as their goal form a single community of persons of intelligence and free will centered in God, a community to which human beings naturally belong as the least members. Hence the pure spirits are in constant communication with each other and with God, sharing the fruits of their contemplation as they achieve them.

How do they communicate? In human communication there is no direct transfer of information from one mind to another. Instead, we have developed a linguistic communication that consists in signs that arouse in us images and concepts we already have, and which we then use to construct what is in the other’s mind. Teachers instruct by helping students order the knowledge they possess in such a way that they arrive at new insights and inferences. Pure spirits cannot directly know what is in other spiritual minds or wills, nor do they use a physical language in communicating with each other.³⁶ They are, however, able to aid inferior spirits in their thinking (much as a human teacher helps human pupils) through a kind of interior spiritual strengthening of the lesser spirit’s intelligence.

Why do pure spirits not communicate with us?³⁷ According to Aquinas, they can do so either by acting on our bodies to produce images in the imagination or by spiritually supporting our thinking as one spirit does for another spirit. Thus we are not necessarily conscious that they are aiding our thought. Since, as already noted,

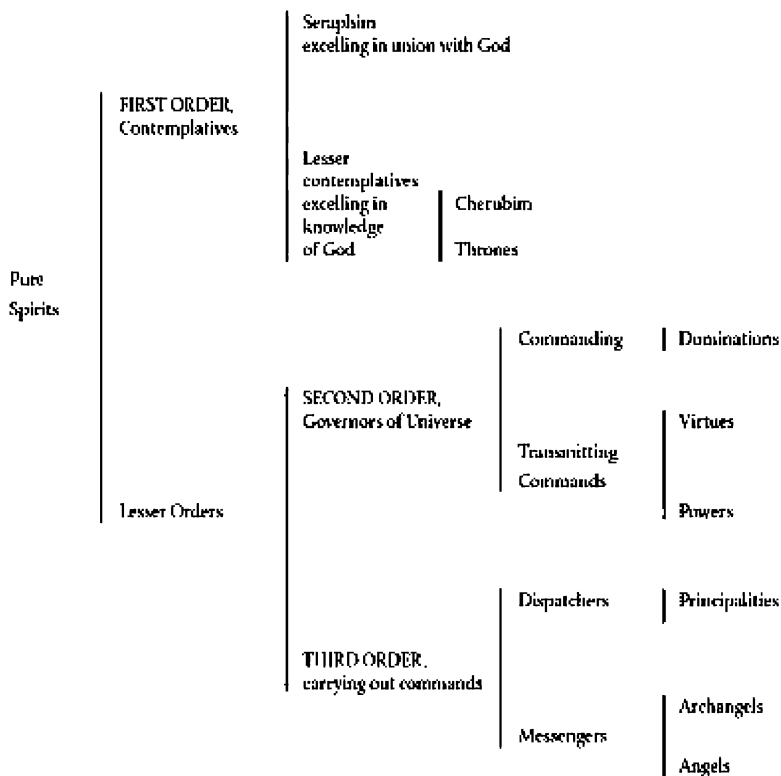
they can affect material things, they can guide the course of natural events. This implies that they can also communicate with us not only in our interior visions through our imagination, but can also produce exterior phenomena, such as the appearances of pure spirits in human form related in the Bible. It is not surprising, however, that they do so only rarely and for special purposes, since in the ordinary course of the universe their actions are known to us only in the ways just described.

I would add that there may be evidence for assistance by pure spirits in the rare occurrence of extraordinary genius in human affairs. Socrates believed that he had a guardian spirit (*daimon*) who on occasion guided him to right conduct.³⁸ The creative processes of great artists and scientists sometimes seem superhuman. When we consider the extraordinary influence of the great religious leaders in history in raising the level of their cultures, they seem somehow inspired. Why not suppose that they had special superhuman assistance, though less perfect in kind than the direct divine inspiration Christians attribute to the prophets?

Aquinas also proposed a model for the hierarchy of spirits based on three dialectical principles:

1. In every hierarchy there is a beginning, middle, and end, and within each of these three divisions a similar fractal division into beginning, middle, and end is possible. Hence he supposes that there are at least three “orders” of spirits and each order is divided into three “ranks,” giving nine ranks in all.

Diagram 5. Aquinas's Model of the Spiritual Hierarchy



Note: The divisions within each Order are called “Ranks,” and each is a hierarchy of many species of spirits, greater in number than all material species, but with a single individual to each species.

2. The principal activity of pure spirits, analogous to human spiritual activities, is contemplation.
3. A secondary activity of angels is the governance of the universe, including the transmission of God’s commands to lower spirits and finally to human persons.

The names of the nine ranks of spirits—seraphim, cherubim, thrones, dominations, virtues, powers, principalities, archangels, and angels—are based on the Pseudo-Dionysius who derived them from the scattered references in the Bible.³⁹ This remarkable model developed by Aquinas is represented in diagram 5.

Within each rank of this hierarchy are countless species of spirits, but Aquinas argues that, unlike the human species in which the

presence of matter permits a plurality of individuals, each pure spirit is a species in itself, analogous, he says, to the series of natural numbers, 1, 2, 3, . . . n. The ranking of these species of spirits is according to the number of innate ideas through which each spirit knows. Surprisingly, however, the less the number of innate ideas possessed by a spirit⁴⁰ the higher in the hierarchy it is, since God has only one idea, his own essence. The lower in the hierarchy a spirit is the more ideas it takes it to think, since each idea is less profound and comprehensive. Thus, such lowly spirits approach the human condition, in which our thought is stretched out in a stream of consciousness in time, while the highest spirits approach the eternal Now that is the First Cause. Perhaps this is not so surprising after all, since it is often noted in the lives of geniuses that their extensive knowledge is derived from a few basic intuitions. Thus Aquinas, in one of his earliest works, the *De ente et essentia*, expresses his first and not yet perfectly articulated apprehension of the importance of *esse* that was to become central to his philosophy.

b. The Unity of the Spiritual and Material Realms

Metascience cannot, it would seem, go any further in the exploration of the world of pure spirits than such speculations. The field of “parapsychology” that deals with such alleged phenomena as telepathy, telekinesis, and so forth, has so far proved pretty much a pseudo-science. It is likely that superhuman intelligences are not going to manifest their interventions in the world except for two reasons. First, if the good angels intervene in special ways, they must do so within the scope of the providence of the First Cause. Such an intervention would be an act of revelation by the First Cause requiring on the part of humans an act of faith, and its critical study then pertains to that field of sacred theology called “apologetics.” Second, if, on the other hand, evil angels intervene, it can only be to confuse, deceive, and enslave human beings. While Metascience certainly has a role in exposing lies and fallacies from whatever source they arise, it can do so only at the level of human experience and reason.

In the multicultural dialogue, therefore, the approach to the widespread belief in the role of ancestral spirits and other spiritual beings ought not to be one of contempt, as it has too often been in the Enlightenment West. Yet it should not be one of credulity, as has also been the case in the West through the influence of so-called

“theosophy” and occultism. Rather, one must remain open to its possibility, for as Hamlet advised, “There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy.” Among American thinkers, it was William James,⁴¹ son of a rather credulous Swedenborgian father and older brother of the great novelist Henry James, who opened modern philosophy to the exploration of religious experience.

Like Aristotle, William James insisted on a metaphysical “pluralism” that resisted any attempt to a simplistic reduction of the amazing variety of being.⁴² The tendency of the human mind to form a unified picture of reality to satisfy its natural and very proper desire for wisdom must submit to this real variety in the world. This raises the great question of monism versus monotheism. Since, however, this question involves not only the question of the kind of unity possessed by *ens commune*, but also of the First Cause as the principle of *ens commune*, it will be treated in chapter 12.

I argued in chapter 4 that natural science demonstrates the immateriality of human souls, and at least raises the question of the existence of finite pure spirits as prime movers of independent lines of causality in the universe. In chapter 5 I showed that it then pertains to Metascience to reason analogically from the essences and properties of material beings to the essences and properties of spiritual beings. Then, arguing in descending order (*a priori*) from causes to their effects, Metascience seeks a unified view of the whole universe that is principally spiritual and only secondarily material. In the human person, Metascience finds the *microcosm* in which matter and spirit are joined in a single kind of substance. Human persons by their intelligences and wills are truly members of the community of spirits whose goal is contemplation of the total universe and, through it, contemplation of its Creator, the Supreme Spirit.

Although it seems to most scientists highly improbable that our universe includes pure spirits as prime movers of observed effects, it can also be argued that it is also very improbable for human intelligence to have emerged from our material universe, so subject to chance, unless some intelligence with the requisite information to guide the process exists. This point will be further discussed in chapter 9.

E. UNITY, PLURALITY, AND EFFICIENT CAUSALITY

In this chapter the hierarchic multitude of all the beings included in contingent Being, the proper subject of Metascience, has been considered in their Unity and Plurality. It may not be entirely clear, however, why this transcendental is especially related to efficient causality, as I asserted it to be at the beginning of the chapter, rather than to the other three kinds of causality. It is true, of course, that what unifies a being as a substantial whole is its form (formal cause), while it is the goal of its activity (final cause) that gives it dynamic unity. Again, the lack of unity (the plurality) of the parts of a substance results from its potentiality (material cause). Nevertheless, it is efficient causality that produces both unity and plurality in the universe, because the universe, as we have seen, is a dynamic system in which order is produced and maintained by those efficient causes that are the prime movers in the whole system and in each of its subsystems. Thus, the unifying and differentiating (pluralizing) forms of things are produced by their natural efficient causes. These are predetermined to maintain the order of the universe (final causality) out of what would otherwise be the chaos of potentiality (material cause).

This Thomistic view of the multitude and diversity of creatures results also in a conception of their hierarchical order (see diagram 5 above) very different from that of Neoplatonism, which so closely resembles the views of Hinduism, Buddhism, and Taoism. It was the Pseudo-Dionysius, in his remarkable treatises *The Celestial Hierarchy* and *The Ecclesiastical Hierarchy*,⁴³ who first introduced the term “hierarchy” (*hieros-arche* “sacred order”) into theology, although in present usage it is often used without any connotations of the sacred. Neoplatonism conceived this hierarchy of beings as perfectly *linear*, so that whatever perfections were contained in an inferior member of the series were totally contained and in a better way in its superiors, from which it received them less perfectly. This model of hierarchy resembled the series of the natural numbers, in which the units of any given number X are contained in any number greater than X.

Aquinas accepts the analogy to the number series, but with a very important distinction. For him, this analogy is more perfectly realized in the hierarchy of pure spirits and less perfectly realized in the hierarchy of material things, but is always qualified, since it is true only generically, not specifically. For example, the human being is higher in the hierarchy of creatures than minerals, plants, and animals, and contains their perfections, but only generically. We humans, although we are the highest member of the material universe, cannot sparkle like a diamond, nor flower like a rose, nor swim like a fish. Instead,

within the generically ordered hierarchy of creatures, each species of creatures has some unique perfection possessed by no higher creature, not even the highest, but only by God. What is true of species is also true in the case of material things of individuals within species, so that in a Thomistic Metascience no substance in the universe is a mere “clone” of another. The higher a creature is in the hierarchy the more distinct it is from other creatures. Two grains of sand are not identical in their perfections, though their differences are minimal. The differences among individual plants are greater, among animals greater still (think of the individual “personalities” of pet dogs!), and very great among human beings.

Since the human soul is a spiritual substance (though when separated from the body an incomplete one), material forces cannot produce it and hence each human soul must be created by a special and unique act of God.⁴⁴ This implies a unique relation of each human being to the First Cause in addition to the relation it shares with other members of its genus. Thus, the pejorative sense in which the term “hierarchy” is often used today, notably in feminist thought, to connote an oppressive power stems from the Pseudo-Dionysian, not from the Thomistic, use of that term.⁴⁵

Thus, in the cosmic system, it is efficient causality that produces the existence of beings. In the case of material things this production presupposes the material cause as it exists under some form, but brings into existence a new substance from this previous matter or (in the case of merely accidental change) modifies an already existent subject. Immaterial beings, however, including the human spiritual soul as the substantial form of the human body, since such pure forms have an existence that is not dependent on matter, can only be created *ex nihilo* by the immediate action of the infinitely powerful First Cause especially concurring in the human case with the natural physical causes of bodily generation.

An efficient cause precisely as such does not itself undergo change when it acts to change another. The change takes place only in the recipient. Thus efficient causality is a fruitful, generous sharing of being with another, precisely because it is not itself diminished by that act. Thus it is a mistake to imagine efficient causality as if it were like pouring water from one glass into another, thus emptying the first glass as one fills the second. In efficient causality as such, the agent loses nothing by giving something to what it effects. Nevertheless, as we have seen in the argument for the existence of the First Cause,

contingent efficient causes cannot act unless another agent also actualizes them, since change is in the recipient of action, not in the agent. But all material agents are moved movers, since, before they act, they are only in potency with respect to that action, and must be put into act by another agent. In an engine the fuel cannot generate power unless the fuel itself is ignited by some agent. Yet it is not contradictory that the First Cause is an unmoved mover since, as just said, an efficient cause *per se* is not moved by the fact that it moves another.

The reason that we make the mistake of thinking that an efficient cause loses something by causing is that in many material actions the action is mutual, and both agents are also recipients, though in different senses. Thus, when we put a hot object next to a cool one, we may say that the hot object “loses its heat,” but in fact heat does not pass out of the hot object into the colder one. What really happens is that the two objects act reciprocally on each other: the cold object cools the hot object and the hot object heats the cold object, and the result is a mean temperature. In the case of living things also, we are inclined to think that when we work our energy goes into the thing we work on, and that this leaves us exhausted because we have lost so much energy. What really happens is that the resistance of the external objects on which we work causes changes in our bodies that then need to be repaired by rest and an input of new energy from food and respiration to rebuild them.

Efficient causes produce their effects either transitively or intransitively (immanently).⁴⁶ A transitive efficient cause produces its effect in another substance—for example, a gun puts a bullet in motion. An intransitive or immanent efficient cause, however, produces its effect in the agent itself. This might seem to contradict what has just been said, namely, that an efficient cause *per se* is not changed by its own action, and might seem also to contradict the principle of causality, that nothing can change itself. The answer to this seeming contradiction, however, is that an intransitive action is performed by one part of a substance on another of its parts, or in all or many of its other parts. Thus, in an animal the brain moves the other parts of the body, yet the change may be intransitive as regards the whole animal (for example, the circulation of the blood by the heart in a sleeping animal that is not acting transitively on its environment).

Ascending the hierarchy of creatures, one finds that their principal efficient activities become more and more intransitive. Thus, although human beings make many changes in things extrinsic to themselves,

their most specific activities are intransitive ones of intelligent thought and choice. For human beings, the interior life is more important than exterior activities, and the highest events of life happen within our minds and wills. In the case of the pure spirits this is truer still. Hence the First Cause, Aristotle says, is best understood as “Thought Thinking Itself.” That is why God created the world freely, because his eternal life is wholly internal and totally self-sufficient. The philosopher Teilhard de Chardin made much of this insight in his poetic praise of evolution as beginning with things whose activities were external and moving upward to the interiorization of activity.⁴⁷ One of the consequences of this conception, as we will see in the next chapter, is that human beings by their free choices not only act externally, but in doing so form their own character by the development of the virtues. We are what we have become through our life choices. The history of the cosmos, therefore, depends not on some predetermined law, but on the free choices of its spiritual citizens.

Unity and Plurality in Other Sciences

A. UNITY AND PLURALITY IN MATHEMATICS

1. *Natural Science and Mathematics*

Metascience, since it presupposes at least natural science that is also presupposed by the other special sciences, depends on them for its data. It cannot, therefore, pretend to correct their *certain* conclusions. It can, however, assist them in several ways. First, it can sometimes show that their first principles have not only a conditional but also an absolute necessity. For example, it shows that the principle of non-contradiction, which in chapter 3 was shown to apply to natural science, applies to all Being, and with absolute necessity. Second, it can compare the findings of one discipline with another and show their similarities and differences. Third, it can often solve apparent contradictions in the special disciplines that arise from semantic confusion. Fourth, it can relate all beings to their First Cause.

For its own purposes, Metascience, as the epistemologically ultimate discipline, uses analogies taken not only from natural science but also from mathematics, a field that excels in clarity

and certitude. For this reason Aquinas held that the method proper to mathematics is to proceed *disciplinaliter*, that is, “teachably,” and, hence, along with logic and the other “liberal arts,” mathematics is to be taught before natural science, even though epistemologically mathematics is posterior to natural science.¹ Yet, in modern times, there are many controversies about the foundations or “philosophy” of mathematics. These problems, of course, pertain to the mathematical sciences themselves, yet are of interest for the effects they have on all disciplines. Because the relations of mathematical objects have such clarity and simplicity we use them to model other types of relations. Thus, even in the practical discipline of politics, we may think of a community as a “circle” in which the various members are united by their concern for the common good as the point that centers the circle and to which each of its parts is related. In this chapter we are especially concerned about the sense in which the objects studied in mathematics are “beings,” that is, whether and how they exist. In particular, we are interested in how the transcendental properties of Being called Unity and its opposite, Plurality, are found in mathematical objects where they have their most explicit and simple exemplification.

Aquinas notes that natural science and mathematics differ in the way the verification of their arguments reduce to the evidence of the senses. Natural science reduces to external sense observation, while mathematics reduces to an internal sense, namely, *imagination*.² This statement is somewhat puzzling since all human intellection reduces remotely to external sense observation, but proximately to internal sensation since, as Aquinas so insistently maintains, we cannot form an intellectual concept without a corresponding “phantasm,” that is, an image in the internal senses.³ Aquinas’s point, therefore, is not to deny that in natural science as in all the sciences we necessarily use internal sense images, but to make clear that this is true in mathematics in some especially significant way.

What is that special way in which mathematics is verified in the imagination? Since the abstraction required for mathematics is that which removes all the categorial properties of a material

object except its quantity, the images needed to form mathematical concepts must first be separated from the other sensible properties they continue to possess in their transmission from the external senses to the internal senses. The imagination is the sense power that has this special ability to combine and separate different elements in an image, as, for example, to imagine a printed page as blank. Thus, when the teacher of geometry draws several kinds of triangle on the board, one equilateral, one isosceles, one scalene, and tells the student that “triangle” means *any* kind of triangle, the student is able to conceive the mathematical triangle that is defined simply as “a closed plane figure composed of 3 straight lines” only by first forming a mental image of such a figure with the length of the sides and the dimensions of the angles blurred and vague. Furthermore, when asked to conceive a “circle” as “a closed plane figure every point of whose circumference is equidistant from a given point,” students need to form mental images more perfectly circular than the one on the board and to perceive that they can make that circle on the board as perfect in imagination as needs be.

Given this understanding of the difference between natural science and mathematics, and the ultimate dependence of mathematics on natural science, I will in this chapter reverse their epistemological order and, for two reasons, discuss mathematics before returning to current natural science. First, I have already in the previous chapter developed the transcendental concepts of Unity and Plurality in their primary instance, that is, as they are found in material substances and their properties. Second, it is because modern science has made such an extensive use of mathematical models as a dialectical instrument for natural science that it is in that area that Metascience today finds its most interesting questions.

2. *Ancient Mathematics*

In all cultures there is some kind of practical mathematics. Even the simplest cultures have practices of counting and measuring.

In Egypt, Africa, Mexico, Peru, there were in ancient times remarkable engineering feats that required considerable mathematical sophistication and were related to elaborate systems of astronomy or astrology.⁴ In fact, “astronomy” and “astrology” were not clearly separated from each other until well after the time of Johannes Kepler (1571–1630),⁵ the discoverer of the elliptical shape of the planetary orbits. Yet Aquinas, following St. Augustine, had rejected the view that the stars can determine human free will.⁶

Chinese and Japanese culture developed an extensive practical mathematics, while India borrowed from and developed Greek mathematics. Arabic Islamic scholars, using Greek mathematics along with developments added to it by Hindu authors, made significant advances, including the important form of arithmetic called “algebra” (from Arabic words for “the” and “unite”). Yet it remains the unique contribution of Greek culture to have discovered a purely theoretical type of mathematics⁷ without which modern mathematical physics would be impossible. In fact, as we saw in chapter 2,⁸ it was this notion of pure theory that stimulated all of Greek philosophy and gave birth to its conception of contemplative wisdom, a delight in the beauty of truth valued for its own sake.

For Plato, following Pythagoras, mathematical objects were intermediate between nonpermanent sensory material objects about which no certain knowledge was possible, and the eternal Ideas that for Plato were the only true realities and which were innately reflected in the human intelligence.⁹ In modern controversies about the foundations of mathematics a prominent line of thought is still called “Platonism” because it defends the truth-value of mathematical statements independent of the constructive activity of the human mind.

Indeed, Aristotle was in this respect also a Platonist; but when moderns use the term, they commonly suppose that this objective truth about mathematical objects is *a priori*, that is, known apart from sensory experience. Aristotle, of course, would not agree with that, and in the last two books of his *Metaphysics*, XIII and XIV, as well as in many other places throughout that work, he is

especially concerned to refute Plato's view of the "mathematicals" as independently existing beings. He strives to show that mathematical entities are known only through intellectual analysis of sensory experience.

For Aristotle, as was explained in chapter 3, mathematics is the study of the objects in the category of quantity abstracted from their actual existence as physical properties of material bodies.¹⁰ Hence, the objects that are its proper subject of study as a science have an "ideal" mode of existence, and to this extent Plato was right; but nevertheless these objects are derived from our knowledge of physical reality. They are not known *a priori* but by abstraction from sensible experience, so that mathematics remains a *real* science dealing with what truly exists,¹¹ although their existence (being) must be understood by an analogy to the changeable beings studied in natural science.

Physical quantities are continuous, since within a single body its parts are in contact and every body that changes must be in contact with some other body that causes it to change or that it causes to change. By abstracting the quantity of bodies, therefore, one establishes a science of continuous quantity that the Greeks called "geometry" (earth measurement) because it was first developed for the practical purposes of surveying land. Yet it is also possible to consider such continuous physical quantities still more abstractly by *counting* the parts of a body, or counting the different bodies themselves: and this gives rise to the study of *discrete* quantities abstracting from their contacts. This science the Greeks called "arithmetic" (Greek for "art of counting").

Thus the proper object of geometry, or the science of continuous quantity, consists in points, lines, planes, and solids, idealized as dividing a homogeneous, unchanging, three-dimensional space only analogous to the heterogeneous plenum of our sense experience. Similarly, the proper object of arithmetic, discrete quantity, is known by counting bodies or parts of bodies, and from this deriving abstract numbers. Since science is of the universal and through causes, mathematical objects have essences composed of form and matter. In the continuous wholes

studied by geometry, the form is a “figure” or boundary limiting the parts of a continuous line, plane, or solid that are further divisible by such limits. This potential divisibility is the material cause of a mathematical entity. Similarly, in discrete quantity, the units of which a number is composed are its “matter,” while the species of number, 3, 4, 5. . ., is the collective unity of these 1s. But, since mathematical quantities are considered as abstracted from change and the changeable beings of human experience, they have no efficient causes nor any final causes.¹² Why then do mathematicians speak of “constructing” mathematical objects, such as a circle, or a number that in an equation like $2+3 = x$ provides the right answer?

The purpose of such constructions is to make sure that the mathematical objects in question in some sense really exist, and thus to answer scientific question 1, “Does it exist?” But in answering this first question for mathematical objects we also answer question 2, “What is it?” because in constructing something we have to know precisely what we are trying to make. Yet how can one make an abstract, unchanging circle or the number 25? One might be tempted to answer that “construct” means to draw a picture of a triangle or a square, or write down a number. But mathematical truths are not perfectly verified in any actual drawing or even counting of physical objects, since we cannot draw a perfectly straight line or a perfectly round circle, nor a one-dimensional line without breadth, and may make a mistake in counting, or one of the objects counted may be destroyed or another added. Perfect triangles or squares or circles or precise numbers exist only in our thought, not in the objects of our external sense experience.

Thus we cannot know these intelligible objects without first idealizing our sensory experiences of physical bodies and then constructing their images in our internal senses, first as a “common sensible” (i.e., at least common to touch and sight, both of which inform us of the shapes of things and the discreteness of objects counted) and then in the imagination.¹³ The internal senses of imagination and the estimative sense¹⁴ are able to combine and modify images received from the external senses.

To this constructive activity of the imagination the cogitative (estimative) sense also contributes, since it compares various images in ways that measure them and reveal their equality. There is a remarkable psychological phenomenon of “idiot savants,” or persons of generally low intelligence who nevertheless can calculate mathematical problems with the facility of a computer. Perhaps this is to be explained by supposing they have a good estimative sense that operates more freely than in normal persons, in which this sense is somewhat inhibited by other mental functions.

It must be noted that in the case of geometry in particular (the study of continuous quantity), while it abstracts from most qualities, such as the color or temperature of the object, it does not abstract from that species of quality called “form” or “shape,” since lines, planes, and solids always have forms, shapes, and boundaries that divide them from the homogeneous space in which they abstractly exist. Because, in physical reality, we cannot draw a perfectly straight line or a perfect circle even in our internal sense organ (today we should say the brain), since the brain is material, we cannot imagine absolutely perfect figures or numbers whose units are exactly equal. Yet, as has already been noted, we can approximate them in imagination in abstract homogeneous space to whatever degree of precision we wish. Thus in natural science all true statements, although universal and intellectual, must be ultimately verified by reduction to sense observations (i.e., external sensation), while it is specific to mathematics that all true statements in that science must reduce rather to imagination.¹⁵

3. Modern Mathematics

Modern mathematicians find the ancient and medieval view of mathematics far too restrictive, but as modern mathematics developed it sometimes forgot the foundations so carefully laid by the ancient Greeks in experienced reality that guarantee that mathematical reasoning is not frustrated by hidden contradictions. If mathematical discourse is to be correctly understood, its terms

must be carefully defined with nonarbitrary reference to real quantity. For example, the term “construction,” as used in mathematics, does not mean we actually make the mathematical objects that we study. Instead it indicates that the science proceeds by analyzing (from the Greek verb *analuein*, “to separate the parts” [of something]) an abstract object into its parts so as to understand the relation of these parts to each other. Thus when, in geometry, one “constructs” a square by dividing a plane by four equal lines that meet at right angles at four points in the plane, nothing is constructed or made in the real world. Instead the intelligence leaves out (abstracts) the imperfections of an imagined square within an imagined imperfectly homogenous plane and analyzes it as a division of a perfectly homogeneous plane. In mathematics, therefore, we can consider perfectly “empty” spaces, although it is impossible to observe such a space since all spaces known to the senses are heterogeneous.

Similar considerations apply to other terms used in modern mathematics that seem to imply “change,” since actually mathematics abstracts from change. For example, the terms “operation,” “function,” or “variable,” or “vector” statements that claim that “as one algebraic quantity changes another changes,” do not properly and univocally state mathematical truths. They are analogical expressions that must be critically referred either to the imaginative origin of abstract intellectual terms or to the intellectual analysis and selection of different timeless quantities between which timeless relations of equality or inequality are true.¹⁶

The kind of confusions to which a neglect of the fact that mathematics is grounded in physical reality, yet abstracts from its changes, can lead is exemplified by current statements in scientific writings such as that “time is the fourth dimension” or “time is symmetrical.” Time is not a “dimension” in the same sense that bodies have spatial dimensions. We can, of course, analogically represent a period of time as the part of a line, but while all parts of a line exist, only the “now” of time is real, since the past has ceased to exist and the future does not yet exist. Thus, in sense experience, we perceive time as utterly different

than space, and the second law of thermodynamics¹⁷ that shows why time is asymmetrical confirms the truth of this perception. According to this law, the physical processes of the universe as a whole are necessarily entropic, that is, move ultimately in the direction of disorder, while a rise in order can only be in a limited region and for a limited time. The rate of entropic increase, however, is not always predictable. While the notions of “space-time” and “the fourth dimension” have a genuine significance in relativity theory, this is misunderstood if taken literally rather than analogically. “Time” differs from “space” in the way already mentioned, and the only dimensions that are directly observable by us are the ordinary three. Hence a fourth dimension, or the ten or more dimensions of String Theory, can be verified only by indirect effects, and the real, physical interpretation is exceedingly problematic.¹⁸

Therefore expressions that seem to imply change in mathematical objects in fact must be understood only in terms of formal and material causality, abstracting from efficient and final causality. In the time of Aristotle, the mathematical sciences were only two, geometry and arithmetic, as described above. As mathematics has historically developed, these two sciences have become more and more general, and have finally fused in set theory. As Aristotle also saw and exemplified in the last two books of the *Metaphysics*, it is a task for Metascience to critically review topics that pertain properly to mathematics, because only in this way can the applications of mathematics to the study of the physical world be correctly interpreted. It is in this sense of analysis of the foundations of mathematics in comparison to those of other disciplines and their epistemological evaluation that Metascience “defends” the principles of mathematics. This analysis is above all concerned with the various senses of “One” and “Many” as used mathematically.

Continuous quantities that are the proper subject of geometry are wholes, each of whose parts has a boundary in common with another of its parts. Thus, in a line, one part is joined to the next at a point, while in a solid each part is joined to another by a plane. Thus continuity is a certain kind of unity (wholeness) in

plurality (division into parts). These actual parts are always finite in number but are potentially infinitely divisible. Thus, contrary to what some assert, a line is not made up of points, nor a plane of lines, nor a solid of planes. Points are limits to lines or their parts, lines to planes or their parts, and planes to solids or their parts.¹⁹ Such limits that give figure or shape to a continuous quantity pertain not to the category of quantity itself but to that of quality (see appendix 2). Mathematical objects usually have homogeneous (similar) parts, so that what mathematicians call “space” is a homogeneous featureless continuum until it is divided into parts by constructed figures that can then be reduced to algebraic relationships.

Aristotle never axiomatized geometry. This was probably first done by Euclid of Alexandria (fl. c. 300 BCE) in his famous *Elements*. Euclid taught in the school of Alexandria, an institution founded by Demetrius Phaleron, a disciple of Aristotle. Although in ancient times Platonists such as Proclus Diadochus (411–485 CE) claimed that Euclid belonged to their school, his *Elements* exhibits an Aristotelian conception of logic and of the nature of mathematics as a science.²⁰ He based geometry on five intuitively evident postulates (a postulate is distinguished from an axiom as a first principle proper to a specific science), as follows:

1. Two points determine a line segment.
2. A line segment can be extended indefinitely along a line.
3. A circle can be drawn with a center and any radius.
4. All right angles are congruent.
5. If two lines are cut by a transversal, and the interior angles on the same side of the transversal have a total measure of less than two right angles, then the lines will intersect on that side of the transversal.

This last axiom is the famous “parallel postulate” that was to give rise to a long but fruitful controversy. In ancient times many interesting theorems were added to those in the *Elements*—for example, the *Conic Sections* of Apollonius of Perga (260–170 BCE), in which a beautiful theory is given of the figures and curves produced by a plane intersecting a cone at various angles.

As Roger Bacon complained, the medieval universities never went beyond ancient mathematics and did not even give that major attention. I have already mentioned the contributions of Hindu and Islamic scholars during that period. Yet it was only in the Renaissance that mathematics began its remarkable advance, an advance that also made possible the rise of modern science through the work of Copernicus, Galileo, Kepler, Descartes, Leibnitz, Newton, and Einstein, all mathematicians of genius. A notable step was taken when doubts began to be raised about the Euclidean geometry that had been the model of ancient and medieval mathematics. Euclid's postulates are in fact not complete, and doubts about whether postulate 5 concerning parallel lines was really a postulate or a theorem to be demonstrated were also raised. Since, after hundreds of years of effort, no positive proof had been found that this proposition that parallel lines never meet was in fact a theorem, Father Geronimo Saccheri, S.J. (1667–1733), attempted the negative approach of assuming the contradictory of the postulate, that is, to assume that all lines if sufficiently extended will intersect. He then sought to show whether this assumption was dependent on the other postulates or independent of them, and succeeded in proving its independence. This opened the way to non-Euclidean geometries in which another postulate was substituted for the parallel line postulate.²¹

It was not, however, until the nineteenth century that the Russian Nicholas Lobachevski and the Hungarian John Bolyai assumed that there can be many lines parallel to a given line passing through a point outside the line. The German Bernhard Riemann took the assumption (opposite to Saccheri's) that, when extended, so-called parallel lines ultimately get farther apart. Thus geometers were able to show that whether we assume the existence of parallel lines, or hold that all lines eventually intersect, or that the apparently parallel lines will more and more diverge, a consistent system of geometry can be worked out. The consistency of the two non-Euclidean systems, however, can be verified only if we first assume that Euclidean geometry is self-consistent, and this we can verify by its exemplification in ordinary physical experience where we do observe lines that are really

parallel within the limits of natural observation. Yet from this discovery of alternative geometries based on alternative assumptions it became evident that the principles of geometry could be given a more general and inclusive form.

The generalization of geometry had also been advanced earlier by the Frenchmen Girard Desargues (1593–1662) and the great Blaise Pascal (1623–1662) when they developed a projective geometry that could deal with the relations between figures that correspond to each other point for point, although their shape, size, and proportions may be quite different. Thus one figure is related to another that resembles it like its shadow or projection on a different surface; for example, the shadow of an object can be projected on a flat surface facing the object, or on the ceiling, or on walls perpendicular to it, or on the curved surface of a pillar. Its shape undergoes all sorts of stretching and shrinking, and still every point of it that appears on a flat surface appears also in its other projections. Obviously the properties that are common to classes of figures related to each other in this way are very fundamental ones. Thus, the postulates required to prove the theorems of projective geometry are of a very general type relating to the order of points in space.

It is possible, however, to generalize still further, leaving out not only the congruence of figures but also the point-to-point correspondence that is still retained in projective geometry. Just as a figure can be projected on another surface so that the distances between its points are stretched or shrunken, so it can also be twisted, bent, knotted, or deformed in any fashion, provided it is not torn or divided. Even when treated in this fashion a physical figure retains certain properties. A rubber balloon can be forced into the shape of an egg, of a dumbbell, or made to fill the interior of a square box; yet it remains a closed surface. The generalization of geometry that treats of these very general properties of continuous quantity is called *topology* (Greek *topos*, “place”). It demonstrates the properties of figures that imply only the connectedness or continuity of the parts. With this generalization the limits of pure geometry are reached, since if we go a step further and remove continuity we cannot properly be said to be in the science of geometry, but rather of number

theory (arithmetic).

This still more radical transformation of geometry was the work of René Descartes, who proposed a system of “analytic geometry” to reduce geometry to the greater abstraction of arithmetic in its algebraic form.²² This he accomplished by completing the branch of geometry called trigonometry that had already provided a method of expressing the ratios of lines and the size of angles in numerical terms. By an extension of Descartes’ method of coordinates, any geometrical figure, whether plane or solid, even those in the non-Euclidean and projective geometries, can be expressed algebraically. Each point in space is specified by three numbers, each line and plane by a numerical equation; and thus geometry seemed to be immensely simplified—at the expense, however, of abandoning its specific character as a science of continuous quantity as distinguished from the science of discrete quantity.

Yet, by pursuing this method of defining geometrical objects in terms of numerical relations, it became possible to speak of geometries of more than three dimensions. Since in algebra a point in space is defined by three numbers giving the distance of that point from certain fixed lines (coordinates), there is no algebraic reason why it should not be possible to speak of points which require four such numbers, or any set n of numbers to determine its location. Each such number required to determine a position may be called a “dimension,” and any number of such dimensions can be dealt with in algebra. The fourth dimension could even be pictured graphically by projecting it upon a solid or a plane, just as it is possible in perspective to project a solid figure of three dimensions on a plane of one less dimension. Thus geometry as the science of continuous magnitudes has been pushed to deeper and deeper depths of analysis, but its distinction from the science of numbers has been somewhat obscured.

What then of the development of the science of numbers? For Aristotle, a number is a quantity, and thus a whole (integer) with parts, but it differs from a continuous quantity in that the parts are discrete, that is, have no common boundary. Numbers are wholes

and their ultimate parts are units.²³ A number as a whole has a true unity, for example, 3 is a true species of number in the category of quantity (analogous to a species of a substantial whole in the category of substance) and is specified by its ultimate unit, yet any one of its units, since they are all identical, can arbitrarily be considered the specifying ultimate unit. Thus 3 differs from 2 by its ultimate unit, $2 + 1 = 3$, and so for any other “natural” number; but the 1 can be any of the 1s that make up the 3, as $1 + 1 + 1$, that compose it. On the other hand, in the science of continuous quantity (geometry), the unit of a line, plane, or solid is a part arbitrarily marked off and used to measure larger lines, planes, or solids—for example, an inch in a foot. Thus it becomes evident why mathematics plays so important a role in providing models for natural science and sciences epistemologically subsequent to it, above all in Metascience. Number as measured by the unit 1 gives us our clearest univocal notion of Unity, and the numbers measured by unity are the clearest univocal notion of Plurality.²⁴

Problems in number theory had already been raised in ancient times by Euclid and by Nicomachus of Gerasa (fl. c. 100 CE) in his *Introduction to Arithmetic*, and are still of very great interest. Thus, there was much publicity when Andrew Wiles in 1994 finally solved the famous Last Theorem of Pierre de Fermat (1601–1665), which states that the equation $x^n + y^n = z^n$ has no integer solutions for x, y, z when $n > 2$. In particular, there are many hypotheses about prime numbers (numbers having no factors except themselves and 1) that are still unsolved, such as Christian Goldbach’s (1690–1764) conjecture that every even integer greater than 2 can be written as the sum of two prime numbers. Yet progress has been made on some of these famous puzzles by the use of computers. Thus, it is apparent that the study of the properties of natural numbers is far from exhausted.

In the Middle Ages, the study of numbers was generalized in the form of algebra, an exceedingly powerful tool that deals with functions or relations between classes of numbers, symbolized by letters or other signs.²⁵ In order to construct such classes of numbers, it proved useful to enlarge the concept of number so as

to include various types of operational or artificial numbers that do not signify a particular integer, such as 2 or 3, but quantities on which certain operations are performed, such as -3, which signifies the operation of subtraction of the integer 3.

The fundamental operations of arithmetic by which numbers are “constructed” by the mental operations of addition, subtraction, multiplication, and division have a physical counterpart when we collect or separate several material objects. These mental operations form greater or lesser wholes by combining or separating their discrete parts. Thus each of these artificial numbers can be defined in terms of operations performed on specified natural numbers or classes of natural numbers. In this way, zero, negative numbers, fractions, irrational numbers, and complex numbers were all shown to form a number field that is closed under the four fundamental operations. This means that any fundamental operation on numbers in this field (with the sole exception of division by zero) will construct another number pertaining to this same field. Thus, to introduce numbers other than the integers, the concepts of series of numbers and of limit are required. Hence, an irrational number can be defined as the limit of a series of fractions, a limit that is approached more and more closely the farther this series is constructed, but which is never reached.

Though useful and necessary for the advancement of arithmetic and algebra, such extensions of the term “number” raise foundational problems. For Aristotle, neither zero nor 1 is strictly speaking a “number,” since a number is a whole with parts and obviously neither zero nor 1 has parts. For Aristotle 1 is not a number but the unit or principle that measures numbers, while zero is 1 with the operation of subtracting 1 from 1. Nor can we say that negative numbers are simply numbers; they are numbers taken with the operation of subtraction, as are “squared” numbers such as $5^2 = 25$, that is, a number multiplied by itself. Neither are fractions univocally numbers since the unit 1 has no parts. Hence $1/2$, or 0.5, is not half of 1, but a ratio (relation) between 1 and 2. Finally *irrational* numbers such as the square root of 2, *transcendental* numbers (still another sense of the term “transcendental”!) such as π , the ratio of the circumference of a

circle to its diameter, and so-called *imaginary* (complex) numbers, such as the square root of a negative number, are not properly numbers but numbers taken with one of the fundamental operations.²⁶

Given these numbers constructed by means of fundamental operations that are justified by postulates, the work of algebra is to study functions, the relations between classes of “numbers” understood in this broad, analogical way. Such a relation is expressed by an equation that indicates that certain operations on certain classes of numbers (variables) will yield a number that can also be constructed in a different (or sometimes identical) fashion. So $3^2+4^2=5^2$ means that the same number, 25, can be constructed by two different operations, the addition of the squares of 3 and 4, or simply by the squaring of 5. Similarly, $a^2+b^2=c^2$ means that there are classes, each containing many numbers, for which this same relation holds.

In elementary algebra the student is taught to solve many such equations of the simplest types, generally simultaneous equations (equations of first degree) and quadratic equations (equations of second degree), of which the “degree” is named from the coefficients (e.g., 2^2 or 2^3) that occur in the equation. The Greeks by the time of Diophantus (d. c. 330 CE) had advanced far enough in algebra to work out the equations of the first two degrees. The general equations of the third and fourth degree were solved by the Italians Nicholas Tartaglia and Ludovico Ferrari, and first published by Girolamo Cardano in 1545. For a long time mathematicians attempted to find general solutions for equations of higher degree. Such efforts were unsuccessful, although rapid progress was made in solving particular types of equations. Finally, a Norwegian, Niels Abel (1802–1829), showed that equations of the fifth degree and higher have no general solution. Henceforth it became necessary to deal rather with the immense array of particular types of equations.

Thus, just as geometry had advanced to more and more general systems such as topology, but was also reduced to the science of numbers by Descartes’ analytic geometry, so the science of numbers was reduced to algebra, which studies every

type of function or relation between numbers. Algebra does this by a general method of calculating every possible value of a “variable,” that is, an algebraic class. When by analytic geometry an equation can be graphically represented as a straight line (a *simultaneous* equation), it is quite easy to see how it behaves for every value of the independent variable. The slope of the line shows how, as we increase the independent variable, the dependent variable increases. If the line slopes upward sharply, this increase is rapid; if it slopes slowly, the increase of the dependent variable for each unit of increase in the independent variable is small. But equations of more than the first degree are found to be curves, and since a curve varies its direction continuously, the slope of the curve is also constantly changing. How, then, can we reduce this to a convenient geometrical expression? Or, to put it algebraically, how can we determine the value of a function for any value whatsoever of its independent variable?

In the seventeenth century Leibnitz and Newton proposed the ultimate solution to this extremely difficult question. Newton, as a physicist studying the motion of bodies, had a special concern. He needed a mathematical method to deal with natural motions in which there is acceleration of change (for example, a falling body whose speed is constantly increasing). Thus, it became vital for mathematical physics to have methods of providing motionless models of motion in which motion, place, and time are all treated as static relations between abstract quantities. The remarkable method by which this task can be performed is called “the calculus” (method of calculating),²⁷ which is spoken of as *differential* when it is used to determine the slope of a line for a given difference of the variable, and *integral* when it is used to determine the area bounded by the line (i.e., to determine either the rate of change in a function or the accumulated change).

The calculus consists essentially in the use of the concept of *limit*. Thus, a continuous line can be converted into a series of numbers by dividing the line into units as small as desired, so that the series approximates to a description of the line as closely as we wish to make it. So also a curved line can be converted into a

series of straight lines (tangents to successive points in the curve) of varying slopes so as to perfect an approximation as desired by considering as small a segment of the curve as desired. For each such small segment, the slope of the curve is roughly the same as a certain tangent straight line. The smaller the segment the more accurate the description, although the exact description is a limit that cannot actually be attained. Such a study of the approach of a series to a limit can also be applied to many types of problems other than those of geometrical curves. For example, the velocity of a moving body is a relation between a change in time and a change in distance, so that the velocity of a body at an instant of time is a limit, namely, the change in distance during a smaller and smaller interval of time.

A still further advance in the generalization of mathematics was taken when the brilliant Evariste Galois (who was killed in a duel in the year 1832, when he was only 21) laid a general foundation for a still more general algebra by showing a way to classify the various types of equations so that each group could be dealt with as a whole. Thus, all of mathematics became understood as dealing with classes of transformations (group theory). By this is meant that very general classes of mathematical objects can be found that have some properties in common, so that they could be transformed into each other by a finite number of specified mathematical operations.

Thus, in our survey of geometry, we saw, as we advanced from Euclid's geometry to topology, that we were dealing with more and more basic properties that applied to wider and wider groups of figures. In topology a circle could be classed with a vast number of other closed figures, into which it could be transformed by a series of operations of twisting and bending and rearrangement. Similarly, as we advanced in algebra we saw that mathematicians were ever seeking to group equations into greater and greater classes, each of which could be solved by a series of defined operations. Of particular interest in studying functions in this way is the determination of whether they are continuous or not, and also the determination of their maximum and minimum values.

In order to reach still greater generality, it is necessary first to

find analogies between unlike things. Thus projective geometry finds an analogy between a solid figure and its projection on a plane. In somewhat the same way analytic geometry finds an analogy between a line and an equation, and algebra finds an analogy between a rational and an irrational number, or a number and an infinite collection, and classifies functions in groups. To avoid paradoxes that can easily result from analogical terms when they are mistaken for univocal terms, mathematicians then try and reduce these mathematical objects and operations to the broadest possible, univocal definitions.

A still greater mathematical generality was instituted when Georg Cantor (1845–1918) introduced the concept of *transfinite* numbers and with it set theory, but in doing so he raised very serious, still unresolved questions about the very nature of the whole mathematical enterprise.²⁸ Aristotle had claimed that although a continuous quantity is potentially infinitely divisible, it is contradictory to speak of an actual infinity of parts in a quantitative whole, since such a whole would have no limits and thus would be like a matter without form. Moreover, since number arises by counting the parts of continuous quantity and abstracting from their common boundaries, an actual infinite number is also an oxymoron since it is not countable.

Yet Cantor claimed to distinguish different infinite sets of numbers and argued that one infinity may be greater than another. It then becomes possible to assign a cardinal number to these infinities by ordering them according to smaller and greater, and then to perform some of the ordinary mathematical operations upon them. The results are very curious. For example, the set of odd and the set of even numbers are both said to be infinite and so is the set of all natural numbers. Then it must also be admitted that all three sets are equal to each other, since we can pair both an odd and even number with every natural number. Yet it will also be true that the set of natural numbers is greater than the set of odd and the set of even numbers that are included in it. From this it would appear that axioms such as “the whole is greater than the part” do not apply to such sets!

Set theory begins with definitions and postulates that abstract from all geometric notions and reduce numbers to collections of

unspecified objects. These objects might be interpreted as points, as lines, as spheres, as integers, as real numbers, as irrational numbers, or in any other fashion, just so long as they form a collection or set which can be defined by some common property. It then becomes possible to perform operations on these abstract sets, according to operational laws that are taken as postulates. In this way we may add sets, divide them, consider the part they have or do not have in common, and so on.

The theorems of set theory are so general that they will apply to any part of geometry or algebra. These theorems make it apparent that most of the theorems previously proved in these sciences are only special cases of more general theorems, in which the basic relations involved are much more evident. In consequence, set theory casts light on the whole of mathematics and gives it orderliness never before suspected.

Set theory was axiomatized by Ernest Zermelo (1871–1953) and improved by Abraham Fraenkel (1891–1965) in seven axioms too technical to formulate here, but which remain somewhat controversial as to the proof of their self-consistency. Kurt Gödel's famous consistency and incompleteness theorems, mentioned in chapter 2, showed that no such proof is possible because no purely formal theory can be shown to be self-consistent from its own axioms, but only by reference to something known outside it.

Set theory, in Cantor's version, assumes that an *infinite* series of mathematical objects can somehow be understood as complete, that is, having some kind of *actual* existence. Others argue against this that it would take infinite time to complete counting or constructing any such series. But mathematical objects, although in a sense "constructed," as we have seen, abstract from time. When we speak of the natural numbers as an "infinite" series, we do not mean that it is potentially infinite in the sense that it will take an infinite time to construct it. What we really mean is that a natural number, no matter how great, is less than some other number. Thus, when we speak of "sets" in the extremely general manner of set theory we are speaking of purely hypothetical entities the possibility of whose existence is not evident and whose properties are determined by whatever

axioms we choose to describe these entities. This is like what is done in non-Euclidean geometry as compared with Euclidean geometry based on physical quantity. When contradictions show up in such a hypothetical system its axioms or definitions are revised to evade these contradictions. The result cannot claim certitude, since when further examined new paradoxes may appear; but these hypothetical sets may and in fact have proved useful in computation, and set theory has suggested new theoretical relations.

Cantor's theory of infinity was vigorously opposed when first proposed, but is accepted in mathematical practice today. Nevertheless, its interpretation remains controversial. Cantor believed in the so-called "continuum hypothesis" which is supposed to answer the question raised by David Hilbert (1862–1943), whether there are sets that are intermediate in size between the set of natural numbers and the set of real numbers. This hypothesis has never been proven, and is believed by many mathematicians to be false. It has, however, been shown to be independent of the Zermelo-Fraenkel axioms, as the parallel line postulate is independent of Euclid's other axioms.

Still more recently (after 1945), a category theory, defined as "a general mathematical theory of structures and systems of structures," has been developed that is considered by some as an alternative to set theory as a foundation for mathematics because of its still greater generality. Almost every known example of a mathematical structure (that is, relations of equality or inequality) with the appropriate definition constitutes a category, sets, groups, topological spaces, and so forth. Once a type of structure has been defined, then new structures can be constructed out of the given one, or given structures can be decomposed into more elementary substructures. Thus, in category theory, the nature of the elements constituting a certain construction is irrelevant. What matters is the way an object is related to the other objects of the category, that is, the "morphisms" (structures) common to them. Category theory also is now firmly rooted in the theory of computer science, to which it has contributed (among other things) a semantics of computer programming and the development of new logical systems. Its

applications to mathematics are becoming more diversified, and it even touches upon theoretical physics where higher-dimensional category theory is of importance.²⁹

From this sketch of how the basic concepts of geometry and arithmetic have been more and more generalized by analogical reasoning, it becomes clear why Metascience is concerned with the notions of One and Many, Whole and Part, in their widest possible sense. In mathematics they play a legitimate and necessary role, but are often used dialectically and in merely analogous ways ultimately derived from natural science. They deal simply with wholes and their parts, Unity and Plurality. Yet, for Aristotle, the “whole and parts” studied in mathematics are quantitative and always refer to material objects. Modern mathematicians, on the contrary, commonly deny that mathematics requires a basis in physical reality, and consequently find it difficult to agree on what “whole” and “part” mean in set theory.

Thus, the accepted definition of a set, namely, “any collection of defined, well distinguished objects of thought brought together as a whole by some specified criteria,” is riddled with ambiguities. The phrase “objects of thought” could include not only mathematical entities but logical relations or angels or God, and even squarecircles! Similarly, as we have seen, terms like “collection” and “whole” have many senses. What “distinguished” and “brought together” means is also vague. In fact, the term “set” so defined could mean simply “a whole with parts.” Its mathematical use is in fact much more restricted. It is no wonder, then, that the axiomatization of mathematics finally led, toward the end of the nineteenth century, to attempts to reduce even set theory to pure logic, as will be shown in chapter 9.

Yet, while Metascience supports the wonderful achievements of modern mathematicians, it also calls their attention to the necessity of constantly clarifying the foundations of their science. Mathematics is the clearest and most evidently certain of the sciences. Consequently, when paradoxes (contradictions) become apparent in its formulation, or when doubt is cast upon the reliability of our ordinary sense experience of quantities, skepticism and irrationalism begin to imperil rational thought.

Thus, there was wide popular concern over the notion of a “fourth dimension” generated by Einstein’s use of Riemannian geometry. It is the business of Metascience to show that mathematics does not overturn our fundamental certitudes derived from ordinary experience and to assist mathematicians to communicate with other disciplines effectively.

The certitude of mathematical knowledge is obviously clearer than are the conclusions of any other science. The foundational question, however, concerns the grounds of this certitude. For Plato it was innate ideas. For Aristotle the consistency of mathematics is guaranteed by the fact that abstract quantity is grounded in physical quantity that is real, and hence governed by the principle of non-contradiction. For Leibnitz and subsequent mathematicians, however, mathematical propositions were often considered to be “analytic,” that is, directly evident from the fact that their predicates were contained in the definitions of their subjects. For example, the statement “two plus two equals four” was thought to be self-evidently true because “four” was contained in meaning with “two plus two.” This, however, is false, since “equal” in this proposition does not mean that the concept of “four” is explicitly contained in the concept of “two plus two,” but that “four” as potentially contained in “two plus two” must be actualized by the act of predication that makes evident to us that “two plus two” is equal to “four.” If that were not the case, the proposition would add nothing to our knowledge. Nor could we be sure that such a proposition is true if we were not able directly or indirectly to give sense to the terms “two,” “plus,” and “four” from our sense experience of physical objects that we have counted and divided (“two,” and another “two”) and collected (“plus” and “four”). Thus, according to Aristotle, the predicate of a true proposition actualizes or makes explicit what is only potential or implicit in the subject, as form actualizes matter. But for Leibnitz, a follower of Descartes and his notion that mathematical concepts are perfectly clear and distinct, only the analytic axioms of mathematics and the analytic principle of contradiction were necessary to arrive at necessary mathematical conclusions.

Kant disputed Leibnitz’s claim that mathematical truths were *a priori* because analytic, but claimed they were “synthetic *a priori*.”

He explained this by arguing that our intuition of space necessarily determines our faculties of sensation, so that we can only construct mathematical objects according to this intuition that is given prior to experience. The modern mathematical “intuitionists,” led by L. E. J. Brouwer (1881–1966), have supported Kant’s view. To the contrary, Bertrand Russell tried to reduce mathematics to logic, while Hilbert, leader of the “formalists,” held that the axioms of mathematics are *arbitrary* postulates.³⁰ The metaphysician has the task of criticizing and, to the degree possible, reconciling these different views of the foundations of mathematics. Because by its apparent certitude mathematics is paradigmatic of scientific truth, the results of this criticism have important consequences for general epistemology. Because mathematics furnishes a vast array of precisely formulated models for kinds of relations by which pluralities can be reduced to unities, Metascience must always be interested in the ways it can be used (or abused) in every science.

Nor should we simply dismiss as superstitious the speculations on “numerology” found in other ancient and present-day cultures. The Jews found mystical significance in numbers and other mathematical symbols, and so did all the ancients and medievals. Since our knowledge necessarily includes so many analogical terms, and mathematical terms provide analogates that are both clear and very complex, mathematical symbolism inevitably plays a significant role in all cultures, from the primitive to the advanced. Thus when, in other cultures, we encounter the use of mathematical symbolism, it becomes important hermeneutically to seek the element of truth that this use may contain, though we must do so critically rather than credulously. At the same time, we must not too credulously accept the mathematical models proposed by modern scientists.

To sum up this section, it can be said that Metascience is said to “prove” the principles of mathematics in the sense not of deductive demonstration but of clearing away confusions that might obscure their immediate evidence. It does this by distinguishing two levels of the immaterial intelligibility of quantity, the proper object of mathematics. These two levels are, first, the level of abstraction from change and, second, the grounding of

this abstract quantity in the real physical quantity of changeable things. Metascience then shows the necessary dependence of abstract idealized quantity on real physical quantity. Furthermore it distinguishes general mathematics into the sciences of continuous and of discrete quantity. It also clears up confusions that may arise from theoretical mathematics and its practical implications. Moreover, as Aristotle's *Metaphysics* illustrates, it refutes the mistaken exaltation of mathematics found in Pythagoras and Plato, who tried to use mathematics as a bridge to immaterial reality. Metascience also exposes the fallacy of excessive confidence in the use of mathematics in natural science, and the Cartesian fallacy of seeking mathematical clarity and certainty in other sciences. Finally, it disposes of the Leibnizian notion that mathematical propositions are analytic and hence merely logical and *a priori*, which has done its damage both in the idealist and empiricist traditions.

B. MATHEMATICAL PHYSICS AND COSMIC UNITY AND DIVERSITY

Because quantity is the first property of changeable beings and the condition of all its other properties, all descriptions and definitions of changeable things involve measurement. In actual observation we measure one physical thing by another physical thing, such as the size of an object with a ruler. Since qualities presuppose quantities, it is not strange that we can also measure qualities by reference to quantities. Thus we measure the gravitational force of a heavy object by how far it moves a pointer on a scale, or the brightness of a light by the distance at which it can be seen. In this way, natural science as it has developed in modern times, in defining physical objects, tends to replace all the other kinds of properties of things with quantitative measurements in order to be able to reduce them to abstract mathematical terms. Thus, from Galileo on, many scientists and philosophers

have denied the objective reality of the “secondary” qualities of things as they are impressed on our senses in favor of the “primary” quantities that can be easily measured.³¹

The fundamental problem with this application of an abstract mathematics to concrete, changing physical reality is, of course, that an abstract geometrical figure or an abstract arithmetical number leaves out the dynamism and other properties of concrete physical objects. Thus the mathematical model always only approximates the physical object. The circle drawn on the blackboard never quite fits the mathematical definition of a circle. From this it follows, as shown in chapter 3, that whereas what is demonstrated to be impossible in mathematics is also impossible in physical reality, the converse is not always the case. This is why, although the use of mathematical models is legitimate in dialectical explorations in natural science and forms the “mixed science” of mathematical physics, such models cannot yield any *strict* (apodictic) demonstrations except ones that conclude negatively. Thus Aquinas gives a demonstration that the earth is round from the fact that in an eclipse of the moon the earth, no matter at what angle it covers the moon, casts a circular shadow.³² This is a true demonstration, because mathematics shows that it is not possible for any object except a sphere always to cast a circular shadow no matter what its angle of projection. Note, however, that this does not *positively* prove the earth to be a perfect sphere; in fact it is only spheroid. Thus positive mathematical-physical proofs are only probable and open to further refinement.

Although mathematical physics cannot as such attain positive certitude but only probability, it can serve as a powerful dialectical tool in preparing the way for true demonstrations of the sort proper to natural science in the strict sense. Thus, the Ptolemaic geocentric mathematical astronomy predicted the position of sun, moon, and planets quite accurately, yet Copernicus’s heliocentric model of the planetary system had a compelling mathematical simplicity and worked still better in predicting planetary positions. Nevertheless, it was not empirically verified for many years because the stellar parallax it predicted could not be observed.³³

Yet, as a reasonable hypothesis, it eventually led to better observational techniques that finally made possible its physical confirmation by the discovery of such a parallax and of the previously unimaginable immensity of the distance of the stars.

Today the standard model of particle physics dominates natural science, but it is more mathematical physics than physical physics. Yet ultimately it must be tested by strictly physical principles. This modern dominance of the mixed science of mathematical physics led the distinguished Catholic physicist and pioneer historian of science Pierre Duhem to argue that natural science, as distinguished from natural “philosophy,” can never do more than, like Ptolemaic astronomy, “save the appearances.”³⁴ Duhem attributed the rise of modern science not to the Aristotelian tradition but to the Nominalist tradition of the Ockhamists. It was probably under Duhem’s influence that the great twentieth-century Thomist Jacques Maritain devised his theory of an autonomous Thomistic *philosophia naturalis* (that Étienne Gilson thought simply obsolete) distinct from metaphysics.³⁵ Maritain argued that while for Aquinas natural philosophy is *dianoetic* (ontological), that is, concerned with the essences of material things, modern science after Galileo became *perinoetic* (phenomenal), concerned not with the essences of natural things but only with their accidental phenomena. Modern science only explores these phenomena, Maritain claimed, either in terms of mathematical (*empiriometric*) models or in terms of analogical (*empirioschematic*) models. Hence, for Maritain, *philosophia naturalis* remains *formally* distinct from modern science and extends only to the questions treated in Aristotle’s *Physics* and *De Anima*, while all other more specific questions about nature must be relegated to a perinoetic modern science limited to a mere “saving of appearances.”

The obvious difficulty with this solution is that, for Aquinas, one cannot formally apply the term *scientia* (Aristotle’s *episteme*) to a body of knowledge that attains only probable conclusions,³⁶ to which Maritain limits perinoetic “science.” Instead, as pointed out by Charles DeKoninck,³⁷ such a saving of appearances is a *dialectic* that can serve genuine science but cannot be formally

distinguished from it as one genuine science in relation to another genuine science. Thus Aquinas would have called Maritain's empiriometric science the "mixed science of mathematical physics." Hence those of its negative conclusions that attain certitude render this mixed science a true science, but, as regards its positive and thus merely probable conclusions, it is only a dialectical instrument of natural science. Maritain's empirioschematic "science" is also nothing more than the dialectic of nonmathematical models or metaphors in natural science. Therefore, according to Thomistic principles, natural "philosophy" is not formally distinct from natural "science," but is the integral, foundational part of that same science.

Moreover, as William A. Wallace, O.P., has shown, it is not true that modern science reaches only probable conclusions, although admittedly at any given stage of scientific progress much scientific theory remains only dialectical and probable, and increasingly so as it deals more and more with questions concerning details difficult to observe.³⁸ Metascience therefore must conclude that, while in mathematical physics natural science is logically subordinated to mathematics, in the search for a true understanding of our changeable world mathematical physics can play only an instrumental role, although a very important one. Ultimately, all its results must find a physical interpretation, grounded in the foundational part of natural science.

The fundamental difficulty in giving a physical interpretation to what science is discovering about the microstructure and active and passive changes of material bodies seems to be a failure to distinguish correctly between the definition of a physical and a mathematical quantity. There is a lingering assumption in the thought of modern scientists that since "quantity" is defined as a whole having actually distinct parts united only by common boundaries, and since the parts of mathematical quantities are infinitely subdivisible, either this must be true of physical bodies or their minimal parts must be indivisible, unchanging, and actual particles. The latter alternative, favored by Democritean atomism and congenial to a mechanistic and deterministic physics, predominated in modern physics before the twentieth century. In that century it was replaced by quantum theory, with its wave-

particle dualism and indeterminism.

Metascience, however, by carefully distinguishing physics, mathematics, and mathematical physics, undermines the assumption that these are the only two possibilities and suggests a third one. A physical quantitative whole must have actually distinct parts, but these cannot be, like mathematical quantities, infinitely divisible, since this would make a physical body infinitely actual. Natural science, however, defines changeable beings as composed of potency and actuality (matter and form), so that the actuality of bodies is limited by their potency. There is, of course, an element of truth in Democritean atomism, namely, that bodies, to be actual, must at least have *minimal* parts. Current science hypothesizes that these are “quarks” and “leptons” or something of the sort, and treats them mathematically as indivisible points. But it is an error (although one often found in mathematical writings) that a line is made up of points, because a point is not a quantity (since it has no parts) but only a *limit* of a quantity, a boundary. But how can a minimal part of a potentially divisible whole be itself indivisible? The answer given to this question by Thomists has always been that a minimal part as such is only “confusedly extended.” This sounds like an evasion, but what it means is that since changeable bodies are composed of potency and actuality, these minimal parts that are actual as parts of a greater whole are in themselves only imperfectly quantitative, that is, potentially but not actually divided.

From all this it follows that the principles of natural science imply that it is a mistake to suppose that as a physical body is more and more precisely observed it will always be found to be infinitely structured of smaller and smaller distinct parts. Instead, it is inevitable that the more finely its microstructure is observed the less distinct and determined will be its parts. As less distinct, their behavior within the whole will be less and less uniform and will only be reducible to probabilistic rather than deterministic laws. Thus, even before quantum physics was proposed, it could have been foreseen on general Aristotelian principles that, as material microstructure was explored, the gap would inevitably widen between any but an approximate mathematical model of microstructure and the physical reality it purported to describe. To

suppose otherwise would be to yield to the mathematician's temptation to eliminate the potency of physical objects to change. In saying this, I do not claim that the leptons and quarks are in fact the minimal parts of physical bodies, but only that it is congruent with the principles of natural science as I have explained them, that there is a *limit to the divisibility of bodies* that progressively manifests itself as it is approached. This is an objective indeterminacy, not merely our inability to observe smaller and smaller parts.

Furthermore, the problem often raised that we cannot know physical reality as it is because, in observing microstructures, we determine them, is poorly stated. Even at the macroscopic level, as I have previously insisted, the very nature of sense cognition involves an initial material interaction between the sense organ and the object sensed, causing a change in both. This does not mean that our sense perceptions do not attain real objects, but only that they are subject to a degree of *negative* error.³⁹ By this I mean that because we change the object in sensing it we cannot know everything about its condition prior to observation. But this lack of complete knowledge does not prevent us from gaining some real, true, and positive knowledge of sense objects. This problem of modern physics is not new but is profoundly magnified now that science studies the deep microstructure of physical reality where the changes wrought by observation almost but not quite overwhelm the object observed. I say "not quite" because in fact scientists are able to establish laws that make very exact predictions, though in terms of probabilities only.

What then can be said about the Unity and Plurality of our material universe as it is now known through natural science in terms of mathematical models? There are of course theories about other possible universes and about a "pre-universe" out of which the present universe has emerged. These theories can at present be put aside, because it is difficult to see how they could be either verified or falsified. Yet with good evidence current science believes, as was discussed in chapter 4, section C.2, that our observable universe is expanding from the singularity of the Big Bang that occurred about 13 billion years in the past. As the universe expanded, its energy in the form of an original, single,

unified force differentiated into the four fundamental and interrelated natural forces or efficient causes by which science now explains later history and present behavior of the universe. At about 300,000 years after the Big Bang, matter cooled sufficiently that hydrogen and helium and perhaps other simple atoms were formed. Through the gravitational force these collected into clouds of gas and dust, in which stars were and still are formed. Then, within these stars, atoms of the heavier elements are constructed, and ultimately simple molecules formed. The stars themselves keep collecting into galaxies, perhaps centered around "black holes," collapsed stars of such density that not even light can escape from them. Finally, the galaxies have collected into great filament-like super-galaxies.

As far as we currently know for certain, only our solar system of rather small planets orbiting at a comfortable distance from a middle-aged star, the sun, includes such a planet as our earth on which life has arisen with the formation of more complicated molecules. It is here at least that life has evolved and produced intelligent organisms. While it seems that other stars must have similar systems, the probabilities of the existence of other planets having, like our earth, the very complicated conditions necessary to sustain life is difficult to estimate, as evidenced by the disagreements between informed experts of whom one group rates the probability as high, near certain, while the other group rates the probability as exceedingly low.

It thus appears that our universe does not at all have that kind of neat unity of order that Aristotle and the ancients inferred from the regularity of the succession of days and nights and the seasons. Aristotle's theory of a celestial mechanism of inalterable spheres in perpetual motion about a relatively small terrestrial region subject to random and chance events bears little resemblance to the vast universe almost all of which has a much lower level of unity than our earth that science now explores. Instead, we see that our earth with its relatively well-ordered ecology has emerged from an awesome chaos.

This almost chaotic universe is as a whole a vast expanding "field" of energies out of which emerge a widely scattered collection of atoms, among which are certain regions of greater

atomic density. It is an ever-expanding “field” or concurrent “fields” of far-reaching gravitational and electromagnetic quantum forces, while the weak and strong nuclear forces are very short-ranged and exist principally between the parts of atoms. Scientists speak of the spaces between the particles within an atom or molecule, and the vast spaces between the stars and the galaxies as simply a field or concurrent fields. Yet to these “fields” or “empty space” they attribute expanding “dimensions,” “curvature,” radiating electromagnetic and gravitational “waves or particles,” and “quantum fluctuations,” even in those deserted regions where nothing having inertial mass can be detected. Yet these empty spaces must, in the Aristotelian sense of a quantified and dynamic reality to which active natural actions and changes can be attributed, be an oceanic material body or bodies.

Some, therefore, suppose that the universe is actually a single body, a continuous field of which all observed realities are simply parts. This concept, however, defies the facts of natural observation that manifest the existence of many substances, that is, entities having relatively independent existence and an intrinsic unity that explains their diverse observed properties. While the distinct existence of these substances is clearest in the case of higher living organisms, in lesser degrees it is also evident from the results of physical and chemical research that atoms and molecules satisfactorily fit the definition of “substances.” Great collections of bodies of different kinds, such as constitute the terrestrial minerals of the earth, occasionally form crystals in which atoms or molecules of a given species form larger solid bodies. Such larger bodies can, when heated, also become liquids in which the atoms or molecules are able to loosen their places and move freely about. Finally, when heated further, these atoms and molecules become wholly independent of each other. In all these states, however, a mixture of different species of substances is the more common condition.

Thus, below the level of life, distinct substances can also be identified, although chiefly at the level of single atoms or molecules that are intermixed with atoms or molecules of other species to form “minerals.” Far the major portion of the universe is formed of clouds of dust and gas. Even the stars, and planets like

Jupiter, though quite dense, are mainly gaseous. It is estimated that about 90 percent of the matter of the universe is “dark” and hence difficult to observe. It is estimated that the intergalactic spaces contain “only three atoms in a space about the size of a small room.”⁴⁰ What then in these spaces fills the distance between one atom of hydrogen and the next? As already argued, this must be a material possessed of zero inertial mass. It cannot of course be Aristotle’s “quintessence,” out of which he hypothesized the celestial spheres are composed, nor the nineteenth-century mechanical aether invalidated, as mentioned in the last chapter, by Michelson and Morley. For current science this interstitial material can only be described as a field that is able to transmit gravitational and electromagnetic forces, including light, and as “bubbling with quantum fluctuations.” A physicist at the University of Oregon, James Schombert, writes:

The properties of the Universe come from “nothing,” where nothing is the quantum vacuum, which is a very different kind of nothing. If we examine a piece of “empty” space we see it is not truly empty, it is filled with spacetime, for example. Spacetime has curvature and structure, and obeys the laws of quantum physics. Thus, it is filled with potential particles, pairs of virtual matter and anti-matter units, and potential properties at the quantum level.⁴¹

I would suggest, although I do not know any scientist who thinks in these terms, that the simplest hypothesis would be that the body of an atom, while retaining its known orbits near the nucleus, expands with the cosmic expansion, so that intergalactic space is continuously filled, though very sparsely, with atoms and molecules or bits of dust compacted from them. Thus it is a kind of continuous gas. In the volume of a small room, as mentioned above, there are only three atomic nuclei, yet the whole is completely filled by the three atoms, each of which constitutes a “field” through which the four fundamental forces are transmitted.

Thus the universe is not a single body but a collection of bodily substances that are probably atoms and molecules forming

a material system in which these substantial parts are not separated by “empty space” but either by the matter of which these atoms and molecules are composed or by a kind of “aether” distinct from them and occupying the distances between them. Thus the material cosmos has only the unity of a system of bodily substances interacting gravitationally and by electromagnetic waves, and the parts of each substantial body is internally unified by the weak and strong nuclear forces. On our earth, and as far as we now know only on it, are also found more complex, living substances, and finally intelligent human beings capable of understanding something of the cosmos and having some technological control over it.

The most complex material substance of which we know, that is, the one that has the most parts and the greatest unification of these parts, is our own human body. It is composed of about a trillion (10^{12}) cells, of which each one (except for blood cells) contains the human genome of about thirty thousand genes. The most complex and unified organ of the body and the source of its unified actions is the brain, composed of about a billion (10^9) neurons each having many connections with other neurons in a dense network. These numbers, of course, give only a material view of human complexity. It is the formal interrelation and dynamic unifying interaction of these parts that is far more amazing.

Modern biology has shown us how, from the genome in the single-celled human zygote, the whole body builds itself up by division and differentiation into different cells. It then structures these into its different organ-systems under the governance of the brain. This ordered diversity of organs then makes possible the operation of the different powers of the human psyche: the cognitive powers of the external and internal senses, the affective powers or drives for food and reproduction, the aggressive drives for the offense and defense of the organism in its environment, and finally the locomotive powers by which the organism moves about in that environment and changes and controls it. All these remarkably complex organs serve as instruments of the human spiritual intelligence and will, which, as I have argued, cannot

themselves be the product of material, biological forces.

While the physical universe contains many more atoms and bits of dust than the cells of the body, these scattered entities lack the dynamic order that climaxes in the human brain as the instrument of intelligent life. This immense cosmic diversity and unity must be then projected analogically to give some faint idea of the still greater part of the universe, the hierarchy of spirits. Each of these spirits is a unique form, an intelligence whose innate ideas include a knowledge of the whole material universe far more perfect than the ideas in the mind of any human scientist. The higher the place of a spirit in this hierarchy of spirits, the more unified in fewer ideas is its knowledge of itself and of the universe as a whole. Thus the diversity of the universe is unified most perfectly in its intellectual beings; yet for none of them is the ultimate goal of the universe wholly knowable by its own powers.

C. UNITY AND PLURALITY IN ETHICS AND POLITICS

1. The Unity of the Virtues

The mathematical sciences, like natural science, are theoretical sciences whose aim is simply to observe and explain facts. If we now turn to the practical sciences that are concerned not with the explanation of facts but with the choice of ends to means, we find that Unity and Plurality, whole and part, have different analogical applications, but extremely important ones. These practical disciplines are of two types: the *ethical* sciences and the *technologies* (arts). The former study the possible means to attain *unconditional* goals, the satisfaction of human needs that are innate to human nature and must be satisfied. The latter study the means available to attain goals that, though they are somehow related to innate human needs, remain to a degree at

least optional, *conditional* matters of free choice.

Both types of practical science—technology and ethics—depend on theoretical natural science in its pure and mixed forms (and thus also on the mathematical sciences) for two reasons.⁴² First, they need these theoretical choices to determine the necessary or optional needs to be achieved, as they are factual and possible of attainment. Second, they need to know the various means to be used as resources with various accessibility, characteristics, and efficacy. For example, to know how to meet my need for food, I have to know something about a good diet and also something about what foods are available to me. This needed knowledge has both ethical and technological aspects. I ought not to kill other humans to get food (an ethical consideration) and I ought not eat polluted food (a medical, technological consideration). To think about these practical problems I first need to know something about human biology. Mathematics may be relevant also, since biology sometimes uses mathematical models, and I may have to measure the food and reckon its costs or keep track of my weight. Yet attempts to create a mathematicized social science that is value-free have not yet been very successful.⁴³

Ethics divides at least into *individual, family and social* (political) ethics.⁴⁴ In individual ethics there is first of all a theory of the *virtues* or skills in meeting moral problems. Aquinas classifies these as the four cardinal virtues of prudence, justice, fortitude, and temperance, and locates these different skills in various powers of the human person.⁴⁵ Fortitude and temperance give control of the emotions that have sites in certain differentiated parts of the human physical organism. For example, hunger originates in the stimulation of the digestive system, sexual desire in the erogenous zones of the body. Justice is in the will, and prudence in the intelligent active qualities of the spiritual human soul.

Aquinas also shows the connection of these different virtues in a network of efficient causality. For example, fortitude (courage) enables someone who needs to diet to endure the discomfort of hunger in order to achieve or practice the virtue of temperance

that controls the desire for the pleasure of eating. Again, justice and prudence may be involved in the way I must diet if I need to be healthy to perform my duties to others and if I need to think realistically how this is to be done. Thus, the goal of individual ethics is to form the plurality of necessary virtues in a unified and harmonious way in order that the plurality of human choices that form the pattern of actual life can be made consistent with human needs rightly ordered to the goal of human life.

The One and the Many of Being as analyzed by Metascience enter into the critique of individual ethics in two ways. First, the moral life is grounded in a commitment to a life goal or “ultimate end” by which every deliberate choice of means is measured.⁴⁶ The miser measures all he does by whether it increases or decreases his possessions. The saint measures all she does by whether it unites or distances her from God and neighbor. Thus, any human life either has a unity of purpose moving toward a goal, or (as happens perhaps in most cases) it exhibits repeated crises of backsliding and then of reconversion. There is some inconsistency (venial sin) even in saintly lives that do not waver in their commitment to the true goal of human life. Thus, individual ethics is much concerned about understanding this kind of moral unity or consistency in the immense series of choices that make up a single human life.

Second, ethics is concerned about *character*, the formation of the person in virtue—that is, growth in the ability to make choices that are consistent with a commitment to true human happiness. Socrates and Plato, because they attributed virtuous actions exclusively to knowledge of the good and immoral action to ignorance, taught that there is only one virtue, wisdom. Thus the traditional “cardinal” virtues of prudence, justice, fortitude, and temperance are only four dimensions of every morally good act. On the other hand, Aristotle, and Aquinas even more extensively, developed a theory of the division and integration or connection of the virtues.⁴⁷ Aristotle distinguished these major virtues and numerous lesser ones as specifically distinct skills in dealing with specific types of problems.⁴⁸

Everyone needs to acquire not just one but many such skills,

and may have one without another. Thus, persons who have good control over their desires for pleasure (temperance) in view of their search for authentic happiness may still be such cowards that they turn back from seeking true happiness because of the difficulties involved, and instead may content themselves with vain pleasures. Thus one virtue can strengthen another, or a lack of one virtue may make it difficult to acquire or maintain another. An alcoholic's lack of temperance can ultimately destroy his whole moral life, while a person's practical thoughtfulness (prudence) may help a person acquire all the other virtues.

Aquinas adopted this Aristotelian ethical theory of separate yet connected virtues, but in his theology argued that a more intimate connection of the virtues is achieved in the Christian commitment to love of God and neighbor.⁴⁹ He also gave much attention to the hierarchy of the virtues and showed that, while some virtues are more important than others, each virtue is the most important as regards its specific contribution to moral life. For example, prudence unites the virtues and is much more important on the whole than temperance, yet the unchaste person, who lacks temperance, is liable to act on impulse and do utterly imprudent and destructive things. Thus, for ethics, this twofold plurality of means and virtues (on the one hand) and (on the other) the unity of goal and integrity of action are always central considerations.

2. Persons in Community

The human person, however, does not lead a merely individual life. The most important human needs can be met only in community, and only in community can persons fully exercise the generosity that is the mark of human excellence. Modern American society is intensely individualistic in its understanding of human life, although in actual practice solidarity in the common good cannot be ignored. On the other hand, the twentieth century witnessed powerful totalitarian movements in which the good of persons was sacrificed to the power and prosperity of the state. Thomists debated this question vigorously, and Jacques Maritain attempted to solve it by claiming that Aquinas held that the good

of persons transcends the common good. Charles DeKoninck refuted this—successfully, in my opinion—by showing that for Aquinas the good of persons is distinguished into private and common goods.⁵⁰

The private goods of persons must sometimes be sacrificed to the common good. They are principally material in character, and thus can be divided among persons but not shared in their totality. True common goods, however, are more spiritual in character. Hence they can and indeed must be shared. If I eat my piece of pie, since it is a material good, you cannot eat the same piece. Hence ordinarily it is nobody else's business whether I eat it or not since it is my property. Yet if you need it more than I do, I ought to let you eat it. But if I make a scientific discovery, although it is mine, I ought to share it with everyone, and since it is spiritual it is not consumed by anyone but becomes a shared common good of all.

The error of totalitarianism, therefore, is in supposing that the good of a community consists in such material things as economic prosperity and military power, rather than in truly common goods such as virtue and truth. Thus the common good is precisely that good in which all persons share according to their individual needs and merits. We have here a good example of how a careful distinguishing of the ways in which the Unity and Plurality of Being proper to a given science can be extremely illuminating in practical matters as well as theoretical ones.

The natural moral law does not prescribe any particular form of government for human society as a whole. Choice must be made in consideration of many circumstances in a given society between three basic forms of government in which decisions for the common good are ultimately made by designated persons and all citizens are required to obey these laws for the good of each and all. One person (a monarch), or a group of persons (aristocrats), or all the members by majority vote (democracy) can be designated as the authorities of the society. A *monarchy* excels in unity of action, but the monarch may be incompetent or become a tyrant who seeks his own but not the common good. An *aristocracy* excels in employing the gifts and experience of outstanding leaders, but can degenerate into a class tyranny, or

rivalry and quarrels among the leaders can destroy social unity. *Democracy* excels in giving freedom and respecting the equal rights of all citizens, but can fail to achieve unity and thus end in indecision, disorder, and the rise of tyrannical demagogues. Aristotle and Aquinas, therefore, commend a constitutional government or *republic*,⁵¹ like that of the United States, that seeks a mixture of all three forms of government, with president, congress, and popular vote. The most impractical form of government, however, is *anarchism*, an extreme form of democracy that leaves all decisions to consensus. In practical matters, persons of equal good will and intelligence (even the good angels, says St. Thomas⁵²) can honestly disagree on what is best to do, with the result that under anarchy no unity of decision can be achieved, so that there is no common action to attain the common good.

The basic community of human life on which any larger society must be grounded is the family, which differs from larger societies in that its structure is to a degree naturally determined by the requirements of reproduction and child care, although this can be modified for good or ill in certain cultures.⁵³ In United States society today the natural family is suffering a great deal. We ignore the fact that evolution has adapted the human mother physically and seemingly psychologically for the long pregnancy and period of nursing and care. Her special gifts are demanded for the development and basic moral formation characteristic of the human species with its large brain and lack of detailed instincts. Evolution has also resulted in making the male stronger and free of pregnancy to care for the woman and her children during this protracted period. It has bound the human female and male together in sexual desire, since in the human race the female is regularly prepared for intercourse, thus binding the male to her in what is preferably a monogamous relation for the advantage of her and their offspring.

This biological and psychological differentiation and mutual relationships freely entered into by the man and woman as equally human persons should be understood intellectually by both of them, so that decisions are made only with mutual

consultation of both parents, and even of the children as they mature. Yet by the natural law the male is designated head of the family and thus has the responsibility of ultimate decision in family matters, but must subordinate his own personal good to that common good.⁵⁴ The female must have the courage and strength to defend her own needs and those of her children, but must accede to the final decisions of the male *if made for the common good*, just as in even a democratic society all citizens must obey legitimate decisions of the majority. In the family, however, if man and wife claim equal authority and attempt to make decisions only by consensus, the result is anarchism. If authority were assigned on the basis of competence, who would decide whether the man or the woman was the more competent?

Hence it seems ordinarily best to follow the natural designation of the male as head of the family, an arrangement that seems specific to the human species in the form of responsible fatherhood. True fatherhood is found among animals, where males generally do not seek the common good but only the propagation of their “selfish genes.”⁵⁵ Thus both parents need an understanding of their rights and responsibilities studied in family ethics, but especially the father. The view, however, that the human male is naturally promiscuous like an animal in order to insure the transmission of his genes fails to take into account that the needs of a human wife and child demand the male’s fidelity. Human children have a special need for a father’s guidance during the formative years, more extended than for other animals. It takes this extended period of dependency for a child with a large brain to be supplied with the accumulated information of its culture that it needs to survive and reproduce. Hence it is more reasonable to suppose that evolution, in difference from its results for other less brainy animals, for the sake of the welfare of his offspring and hence for the survival of the species, has adapted the human male for monogamy.

The community of the larger society also consists of a diversity of people, all of whom not only have the same basic rights, but who differ in particular different needs and also in the gifts that they contribute to the common good. To this principle,

however, must be added (in accordance with the Thomistic conception of hierarchy) the principle of *subsidiarity* and its application sometimes called “corporatism.”⁵⁶

The principle of subsidiarity states that since good practical decisions depend on good knowledge of the circumstances of action, decisions in community should be made at a level of authority closest to the persons concerned. This implies also that higher authority has oversight to correct or supplement the decisions of lower authorities in the interest of the total common good, but also has the responsibility to help the lower level resume its responsibilities after this correction or supplementation has been achieved. Thus, the ethical governance of such systems constantly requires a reflection on the relation of parts to whole and whole to parts, of the rights of individuals and the requirements of the common good. Metascience necessarily enters into such concerns to understand the ultimate spiritual goals to be attained and to correct errors that arise from false understandings of the kind of unity and plurality proper to society. For example, totalitarianism is based on a false analogy between the human community and an organism, anarchism on a rejection of the hierarchical structure required in the unification of any system of free persons.

The view made famous by Thomas Hobbes,⁵⁷ that in the “state of nature” individuals were at liberty to do what they pleased and that government is an unnatural even if necessary restriction on human freedom, is without factual support. Human freedom is most free when we act reasonably to meet our natural needs and promote the common good in which we naturally share. To act unreasonably in the name of liberty and freedom is to abuse and ultimately destroy our natural freedom.

D. UNITY AND PLURALITY IN TECHNOLOGIES AND FINE ARTS

In contrast to the three ethical sciences founded in human nature, the technologies (Greek *technai*, Latin *artes*) are unlimited in number since they are free human inventions.⁵⁸ It is important to note, however, that the needs they meet are not all of the same kind. Thus, medicine and the technologies that produce food, clothing, housing, and physical security are very directly related to human bodily needs as “necessities.” The architectonic science that deals with the production, consumption, supply, and demand of material goods is *economics* (Greek “laws of the household”).⁵⁹ In Aristotle’s thought, this term referred to the ethics of the family. It is now, however, used for a certain kind of technology, and is sometimes distinguished into simple *economics* and *political economy*, referring respectively to the private and the public management of economic affairs. On the other hand, other technologies, such as printing and the media of social communication, are more directly related to the spiritual needs for truth. Again, the fine arts are a special class of technologies whose purpose is to provide recreation of a contemplative type. Finally, there are many modern technologies that cannot easily be justified as meeting legitimate human needs, for example, the production of weapons of indiscriminate mass destruction.

It is not necessary here to say more about how these practical technologies use analogical notions of unity and plurality than to give two examples. Medicine is an art that is not absolutely necessary for human survival but very useful to it because it studies the anatomy and function of the human body and the intricate unifying connections of this physical system in order to keep it operating well. Engineering is also a technology concerned with forming artificial structures that ultimately imitate natural structures having wholes and parts and which also have controlled and unified efficient actions. The unity of an artificial structure is only analogous to that of a natural substance with its parts. “Art imitates nature” and hence has to use natural materials and forces.

In the fine arts, such issues of Unity and Plurality have a particular prominence.⁶⁰ A painting is a unified composition of various figures colored in various ways. A poem, novel, drama,

film, opera, or symphony is also a combination of sensuous images. A sensuous image, however, is also a sign of a certain intellectual and affective event in the artist's mind to be embodied in the literary, musical, or plastic work, and communicated to those who contemplate its beauty. What is meant by "beauty" in this case will be discussed in chapter 10. Art criticism is very much a matter of discussing the relations of the parts of a work to the whole, both in its sensuousness and its meanings. Note how analogous this is to the thought of a natural scientist studying the composition of material things or the whole system of the universe. In a religious view, this is the analogy between the art of the Creator and human art that imitates it.⁶¹ In a materialist view this analogy is far fetched.

A striking feature of "modern" art, that is, the art of the twentieth century, was the invention of the style called "cubism," which may have had its origin in the *collage* of images used in the art of cinema or "movies" that had been invented shortly before.⁶² In the cubist style, not only are natural forms reduced to geometric ones (cubes), but they are fragmented and reassembled. Similar artistic devices were used in famous "modernist" literary works such as James Joyce's *Ulysses* and *Finnegan's Wake*, and in T. S. Eliot's *The Waste Land*. This juxtaposition of displaced forms had three effects. First, it emphasized that a painting is not so much a representation of reality as it is a purely formal structure created by the artist. Second, it expressed the fragmentation of human life, especially modern life. Third, as in Robert Browning's *The Ring and the Book* and in the famous Japanese film of Akira Kurosawa *Rashomon* (which both recount a crime as viewed by different witnesses), reality is portrayed relativistically from several inconsistent perspectives. Thus, modern culture manifests itself in a fragmented diversity where the problem of social unity becomes extremely difficult. The resolution of such issues requires the kind of interdisciplinary and intercultural dialogue with which the present book is concerned. Questions might also be raised about unity and plurality in logic, since effective dialogue depends directly on good definition and reasoning. Since, however, this

topic would entail a consideration of what kind of reality logical entities have, it will be postponed to the next chapter.

What, then, has this chapter contributed to interdisciplinarity and multicultural dialogue in our universities? Its purpose has been to begin to uncover the fact that issues about Unity and Plurality run through every discipline, and that differences in worldviews about an ultimate materialistic or spiritualistic monism, in contrast to a pluralistic theism of Creator and a universe of material and spiritual creatures hierarchically ordered, are central to multicultural dialogue. In this dialogue it is essential, first, to show that in each discipline Unity and Plurality, the whole and the part, have very different yet related meanings. Confusions about these lead to fatal misunderstandings. I have mentioned as an example the grave error of totalitarian politicians in confusing the unity of the state (a political concept) with the unity of an organism (a natural science concept). Again, to confuse the poetic unity of a biblical passage with the unity of a scientific argument leads to theological error. To confuse mathematical models with changing physical realities produces paradoxes in natural science. Finally, to suppose that interdisciplinary or intercultural dialogue can hope for nothing more than to recognize the value of "diversity," and thus promote some *modus vivendi*, rather than strive for an honest and rich growth in agreement, is a stultifying pessimism. Therefore, in all such interdisciplinary or intercultural dialogues, the different views on Unity and Plurality should be first identified, then the analogies between them established, and finally the issue of their origin in human experience should be raised.

Truth and Formal Causality

A. THE VARIETIES OF TRUTH

1. Logical and Ontological Truth

The second transcendental property of metascientific Being is Truth, that is, the aspect of the being of anything that arises from its relation to some knower, its knowability, or, more strictly, its intelligibility. In interdisciplinary and multicultural dialogue the problem is always that reality is related to different knowers from different perspectives differently! In considering this problem it is first important to distinguish between logical and ontological truth, and then give some account of the science (or art) of logic.

By “logical truth” is meant the truth of a proposition, such as “The cat is white” or “The cat is not white,” in which a predicate concept (white) is affirmed or denied of a subject concept (cat). Aristotle is emphatic in *Metaphysics* VI¹ that propositions, since they are mind-dependent compositions, do not fall under the subject of Metascience, since Metascience deals only with mind-independent being.² This should not be taken, however, to exclude mind-dependent entities (*entia rationis*) from the consideration of Metascience entirely, since it must consider them

so as to avoid confusion of the mind-dependent with the mind-independent.

By “ontological truth” is meant the integrity, completeness, or perfection of a real being, that is, its conformity to its essence or exemplar. It is in this sense that Truth is properly a transcendental, since, as was shown in previous chapters, the transcendentals are properties of the proper object of Metascience that is Being in the sense of existing substances with their properties and their First Cause. Hence ontological truth is actually nothing other than formal causality, the likeness of one kind of thing to another kind of thing that renders it knowable, since in knowing we know a material thing through the form by which it exists. Similarly, it is also by their essences as actualized by their existences that we know immaterial things.

Yet it is also sometimes said that someone is “a true human” if she or he conforms to what we have observed humans are like and lacks nothing that characterizes a normal human, and hence is knowable to us in terms of that one’s feminine or masculine humanity. Such a usage of the term “true” is justified by the fact that in contingent things their essential nature is not always perfectly realized (actualized). We say that a certain woman “has not fulfilled her potential.” Or we note that someone is immature, diseased, handicapped, or morally perverted, though that person’s defect is veiled by a euphemism such as “visually disadvantaged” for “blind.” What is meant is that the entity lacks its full perfection of being. From this it follows that the form of being proper to that species of thing cannot be completely known through this particular case. We cannot know what it is to be truly human from someone whose humanity is defective. It is, therefore, in this ontological sense that Truth is a transcendental term, since of all contingent things we can ask whether they are ontologically true or not, that is, good examples of their species or defective ones.

Since the object of a science (*scientia*, *episteme*) is necessarily related to the knower of that science, it must be intellectually knowable. Consequently the totality of Being as it is the object of Metascience, if it is logically true, must also be somehow ontologically true. If any being lacked all ontological

truth (actually an impossibility) nothing either logically true or false could be said of it. We can affirm or deny something about X only if X is some kind of thing that belongs to its species whether perfectly or imperfectly, that is, has some measure of ontological truth, since it more or less conforms to what is normal to its species. Even monsters belong to some species of normal, healthy animals. It has been shown already that the First Cause efficiently causes all contingent Being. It has also been shown that the First Cause acts freely, and therefore knowingly. Hence it is evident that nothing exists that is not known in its ontological truth or falsity to the First Cause, even though it may not be known to us or to other intellectual creatures.

To know a truth and to state it as a true proposition, however, requires more than that one know an object as it is. One must also know that one knows what one knows to be true, that is, knows the conformity of what one thinks to the object thought. That we can do this at least in some cases shows that intelligence is not material but spiritual, and can be present to itself, conscious of its own act of knowing in relation to the object known. It is this sense that it can be said that in intellectual knowledge the knower becomes—in a special way, not totally—the thing known.³

It is essential to note that this does not mean that the knower knows herself better than the object known. I am far too complex to know myself as well as I know that I have ten fingers. Otherwise we wander into the blind alley of solipsistic idealism. What is first and best known is not the knower but the object known, primarily some sensible object. Only indirectly and through the presence of this sensible object does the knower become aware of herself as knowing. The knowing self remains hidden until its existence and nature can be known *reflexively*, by arguing from the act of knowing which is itself known only as it apprehends and is actualized by an object. In this act all that is *directly* known is the object as intellectually conceived and judged in a truthful manner.

That I am sure you are a human person and not a tree is because my intelligence recognizes you in what my senses show me and as I note what in this information is relevant to my

question whether and what you are. To be sure that what I am thinking is true, I have to ask that question and seek out in my sense information what is relevant to satisfying my question. Thus I am aware of myself as questioning and as satisfied with the answer when it is found—that is, I know the conformity of my thought to the object, and I know that I know this conformity. What I know about myself as thinking is thus the dynamic of puzzlement, questioning, and satisfaction in the answer, the teleological thrust of the human intellect. That I have a natural urge to question, however, does not tell me for certain, as Transcendental Thomists seem to claim, that this urge proves that an Absolute Answer to my questioning exists. I can reasonably question only if the data presents a meaningful problem. But the problem, “Does an Absolute exist?” presents itself as meaningful only after I have solved those prior problems that Aristotle raises step-by-step in the *Physics*, before stating the problem of the existence of a First Cause.

If, on the other hand, I begin as an idealist, seeking truth in my own mind, nothing appears but a blank questioning or imaginary projection. It is the object that arouses the question, and I become aware of my puzzlement. Then I experience my satisfaction in knowing the object, and in knowing that I know the object as it is because I have engaged in the process of asking and answering questions. That process is natural to me, and thus intellectually satisfying. If, however, I am an empiricist or nominalist who fails to make an essential distinction between sense knowledge and intellectual knowledge, I am inclined to reduce all truth to the truth of particular facts. Hence I am unable to recognize the difference between what is the case only by chance and what is true of something essentially, such that it tells me something universal about a whole class of things. Finally, if I am a skeptic, I content myself with pointing out the inevitable errors and failures that occur in the human search for truth, and I neglect serious effort to discriminate the true from the false.

Since truth is a relation between the being of the object as knowable and the knower as knowing that object, it is also necessary to distinguish between its *objective* and *subjective* aspects. Subjectively considered, either a true or a false assertion

can obtain the *assent* or belief of the knower that it is true or false, either certainly (and then with different kinds of certitude) or probably (and then with different degrees of probability), with or without adequate objective warrant for the kind of assent given. We may deny or doubt what we know to be objectively true, and we can assent to what we have no sufficient warrant to think is true. Yet we human knowers have not only the power to know the truth but to correct erroneous assent, and this not only when the correcting evidence becomes stronger, but by a persistent effort to criticize and test the truth of our convictions. This search for truth, moreover, cannot be left to merely individual effort but must be aided by a social effort of research, criticism, dialogue, and cognitive “conversion,” that is, the honest admission of error or of ignorance.⁴

In chapter 3 mention was made of Kant’s “Copernican revolution” in the notion of truth. Instead of the classical definition of truth as “conformity of the mind to reality,” he argued instead for a consistency concept of truth by which truth is “conformity of reality to the mind.” By this he meant that the information supplied by the senses is so conditioned by the structure of the human body and the human mind that we cannot know the object as it exists extramentally but only as it has been subjectively structured. Thus the best we can hope for in the search for truth is consistency among the assertions to which we assent. Aristotle and Aquinas agree; indeed, they consider it axiomatic that “anything is received according to the mode of what receives it.” Thus Kant’s point must be included in a sound epistemology, but it must not be exaggerated as he did, or the objective aspect of truth that is primary will be ignored and “reality” will seem a mind-dependent fiction.

A consistency notion of truth cannot defeat skepticism, since human ingenuity can erect apparently consistent theories, like the Aristotelian-Ptolemaic astronomy, the phlogiston theory of energy, or Freudian psychology, that collapse in the face of more accurate observation of the real world. Even to have an apparent consistency, a theory must contain an element of objective truth, just as these exploded theories had elements of truth that had to be retained in an improved theory. This is why post-Kantian

philosophers found it necessary to seek some way out of the dilemmas produced by his notion of truth.

Another fundamental distinction that must be made is that between *theoretical* and *practical* truths. Karl Marx linked “theory” and “practice” so closely together it would seem that although practice must be guided by theory if it is to be effective in attaining a desired goal so also no truth can be true unless it is useful to achieve human goals. Pragmatists go even further and assert that the practical effectiveness of an assertion is the sole criterion of its truth.⁵ No doubt the truth of any practical assertion depends on whether it helps us achieve our purposes; but to say that only practical truth is truth is false for three reasons: (1) Every practical truth presupposes a theoretical truth and is confirmed by a theoretical truth, namely, the fact that it “works.” (2) Theoretical truth can be a human goal as well as a means to some human goal. (3) Practical truth is generally only probable, while theoretical truth is often certain.

The first of these reasons holds because human practical decisions and actions must always take into account the truth of a world that we did not make and cannot entirely control. A builder must know the nature of the building materials available for his constructive work. A physician must correctly diagnose a disease before he seeks a remedy for it. We must understand our innate human needs before we can satisfy them. Moreover, to judge whether what is supposed to be practical truth is such, we must ascertain the state of affairs that it actually produces; and the knowledge of this state of affairs is a theoretical truth (a matter of truth as conformity or, as Peirce also put it,⁶ of “retention of a purified philosophy”).⁷

The second reason holds because it is absurd to claim that the goals of practical action are only other such goals, *ad infinitum*; we seek and enjoy knowledge for its own sake, whether we can make practical use of it or not. If life were the endless doing of means without satisfactions, we would cease to act. And among these satisfactions the most specifically human is the satisfaction of our desire to understand our world and ourselves. As Aristotle rightly said, “All humans desire to know.” Pragmatist

thought has never dealt adequately with this urgent human need to know for its own sake. John Dewey, in his *Art as Experience*,⁸ tackled the obvious objection to a purely pragmatic definition of truth that works of fine art are not useful but enjoyable. The only answer he could find consistent with his pragmatism was to claim that in viewing a work of art we imaginatively copy the artist's experience in creating it. But even if this be the case (which is dubious), can we say that the artist enjoys his work *only* because it effectively produces a picture that he can sell or gain a reputation for producing? Is it not rather obvious that both the painter and the viewer of his work enjoy the beauty of its work simply as an object of contemplation, that is, because of its ontological truth, the perfection of being it possesses?

The third reason why pragmatism fails is that practical truths are in general only probable, since not only are there often different ways to achieve an end whose advantages and disadvantages render their practicality ambiguous, but what is generally effective may sometimes fail by chance. Since, as will be argued later, truths have no probability unless supported by some certainties, this means that practical truth always requires the support of theoretical knowledge that involves not merely probable but also some certainly true apprehensions. Thus, although Marxists and the pragmatists have much to say about the importance of truth that is valid as to its value both in guiding action and in confirming the theoretical understanding on which this guidance is based, yet their depreciation of the value of truth for its own sake is hopelessly exaggerated and one-sided.

If we consider the various sciences, it should be obvious that natural science as such is aimed at observing and explaining the natural world, and is worth pursuing even when it has no evident technological value. It does, of course, have enormous value as a basis for the advance of technology, and it makes extensive use of technology in its researches; but Einstein did not pursue his work for the purpose of making the atom bomb. This is evidently true also of mathematics, a field in which the experts are notoriously indifferent to the possible technological uses of their discoveries. It is also true, as just indicated, of the fine arts. Thus, Aristotle was completely justified in classifying natural science,

mathematics, and, as regards their contemplation though not their practical production, the fine arts as theoretically true, in contrast to the technologies and ethical disciplines as practical. Since, however, human knowledge always falls short of omniscience and is also often tainted with prejudices, errors, and confusions, all human claims to truth require clarification, criticism, refinement, and better verification. A “science” or “discipline” in the broad Aristotelian sense is precisely such a critical effort, and its claims to success remain modest.

2. The Sources of Truth

a. Styles of Human Reasoning

Human cognition has more than one level, and these levels will be taken into account further on. In speaking of “human reason,” therefore, it suffices at this point to use the term simply to include its sensory, intuitive, and discursive aspects in their totality as they are evident in the daily life of human beings raised in any culture or trained in any discipline. Yet within the modes of thought common to all humanity there is a wide range of kinds of “awareness” of reality.

Anthropology has well demonstrated the fallacy of theories of “primitive” intelligence. As far as we now know, the human species evolved from animal ancestors about 200,000 years ago, and was even then as intelligent to the same degree and in the same manner that it is today, although it lacked the cultural accumulation a modern child quickly absorbs. Yet, even in the simplest cultures that now survive, people observe their world, achieve insights into its diversity and order, and draw reasonable theoretical and practical conclusions about it. All known humans have a linguistic mode of communication that is not genetically based but freely invented, and all languages are mutually translatable although not always with ease.⁹ Hence there is firm ground for hope that effective transcultural dialogue on a global scale will be possible.

Perhaps the most marked contrast in mental styles is not that

between preliterate and literate cultures, or between preprint and postprint cultures,¹⁰ but rather it is between what is often called “modern” culture, that is, a culture based on science and scientific technology and marked by a Secular Humanist worldview, and those in which such an extensive control over nature is lacking. Though natural science and its technological application originated in Greek culture and played a part in medieval and renaissance culture, they did not constitute the predominant worldviews of those periods, as they now do in our universities, public media, and political and economic systems.

This modern culture, as we have described it, believes that a kind of science that is self-restricted to the material world is the sole source of rational and objective truth. It consigns questions of value to cultural relativism and sees them as human constructions to be compared only as one would compare works of fine art, none of which provides a norm for evaluative judgment.¹¹ The argument in this book is directed to showing that a better understanding of the foundations of natural science will permit us to bring this modern mentality into reasonable dialogue with other mentalities. At present, the so-called “modern mind” is incapable of doing more than describing other cultures as historical phenomena and largely fails to appreciate them as having objective truth-value. This is why a *postmodern* vindication of Metascience, such as I am attempting here, is so badly needed.

Certainly the styles of thinking and expression that characterize different cultures can be strikingly dissimilar, even opposed. Thus, the Japanese writer Hajime Nakamura, in his fascinating book *Ways of Thinking of Eastern Peoples*, contrasts the thought styles of the two great cultures of India and China. On the one hand, he shows that Indian thought, in spite of its vast diversity, tends to reduce all things to a single principle, the Absolute. Hence it tends to confine its thought to universal, static concepts and to treat them as concrete realities, to the neglect of individuality and specific particulars. It is highly introspective and seeks a subjective comprehension of personality; hence it emphasizes the universal self over the individual self, withdraws

from study of the objective natural world, and neglects history. Thus it is profoundly “metascientific” in the sense that it quickly transcends the phenomenal world of the senses in search of wisdom about a spiritual Absolute. Hence the great sages of India have preferred to think in negative terms that emphasize the necessarily mysterious inexhaustibility of reality. One notes, therefore, that the thought of India is strikingly similar to the style of the thought of Plato and Plotinus that has so profoundly influenced the thought of the West.¹²

Nakamura says that the predominant style of Chinese thought is almost the opposite of that of India. This he demonstrates by showing how Buddhism, a typically Indian worldview, underwent drastic revisions when the Chinese adopted it. The Chinese approach to reality tends to be practical, ethical, and antimetascientific. It shuns the abstract and universal to emphasize the particularity, concreteness, and pluralism of things. It is much interested in history and exalts the traditions of antiquity and conformity to custom. While Chinese culture is very individualistic in its understanding of human personality, yet it reverences a hierarchical structure of society, while at the same time showing a profound esteem for nature and the correspondence between the natural order (“Heaven”) and human private and social conduct.

Yet China shares with India a spirit of tolerance for different views and attempts to reconcile them only in an eclectic manner, rather than in the systematic manner of Greek thought. Nevertheless, as Indian thought resembles that of Plato, so Chinese thought resembles that of Aristotle, at least as regards ethics.¹³ Thus, studies such as that of Nakamura demonstrate the possibilities of intercultural dialogue, and similar logical analyses can be used to further interdisciplinarity within the fragmented culture of our universities.

b. Faith and Revelation

The “modern mentality” of our universities arose in the context of the religious wars that divided Europe in the seventeenth century. It is, therefore, allergic to the worldviews of Judaism, Christianity,

and Islam that are based on faith in a divine revelation. Hence, oddly enough, our universities at the beginning of the twenty-first century seem more receptive to the eclectic toleration of different views that Nakamura attributes to Eastern thought than to the monotheistic Judeo-Christian-Islamic perspective. This is evident from the way in which “departments of religious studies” have in many universities replaced the former departments of Christian theology.¹⁴

According to monotheistic religion, a creator God has taken pity on a humanity that has historically chosen an irrational and destructive way of life that has darkened its understanding of reality. Hence God has, in a manner that transcends the capacities of human reason, enlightened certain persons as “prophets” to guide humanity back to the true path. In Eastern thought, however, although there are sacred writings attributed to sages, these sages are not considered “prophets” in the sense that monotheistic religions understand prophetic revelation.

Christianity claims that the greatest prophet was the Son of God who has become incarnate as a human being to reveal God in the fullest way possible. He has founded a Church, an organized community, commissioned to transmit this message by word and example.¹⁵ In contrast, neither Judaism nor Islam has retained such a unified teaching organization. Their faiths depend on the personal perusal of their sacred scriptures, along with some assistance from others more adept in interpreting these scriptures. All three monotheistic cultures claim a superrational revelation, but generally they do not reject the use of reason in ordinary human affairs or in the development of science and technology. They do, however, criticize the influence of the Secular Humanist outlook on science and its unrestrained use of technology to the disregard of the order of nature established by the Creator.

Today, however, Orthodox Judaism¹⁶ and Islam¹⁷ make only a minor use of a rationally based wisdom of Greek origin to defend their faith against the modern mentality. Protestant Christians, and even the Eastern Orthodox Christians who formerly made use of Greek philosophy in their theologies, today rely less than

Catholics do on a rational, philosophically critical apologetic in defense of their faith. They generally make their appeal for conversion on subjective grounds of religious experience and the tradition of biblical inspiration. Emphasis on the harmony of faith and reason is, however, characteristic of the Roman Catholic Church, as is plain from John Paul II's recent encyclical, *Fides et Ratio*.¹⁸ The Catholic view is that the Gospel as contained in the Bible and the Church's official tradition is consistent with reason. Furthermore it holds that God has given signs accessible to human reason, especially the miraculous life of the Church in its unity, universality, holiness, and historical continuity, that manifest to reason the Church's prophetic trustworthiness in witnessing the Gospel.¹⁹

Yet the Church also holds that the acceptance of faith is a gift of the grace of God utterly beyond any human claim to deserve it. Catholics also believe that God grants some persons mystical experiences exceeding natural intuition and reason. Since, however, Christians believe that public revelation was complete in Jesus, the Word of God, these private insights, even when genuine, serve only to confirm the Church's public teaching. Judaism and Islam also admit the truth of genuine private mystical experiences but only when they seem to conform (respectively) to the Hebrew Scriptures or the Qur'an that record the teaching of prophets.²⁰

c. Mystical Experience

When we turn to the world religions other than the three great monotheistic ones, we find that, in general, they do not sharply distinguish between reason and faith and do not claim a prophetic divine revelation in the sense that the monotheistic religions do. Although these ancient worldviews may possess sacred scriptures, such as the Vedas or the Taoist *Tao Te Ching*, these writings are valued as recording the spiritual insights of the sages and hallowed by tradition, somewhat as Catholics value the works of great spiritual writers, but not precisely as the Word of God transmitted to the people by persons God has called and sent as his messengers. The Eastern sages did not claim to speak in the

name of the One God, but simply reported their spiritual insights as accessible also to anyone who would follow their methods of meditation. Similarly among preliterate people it is generally supposed that their traditional worldviews are a heritage from ancestors who had remarkable mystical experiences. These traditions are often preserved and elaborated by shamans who claim similar experiences. Such traditions are transmitted by ritual practices with mythological explanations.²¹

The great world religions, especially those of the East, although they have sponsored a very considerable philosophical and even technological development in the cultures they have influenced, today find it pragmatically necessary to import modern science and technology from the West. Yet to date they have generally done little to reconcile their worldviews with the Secular Humanism that has been the chief sponsor of this modern science and technology. These peoples are not much concerned to systematize their worldviews in a consistent synthesis or develop a rational apologetic in their defense. The wisdom of their sages is transmitted largely in aphoristic forms.²² The truth-seekers in these cultures meditate on such sayings with the hope of arriving at the same experiences or insights. They follow a master of their tradition who will teach them the discipline and techniques of meditation by which they hope to obtain this same superrational enlightenment. This has made Eastern wisdom especially attractive to Westerners raised in the Enlightenment tradition that regards the obedience of faith demanded by the monotheistic religions in a revelation not directly accessible to every individual as contrary to personal freedom and autonomy. A Secular Humanist finds it easier to become a disciple of a guru he has chosen to teach him how to mediate, somewhat like an athletic trainer, than to put his faith in truths revealed in the Bible or the Qur'an.

It would be presumptuous to deny that the personal enlightenment claimed by Eastern sages is genuine, since it has fostered great cultures that have survived so long and borne such rich spiritual fruit. The problem for Metascience is to form some idea of the ontological character of such experiences and

intuitions, since it is generally maintained that they cannot be described adequately in words. Some secular humanists, of course, would attempt to understand these mystical experiences simply as psychological “states of consciousness” without truth-value, though perhaps contributing to health or peace of mind. Those who accept the reality of a spiritual realm of being, however, cannot so easily dismiss this type of spiritual experience.²³

Of the traditional six systems of Indian thought, the most influential one in the West has been *Yoga* (from the same root as English “yoke,” with the sense of a discipline that concentrates the mind).²⁴ *Yoga* techniques of meditation (mentioned in chapter 4) or similar ones are common to all the forms of Indian religion. It includes the classical *Raja Yoga* of Patanjali that has very ancient—perhaps pre-Vedic—roots and has also close association with another system, *Samkhya*. According to *Yoga*, the self is troubled by the reflection in itself of the material world through sense impressions that lead to ignorance of the following truths: (a) the changing world is not permanent reality, (b) the body and the stream of consciousness are not the true self, (c) pleasure is not to be desired, (d) pain is not to be avoided, and (e) life is not to be loved nor death feared. Enlightenment is to be achieved by an eight-step process: (1) abstention from immoral acts, (2) observance of moral duties, (3) correct posture, (4) correct breath control, (5) withdrawal from the senses, (6) fixed attention, (7) contemplation, and (8) concentration leading to *samadhi* or ecstatic trance. It is claimed that when this state is attained abnormal powers of telepathy, telekinesis, and so forth are also acquired. Yet salvation does not consist in the exercise of such powers but only in release from suffering.

From the viewpoint of Thomistic thought, Jacques Maritain supplied what to my knowledge is the best explanation of this *Yoga* experience.²⁵ Maritain considered what seemed to him two possibilities. First, that the practice of meditation, especially with *Yoga* techniques, can lead to an intense *intuitive* awareness of the spirituality of the human mind, in contrast to both its sensible awareness of the material world and its rational activities.

According to Aquinas, the proper and direct object of human consciousness is the essence of material things present to the senses. Hence, our own selfawareness is indirect and essentially consists in a *negative* intuition. By “intuition” (Aquinas’s *intellectus*, or Augustine’s *ratio superior*²⁶) is meant a direct insight that is not the result of merely speculative reasoning but an immediate awareness of reality as it truly is. This intuition does not arise from an experience of sensible objects, nor can it be an experience whose object is the spiritual soul itself. Rather it is an experience of the *void*, a dark awareness of the self as the *existential presence* of an immaterial reality whose positive character remains undefined. Yet because this negative intuition of immaterial reality really does pertain to the spiritual order, it is a state of blissful and serene peace. This “natural” mysticism, Maritain thought, seems to account for what the practitioners of Hindu, Buddhist, and Taoist meditation experience claim to have achieved and declare to be ineffable. Maritain believed that the danger of this type of spiritual experience is that it exposes an adept to the temptation to think that his or her spiritual self is identical with God. The negative character of this insight prevents any clear perception of the merely finite character of the human spirit. This danger, Maritain suggested, is manifest in the tendency of these Eastern religions to monism and their resistance to a monotheism in which created spirituality is sharply differentiated from that of the Creator.

As a second possibility, Maritain also pointed out that *bahkti* devotional practices, by which devotees worship Shiva, Krishna, the Mother Goddess, or other symbols of the Absolute, put more emphasis on the will than on intellectual cognition. Thus, *bahkti* reaches out to the spiritual goal of human life without claiming to have clear knowledge of it. In the monotheistic religions it is believed that God generously offers grace to all who are willing to receive it. Hence, in Maritain’s opinion, this type of yoga devotion, in spite of its monistic formulation, actually tends to monotheism and thus, by grace, can become a genuine supernatural mysticism. In such a mysticism, faith as submission (*fides quo*) predominates with only a minimum content of revealed truth (

fides quod).²⁷

Maritain's analysis can also be applied to religions other than those of India and China in which this type of meditation technique is practiced. The trance-inducing rituals of many kinds of religion and intense efforts at prayer may result in natural mysticism, and this may be transformed by God's grace into authentic supernatural mysticism. Walter T. Stace²⁸ and others think that all forms of mysticism are essentially the same,²⁹ and in different religions are only clothed in different symbolism and rituals of prayer. Yet studies in comparative religion leave no doubt that there are certainly a variety of kinds of spiritual experience that may have very different sources.³⁰ One cannot exclude the possibility that some reported religious experiences, for example, those of enthusiasts, occultists, or drug-abusers, may have their origin in mental or moral disorders rather than in authentically spiritual experiences. One may also ask whether the reliance on induced trance states that seem common in religions that regard the world as merely phenomenal (*maya*, *samsara*) may not lead to a confusion between the real and the unreal, the mind-dependent and the mind-independent, and open practitioners of these forms of meditation to all manner of illusions and aberrations.³¹ Even the possibility that such experiences may have a demonic origin cannot be excluded.³² I must, however, postpone the debate between monism and monotheism—fundamental to the comparison of different types of Metascience—to chapter 12.

Yet, this comparison of worldviews based on revelation and reason, on one side, and worldviews based on intuition and mystical experience, on the other side, manifests that in our search for wisdom we need to remain open to truth that is intuitive rather than rational and that has superhuman sources. At the same time we must be cautious that we are neither credulous nor lacking in humility and prudent discernment. Thus St. Anselm of Canterbury's definition of theology as "faith seeking understanding" remains a sound guide. Metascience is a rational undertaking, but rightly developed it is also a "theology," though at a purely human level. It can be of great use in discerning

pseudomysticism that contradicts rational truth. It can also be of great service in helping to express both authentic mystical experience and genuine revelation from God in ways that make such truths good guides for those who lack such experience or prophetic gifts. In the last analysis, Metascience is a humble science, because human intelligence is the least of spiritual intelligences. It behooves us, therefore, not to make too great claims, while remaining open to authentic truth from whatever source. But as Pilate wearily asked, “What is truth?”

B. EPISTEMOLOGY

1. Skepticism and Sophism

Given the relation between ontological truth and logical truth, between its objectivity and its subjective reception, it is obvious why not all that appears true is true. The term “epistemology” (Greek for study of *episteme*, certain knowledge) refers to a study concerned with the truth-value of human knowledge. The term does not occur in Aristotle or other ancient or medieval writers, and was probably introduced into philosophy by the Scottish philosopher J. F. Ferrier (1808–1864) in his *Institutes of Metaphysics* (1854). For Aristotle, every science, to be a science, must study a formally distinct generic subject, be based on certain and necessary first principles proper to that subject, and be able to demonstrate with certitude at least one property of that subject through one or more of the four causes. Hence every science has its own criteria of the kind of truth proper to it.³³ Thus, for Aristotle, epistemological questions belong first of all to each of the special sciences, not to Metascience, whose subject is principally mind-independent being in its full extension, not logical truth.

Yet since Truth is a transcendental “property” of Being as Being, it is still a task proper to Metascience to conduct a critique

of the validity of the other sciences, a validity that it assumes as a fact but seeks to understand as a reasoned fact. So Metascience seeks to understand the ultimate causes of the various kinds of truth proper to the various sciences.³⁴ I provided in chapter 2 an historical typology of views on “metaphysics” as a term and as a discipline, and in doing so I outlined a broad classification of types of epistemology. The reader is referred to that chapter for data on authors and notes with bibliographical introductions to and critiques of their writings. Here it is necessary principally to say something about the problem of skepticism and the chief answers that have been given to it.

Repeatedly throughout the history of the West, controversy among the wise has led some to conclude that the human mind is incapable of certain truth. Even Socrates called himself not a “wise man” (Sophist) but only a “philosopher,” a “lover of truth.” But this modesty about claims to possess the truth did not deter him from ardently and hopefully searching for truth and pitilessly exposing what he believed to be falsehoods. In fact, what he especially fought was the view of the Sophists like Protagoras, that truth is only social *consensus* to be achieved by using the art of rhetoric to create a united public opinion.³⁵

The Greek and Roman Skeptics lost faith in philosophical discourse because, far from coming to agreement, the different schools of philosophy came to spend much of their energies in polemics against their rivals. The chief of the Skeptics was Pyrrho of Elis, which is why skepticism is often called “Pyrrhonism.” But it found its most complete expression much later in the work of Sextus Empiricus. These thinkers even denied that one can assert with certainty that skepticism itself is true, or that any one assertion is more probable than another. Like many skeptical attitudes today this conviction had an ethical motivation, namely, to promote an open-mindedness and freedom from dogmatism and fanaticism.³⁶

Of course an easy debating answer can be given to skepticism, by pointing out that it is contradictory to claim to know that certain knowledge is impossible and yet to claim to know that this is certainly the case. It is no less contradictory to go the

further step of claiming that even this claim that nothing is certain may be uncertain, since one cannot know that one knows nothing. Such easy answers, however, do not really meet the skeptics' very real problem: that problem is, as Descartes saw, how to escape the certain fact that so many people believe so many false things, or at least that so many people believe as true things contradictory to what other people believe is true.

2. *Idealism's Answer to Skepticism*

Although Plato continued Socrates's fight against Sophism and Skepticism, his earnest questions, as indicated in chapter 2, raised their own doubts and eventually promoted skepticism among his followers in the Middle Academy under Arcesilaus (315–241 BCE). Skeptical tendencies were even stronger in the New Academy in Athens under the headship of Carneades. These leaders interpreted Platonism to mean that genuine truth is so far above the human condition that we must be content with probabilities. By the time of Cicero (106–43 BCE), an eclectic attitude prevailed. Cicero himself preferred the views of the Academy, yet treated the other schools of Greek thought as having a relatively yet not decisively true view of reality and human life. Thus cultural, moral, and epistemological *relativism* are akin to Sophism, and not far from Skepticism.³⁷

Aristotle had foreseen this failure of Platonic dialectic as an adequate answer to skeptical doubt. As we see in Plato's dialogues, the dialectic is an ascending series of questioning in search of truth that moves from doubt to increasing probability by eliminating certain hypotheses as at least improbable; but it never decisively asserts that any answer to the initial question is final. Every dialogue typically ends with Socrates promising that the discussion will continue on another day, or proposing a myth that suggests another possible answer—yet leaves it a mystery. Socrates never claims to have the answer. Certainly this is true of the human search for perfect understanding. But are we not foolish, then, as a sophist or skeptic would argue, to hope for

more than a kind of working, practical probability? Of course Plato did not accept this conclusion. He avoided it by supposing that we have innate ideas hidden within our minds that are absolutely true, and if we continue the dialectical process we will eventually recover (recollect) them. He cited mathematics as evidence for this, and, by idealizing the sage Socrates, suggested not only that some wise men have already attained to wisdom but that their success at least gives us hope to achieve the same. The vagueness of this hope led Aristotle to suggest that if we make our questions precise and limited (aporetic), and ask them in a proper order, we can ascend to ultimate truth step-by-step, beginning from certain, if very humble, truths about things sensed.

When Judaism, Christianity, and Islam replaced Hellenistic paganism, philosophers who were believers in these monotheistic religions, of course, accepted the teachings of revelation as absolutely true. Moreover, since they also believed that God had given humanity a good intelligence to know him even in his creation, they generally rejected skepticism and probabilism, even at the rational level.³⁸ Thus St. Augustine, in his *Contra Academicos*, attempted to refute the probabilism of the later Academy.³⁹ Yet he and most of the Church Fathers (as well as the Jews and Muslims of the eighth and ninth centuries) accepted a basically Platonistic epistemology, first in the eclectic form of Middle Platonism and then often in the more radical form of the Neoplatonism shaped by the pagan Plotinus.⁴⁰

Plotinus held that, although certitude is not possible through ordinary reason, it is accessible through a mystical reunion with the eternal One in ecstatic trance. Once this insight is achieved it can be rationally systematized and defended, as he did in his *Enneads*. Thus the Greek Church Fathers, and Augustine among the Latins, tended to interpret Plato's innate ideas as an illumination from God. As exercised in its lesser forms, this divine illumination makes possible a rational philosophy about the visible world and its manifestation of the Creator, but in its higher forms it becomes faith in divine revelation that, as it is perfected, merges into mystical union with God.

While Augustine defended the validity of rational philosophy in the service of a more perfect revelation, many Christians, Jews, and Muslims, as they became more acquainted with the controversies between the ancient schools, inclined to *fideism* suspicious of philosophy as perilous to faith. Among the Muslims, the profound but Neoplatonizing commentaries on Aristotle's works by Avicenna (Ibn Sina) and Averroes (Ibn Rushd) led to doubts about the teaching of the Qur'an on the freedom of the Creator, human moral responsibility, and the immortality of the human soul. Islamic theologians like al-Ghazali (1058–1111), in his famous work *The Incoherence of the Philosophers*, led Islamic culture away from rational philosophy toward a fideistic position, which Averroes in his rebuttal, *The Incoherence of the Incoherence*, did not succeed in overcoming. Similarly, medieval Judaism more and more neglected philosophical studies in favor either of a legalistic study of the Torah or the mysticism of the Kabbalah, also much influenced by Neoplatonism.⁴¹

The typology of chapter 2 shows that this skeptical mood has, like a recurrent depression, again and again stultified Western thought after the High Middle Ages, notably in the Nominalism of the fourteenth and fifteenth centuries, in the religious conflicts of the sixteenth century, in Hume's attack on the confidence of British Empiricism at the end of the eighteenth century, and with the announcement of the end of Western philosophy by Nietzsche, Heidegger, and Derrida. I have sketched these recurrent times when the hope for wisdom has been weakened, not to evaluate in particular the work of any of the thinkers mentioned, but only to illustrate a fundamental question for Metascience: "In what sense is 'truth' possible for human thinking?" Actually, none of these skeptics, not even Francisco de Sanchez (who, in the sixteenth century, declared that he did not even know if he knew nothing), wholly abandoned the search for truth.

What Sanchez, for example, really meant was that, because scientific certitude seems impossible, we must be content with the best empirical information available. What thinkers of this bent were seeking to avoid was a "dogmatism" that claimed a certitude

greater than could be really justified. Metascience must keep raising that question about every claim to truth. At the same time, it would be skeptical dogmatism to refuse in dialogue to be convinced by sound arguments. As there is a neurotic and obsessive scrupulosity that corrupts practical judgment, there is also a speculative scrupulosity that obsessively invents imaginary doubts.⁴² The objections to the possibility of truth raised by the skeptics can be shown logically to be false, but stubborn skeptics will then deny the validity of logic.

Descartes courageously but unsuccessfully opposed these skeptical arguments by first trying to doubt everything, and finding that at least he could not doubt that he doubted.⁴³ Hence, he convinced himself that he must also be certain of his own existence as the one who doubted. Since this truth seemed certain as a clear and distinct truth, he then concluded that such ideas as he had that were clear and distinct must also be true. By asking still further how he had come by these innate truths, he concluded they must be caused in his mind by a Perfect Being that was self-caused (*Causa Sui*) . Since this God must be Truth and cannot deceive, Descartes then concluded that since his senses were also God's gift they too did not deceive him, and, in at least a general way, could be trusted to inform him about an extramental, material world insofar as it could be understood in a way consistent with his innate ideas.

Modern philosophy since Descartes has found innumerable weaknesses in his strange line of argument, yet has remained enchanted by it; and late into modern times many seem to descend again into skepticism and irrationalism. Even the Empiricists are no longer entirely confident that they can overcome the problems Cartesian Idealism raised. Since it is the Empiricists who today dominate philosophy, at least in Great Britain and the United States, and who seem (in the footsteps of Hume) to be the most prone to Skepticism, it is to them that we will now turn for the liveliest current discussion of epistemology.

3. Empiricism's Answer to Skepticism

A strong empirical tendency became evident in the medieval universities, especially in England in the work of the Franciscans Roger Bacon and William of Ockham. Yet Scotism dominated these schools for many years. After John Wyclif (d. 1384), very much an Augustinian Platonist, until Francis Bacon, English universities had little philosophical activity other than undergraduate scholasticism of an eclectic sort.⁴⁴ Bacon at Cambridge probably became acquainted with the violent anti-Aristotelianism and rhetorical logic of Peter Ramus, promoted there by an influential professor, William Temple. A continental trip from 1576–1579 may have awakened Bacon's interest in the new possibilities for science. Be that as it may, England was at that time becoming a center for experimental scientific studies, as is evidenced by William Gilbert's remarkable work on magnetism published in 1600 and by William Harvey's lectures on the circulation of the blood published in 1616.⁴⁵

Francis Bacon himself never accomplished much in natural science, but he was an ardent proponent of an "inductive" approach to knowledge based on sensory observation and experiment. He was among the first to see the practical technological importance of scientific research and proposed the establishment of a special institution outside the universities to engage in it. To this end, he laid out a rather curious classification of the sciences, in which natural theology "was excluded from" metaphysics (which he thought dealt with the "forms" or general laws of the material creation⁴⁶). Furthermore, he discussed the kind of prejudices that stand in the way of successful scientific research. It was under this Baconian inspiration that British philosophy rejected Descartes' "turn to the subject" in favor of an empiricist epistemology.

This empiricism got its most influential formulation in the work of another graduate of Cambridge, John Locke. Against Descartes' advocacy of innate ideas, Locke declared that the human mind prior to the activity of the senses is as blank as a white sheet of paper. This seemed like a restoration of Aristotelian epistemology, but in fact, as we noted earlier,⁴⁷ Locke did not clearly distinguish between sensation and the analytical

activity of a spiritual human intelligence. For Locke, what we know through sensation are not the extramental objects themselves but “representations” or ideas of these objects; and so the empiricism Locke fathered remained within the perspective of Cartesian subjectivism.⁴⁸ Could Aquinas himself have been in dialogue with Locke, he would have insisted on the distinction between our mental (formal) concept as the *in quo*, or that on the basis of which we know an object, and the *quod*, or the thing itself known as object. When we see our face in a mirror, it is not the mirror that we see, but our face in the mirror. The mirror is only that *on the basis of which*, or the medium of our seeing.⁴⁹

By failing to make the distinctions necessary, Locke in effect replaced the ancient view that truth is the conformity of the mind to reality with the view that truth is the conformity of the mind to *representations formed by the senses*, a very radical step in epistemology indeed. It led him and his followers to think of these representations as mental “ideas” arising from sensation and to see in the work of intelligence nothing more than a generalization of these ideas as mere images, vaguer and less specific than the original external sensations from which they were copied. Thus, instead of Descartes’ assurance that “clear and distinct ideas” are the source of certitude, Locke undercut the certainty of all knowledge except our awareness of our most vivid sensations. This opened the way, on the one hand, to Bishop Berkeley’s idealism, more radical than that of Descartes, and, on the other hand, to David Hume’s skepticism that would provoke Kant’s idealism. Thus Empiricism, quite contrary to its own intentions, normally suffers metamorphosis into Idealism.⁵⁰

The movement called the Scottish School of Common Sense, led by Thomas Reid, attempted to avoid both Hume’s Skepticism (Hume was also a Scot) and Idealism. The epistemology developed in this school also resembled Aristotle’s in holding that human intelligence intuitively attains some first principles from sensory experience that are evident to all, yet these Scotch thinkers tended, still in the line of British Empiricism, to confuse epistemology with psychology;⁵¹ and being perhaps of an overly practical orientation, they tended to apply their system mainly and

prematurely to ethical problems. Mayhap under the influence of Rousseau and Romanticism, the Scottish School also gave special emphasis in ethics to the role of feelings. At the same time, however, Adam Smith (1723–1790), Jeremy Bentham (1748–1832), and John Stuart Mill (1806–1873) developed the very pragmatic ethics of Utilitarianism.

A little later Herbert Spencer, basing his ideas on Darwinian evolution, attempted to construct a philosophy that remained agnostic about any reality other than the material world. By contrast, the famous Cardinal John Henry Newman (1801–1890), working largely within the tradition of Locke, followed a more common sense approach in support of Christian faith by his notion of the “illative sense,” the intuitive certitude that can emerge from the convergence of probabilities derived from many different sources of knowledge.

In the last half of the nineteenth century, in the wake of Romanticism, the influence of Kant and the German Idealists began to be a major factor in British thought. By the time of T. H. Green (1836–1882) and F. H. Bradley (1846–1924), German Idealism dominated British philosophy. On the continent, the Positivism of Auguste Comte had gained influence, supporting the regnant empiricist epistemology by maintaining that science is simply a description of the “positive” facts of observation, free of any attempt at ultimate explanations.

In England, the shift back to the empiricist tradition in reaction to Idealism came with G. E. Moore (1873–1958) and Bertrand Russell, a shift that came to be called “Analytic Philosophy.” Moore’s thinking has a rather “common sense” character in opposing the grand systems of Idealism, but contents itself with the *clarification of language* as it is used in dealing with particular philosophical problems. Russell brought to this orientation a great concern for the appearance of logical rigor in philosophy, supported by influences from Austria, such as that of Ludwig Wittgenstein⁵² and especially of the logical positivists of the Vienna Circle, of whom Moritz Schlick (1882–1936) and Rudolf Carnap were the leaders.⁵³

Logical Positivism programmatically rejected all “metaphysics”

(by which these thinkers had mainly in mind German Idealism), and tried to show that when “metaphysical” language is analyzed it is exposed as “nonsense” concerned with “pseudoproblems.” Logical Positivists hoped to use modern symbolic logic to clarify and unify modern natural science into a single system whose *verification* depended strictly on conformity to empirical data. Karl Popper (1902–1990) replaced verification as the criterion of truth with *falsification*, that is, scientific theories must be able to be falsified by new evidence, since otherwise, with sufficient ingenuity and disregard for absurdity, many theories can be devised to fit the same facts.

By the end of the twentieth century Empiricism also had critics from within, in the form of the anti-foundationalism of Wilfred Sellars, Willard Van Orman Quine (1908–2000)—particularly in his famous essay, “Two Dogmas of Empiricism”⁵⁴—and others.⁵⁵ These anti-foundationalists attacked not only the Cartesian attempt to ground certitude in the *Cogito* but also the illusions of Empiricists. The chief of these Empiricist illusions, Quine claimed, was to follow Kant in supposing that there are analytical statements whose truth is seen to be necessary simply from the identity of their terms, as contrasted to other statements that are seen to be true only as a matter of fact. As Sellars has also argued, a point of fact, such as “This is green,” is not simply a matter of immediate experience since the experience in question cannot be easily separated from the context of all the beliefs that the observer brings to it. These beliefs, in turn, are relative to the context of beliefs of the community in which the observer exists and to whom he makes this statement as having meaning. It is the coherence of all these elements of learning and their public confirmation by the community that grounds the truth of propositions, not some private insight either *a priori* or derived from sense data. Another proponent of coherency theory both as regards the nature of truth and its justification, Jonathan Dancy, defines coherence as “a property of a set of beliefs, not of its members. The set is coherent to the extent that the members are mutually explanatory and consistent.” Belief in it is “justified to the extent to which the belief-set of which it is a member is

coherent.”⁵⁶

The vigor of Quine’s statement of what is sometimes called his “holism” can be sampled from the following:

As an empiricist I continue to think of the conceptual scheme of science as a tool, ultimately for predicting future experience in the light of past experience. Physical objects are conceptually imported into the situation as convenient intermediaries—not by definition in terms of experience, but simply as irreducible posits comparable epistemologically to the gods of Homer. For my part I do, qua lay physicist, believe in physical objects and not in Homer’s gods; and I consider it a scientific error to believe otherwise. But in point of epistemological footing the physical objects and the gods differ only in degree and not in kind. Both sorts of entities enter our conception only as cultural posits. The myth of physical object is epistemologically superior to most in that it has proved more efficacious than other myths as a device working a manageable structure into the flux of experience.⁵⁷

Richard Rorty pushes this argument still further by maintaining that only beliefs that “work,” and thus confirm something as true, are those that gain a public consensus through a free dialogue. He also seems to think that a “free dialogue” can only be defined as that typically enjoyed by university elites!

Still others hold that natural science by its very methodology is limited to “naturalism,” which is a denial of the possibility of a scientific proof of the existence of an immaterial First Cause, for which I argued in chapters 4–5. Their argument is that natural scientists do not verify their theories simply as individuals but must ultimately verify them through the acceptance of the scientific community. Therefore, since intersubjective verification is possible only with reference to sensible observations, there can be no scientific verification of unobservable, nonsensible objects.⁵⁸ Since, however, argument for the existence of immaterial beings is from effect to cause, and the effects on which it is grounded are intersubjectively verifiable, namely, the

changes of material things, this naturalism fails. Certainly a naturalistic scientist believes in quantum fields that, though material, are known only through their effects. Both the existence and nature of these fields are known only by analogy from their sensible effects. Is it not arbitrary, therefore—or sheer prejudice—to close the door on the possible existence of immaterial causes?

A coherence theory of truth, of course, has its origin in Kant's consistency theory of truth,⁵⁹ but insists not only on logical consistency but on the positive support that can be given to a theoretical system by the addition either of new observational facts or new theoretical elaborations. For example, Einstein's physics was an improvement over Newton's, both because it had the support of new observations and also because it, for example, replaced the theoretical concept of action at a distance with such concepts as space-time and space-curvature. Coherency theory also claims to provide an answer to the well-known objection to Hume's probabilism (that it leads to an infinite regress) because an assertion is probable only when there are reasons to judge it to be more or less probable. But if these reasons are also only probable, the probability of the ultimate conclusion weakens until it is reduced to zero probability. Yet nothing either factual or practical can be grounded on the absolutely improbable. To this objection coherentists reply that the probability of a proposition does not necessarily depend on antecedent propositions from which it is deduced, but rather on its coherence with a total system of propositions.

Recent criticism has been made of Quine's position on the grounds that it too is not free from foundationalism, since it still gives preference to observation statements. Anti-foundationalists, on the contrary, insist that no element within the total system, either observation or theory, has superior epistemological value to any other. In science not only are theoretical systems sometimes falsified by a newly discovered fact of observation, but what is claimed to be a "fact" warranted by sense observation is rejected as false because it does not cohere consistently with a well-established theory. In the end, both theory and fact are to be judged by their total coherence. Thus, the strength of Empiricism today seems to be best maintained by a coherency theory of truth

that is also nonfoundational. Or, as Rorty argues, in the final analysis it is simply the consensus of a particular community that validates the coherency of any system of beliefs, although one may reasonably prefer the opinion of some elite or more open-minded group to that of groups who are uninformed or narrow-minded.

When the hopes of the Logical Positivists were shattered, not only by these antifoundationalists but even more fatally by developments in mathematical logic, to be explained below, a split developed within Analytical Philosophy. A new version called Ordinary Language Philosophy proposed that the concerns of philosophy are limited to the clarification of the *language* of natural science and ethics by reducing or connecting it to ordinary experience as that is expressed in the vernacular “ordinary language.” This form of “analysis” came to dominate many university philosophy departments in English-speaking countries in the last half of the twentieth century and found some rapport with continental phenomenology.

Yet the Nietzsche-Heidegger announcement of the death of philosophy at the end of the twentieth century flowered in the paradigmatic late modernism of Jacques Derrida and others. Derrida argues that all language, the vernacular or the technical language of natural science alike, are inherently ambiguous. Hence attempts at “clarification” rather than “deconstruction” are misguided, since they only introduce new and perhaps more dangerous ambiguities. By this “deconstruction” is meant in particular the exposure of the concealed rhetoric by which language is used by one person or group to gain or maintain power over another. This “hermeneutic of suspicion” had roots both in the Marxist theory of “ideology,” which explains how an exploitative class maintains its oppressive domination, and also in Freudian psychoanalytic theory, which seeks to unmask unconscious motivations in human behavior. According to deconstructionism, therefore, philosophy and science are at best both forms of “edifying discourse” no more objective than poetry and often simply propaganda for special interests. Thus, by the end of the twentieth century the desert winds of a radical skepticism were again withering human hopes for wisdom. It was

time for a postmodern attempt at the task.

4. Aristotelian Thomism's Answer to Skepticism

Since this book prefers the epistemology of Aristotle and Aquinas to that of Skepticism, Idealism, and Empiricism, it is convenient to present their positions through a critique of the other three preceding types of epistemology. The despair expressed by the various types of Skepticism and Sophism (cultural relativism) concerning the possibility of arriving at objective truth is based on many undeniable experiences of errors in cognition. In view of the tragic comedy of human rationalizations and of current-day dead-end controversies, who can deny that the search for truth often fails and that it is hindered by a multitude of factors?

Among these factors that generate skepticism and relativism is the lack of interdisciplinary and multicultural dialogue that I am seeking to promote in this book through an understanding of the validity and usefulness of Metascience. The modern failure in this regard may thus be turned into a postmodern success. The history of human thought and present-day experience show emphatically that every claim to scientific truth can be and should be questioned; yet it also shows that natural science does sometimes achieve objectively true descriptions and causal explanations of the world accessible to our senses, though even these remain open to further refinement. The same is the case in other special disciplines. What is required to achieve such truth, however, is the observance of good critical methods proper to each science, based on a rigorous examination of its immediate or mediate foundations in sensible experience, so as to develop an adequate theory of the order of learning (as Aristotle and Aquinas attempted—I believe successfully).

Such insights derived from the critical analysis of experience and made manifest by dialectical reasoning can then form the basis for logical inferences that establish the facts and the causes for the facts. Thus, while a certain skeptical attitude is helpful in the sciences as a *heuristic* or research principle that cautions us to proceed critically in every discipline, it ought not prevent us

from recognizing and accepting truth when the critical standards of a science have been met.

The painfully obvious fact that we sometimes make errors that we are eventually forced to recognize as such does not logically disprove that we sometimes know the truth and know that something is certainly true and will never prove to be false. Skeptics seem to deny that it is possible that others have some certain knowledge. Why are they so reluctant to listen patiently to the arguments of those who claim to have some truth and thus possibly to be convinced? Can it be that they fear the truth and its moral demands?

Platonism is a tradition rich in wisdom that deserves profound respect, especially in its openness to truth and to mystery that permits it to take seriously the possibility of spiritual reality. Yet, as Aristotle showed, Platonism lacks a sufficiently critical, scientific method. Its claim to innate ideas and a *a priori* knowledge cannot be substantiated, since its prime example of such knowledge, mathematics, can be shown (as we will further see in the next section) to be ultimately derived by abstraction from sense experience. As a result, Platonism and the Idealist philosophy that arose in this tradition with Descartes have led to the construction of impressive systems, like those of Plotinus and Hegel, but they have never gotten beyond what Aristotle would have called dialectic, in the sense of imaginative hypothetical constructions founded on plausible opinions but not grounded in sufficient evidence. Indeed, Aristotle's own philosophy collapsed when it was misunderstood as just such an *a priori*, deductive system.

As I argued in the last chapter, the same thing happens to Thomism when it is presented as a metaphysics without the grounding in natural science that Aristotle and Aquinas gave it. In Catholic thought, as we have seen, a notable influence of the idealist tradition is found in the Transcendental Thomism of Joseph Maréchal and his followers, mentioned in chapters 2 and 5. A recent, carefully nuanced version of this is to be found in the approach to metaphysics advocated by W. Norris Clarke, S.J. In his treatise on metaphysics, *The One and the Many* (2001), he argues that "the ultimate root of all metaphysical inquiry" is "the

drive to know and the intelligibility of being,” and speaks of the “radical dynamism of the human spirit toward all being as true and good.” He argues that the human intelligence cannot be satisfied until it arrives at some “Ultimate Reality” which is the “Ultimate Good.” Thus, God, as this Ultimate Being and Good, is implicit in all our thinking and provides the “horizon” on which metaphysics is based.

The obvious objection of moderns to such an argument is that our intelligence questions only when it is presented with a genuine problem, and genuine problems concern the material world of which we are a part. Transcendentalists can only reply that the material world is finite, and hence we have an intellectual drive to question the Infinite and Perfect, the whole of being. But moderns will say that the whole of the only being and value that we experience is the finite material world.

Thus, if we are to ask any meaningful question about a reality greater than this material reality, we must have a reason—more than merely a psychological urge—to think this is a genuine problem. Such a further problem arises only if there is something about this material world in its finitude that renders its being problematic. But this brings us to Aristotle’s and Aquinas’s First Way, since it is precisely the facts that the material world exists changeably and is known to us through its changes that raise a genuine problem requiring a meaningful answer. To claim that this problem arises in our inner experience, simply from the alleged dynamism of our intelligence and will, is to fall back into Cartesian subjectivism and to hold that what we first know is our thinking and our self as a thinking, willing subject rather than the sensible and evidently real things that are the direct object of our thinking and that arouse our desires.

When one examines attempts to arrive at immaterial reality by introspection, as is typical of the Platonic, Augustinian, and Transcendentalist traditions, one finds that they always presuppose what they seek to prove. This is because they assume that we can understand the nature and dynamism of both our intelligence and our will without first proving from sensible human behavior (as Aristotle does in the *De Anima*) that thinking and will are not merely bodily activities. Thus the validity of the

Transcendental Thomist approach to metaphysics presupposes the validity of the Aristotelian approach and cannot claim to be an improved alternative to it.⁶⁰

As for Neoplatonism, with its claim to be derived not from human reason but from mystical illumination, this is a claim that, like the worldviews of Hinduism and Buddhism, transcends the comparison I am making here and will be discussed later.

Descartes' "turn to the subject" that initiated modern philosophy was laudable in its efforts to escape the skepticism and fideism of his times, as had been that of St. Augustine from which it was derived. It underlies all "modern" philosophy, not only Idealism but also Empiricism, and has made a vastly important contribution to philosophy by calling more attention to the subjective aspects of thought and to the mind-dependent aspects of objectivity. It must be admitted that Aristotle and Aquinas, in their concentration on developing a method to achieve objective scientific truth, can be reasonably accused of an exaggerated "objectivism" that too much neglects both the negative and the positive aspects of human subjectivity. In demonstrating the essential *passivity* of cognition that does not create its object but receives the foundations of objectivity in sensation, Aristotelians admit, but too often minimize, the active contribution of the subject to the resulting worldview.

As one reads Aquinas, one notes that he carefully analyzes cognition into its passive and active aspects, as for example, in his "moderate realism," in which the universality of the concept is attributed to an act of the intellect, though it is also grounded in the passive cognition of the nature common to many. Yet, other than this general recognition of the role of subjectivity in knowledge, he gave little attention to the perspectives of individual and group experience, or to the details of the activity of the imagination and the passions in cognition—in short, little attention to the *historicity of the human condition*. While he by no means denied human historicity, he remained coolly unobservant of it. So it has been necessary for modern Thomists like Jacques Maritain, Yves Congar, O.P. (1904–1995), M.-D. Chenu, O.P. (1895–1990), and members of the Polish school, who emphasize "personalism" and "contextualism," to assimilate the researches of

modern philosophy into this objective foundation. Future advance of Aristotelian and Thomistic thought (hardly separable when it comes to the matter of the foundations in sense of human awareness⁶¹) depends on the continuation of such work.

Cartesian Idealism, however, also had the disastrous effect of reintroducing in a very crude form the dualism between the material and spiritual orders that is inherent in Platonic Idealism, with the result that these two orders of reality were put in opposition to each other in a way never found in Plato's own writings. Platonism and Neoplatonism, although they denied certain truth to knowledge derived from the material world, nevertheless believed that the material world imitates the spiritual world, so that the imperfect truth of the visible world leads upward to perfect truth. Yet Platonic dualism is ultimately responsible for the war between Idealism and Empiricism that has prevailed throughout Enlightenment modernity.

Kant's efforts to hold Empiricism and Idealism together had two unhappy consequences. On the one hand, it meant the apparent triumph of Idealism, since his synthesis assigned all certain truth to the *a priori* and denied the possibility of objective knowledge of extramental reality. On the other hand, by its requirement that the mental categories obtain their content from sense *impressions* (i.e., not from the objects as such, but from representations formed by the senses) whose ordering in space and time was subjectively imposed, it limited all certain knowledge to material appearances and hence relegated metaphysical knowledge of spiritual reality to a purely regulative role possessing only a pragmatic, "as if" kind of truth.

Thus, the history of philosophy since the Enlightenment, even if Heidegger is right in claiming this kind of philosophy is now dead, has not been in vain. We need not succumb to Deconstructionism as only another episode of the recurrence of skeptical despair. Furthermore, it seems true that the consistency theory of truth has been fruitful in natural science by its encouragement of an active dialectic in terms of the verification or falsification of hypothetical models. Yet the arbitrary character of the Kantian reconciliation of Empiricism and Idealism was never remedied in the imposing systems of German Idealism that today

appear more as aesthetic constructions in the spirit of Romanticism than as realistically critical thought.

The result of this long struggle has been that Empiricism, at first in retreat, now seems the ultimate victor. Hegelianism, the most successful of the idealist systems, has influenced the twentieth century chiefly through what is called the Left Wing Hegelianism of Karl Marx and his materialist, dialectical theory of history, especially as interpreted by the Russian V. I. Lenin (1870–1924). Marxism violently opposes Idealism, and claims to be an empirical science. Now even this materialist version of Hegelianism has been exposed as a pragmatically unsuccessful myth.

As for Empiricism, Aristotle and Aquinas would agree with its contention that all merely human knowledge must be derived ultimately from sense experience and receives its certitude only from its conformity to the reality of material things. They would, however, disagree with modern Empiricism as it stemmed from Francis Bacon and John Locke. Of course they reject Bacon's crude inductivism that no one any longer defends,⁶² but more importantly they reject his view that natural science is to be valued primarily for its practical, technological results. For Aristotle, "all men desire to know" not merely for practical purposes but because truth is the highest of human values and its contemplation the greatest of human activities.

As for the attack on foundational truths or first principles by revisionist empiricists like Willard Van Orman Quine, it must be pointed out that his notion of a "first principle" is quite different from that of Aristotle. Aristotle and Aquinas sought a method of thinking that promised to incorporate (without ever consisting exclusively in) *episteme*, that is, universal and certain truths. To achieve this, they argued that one must always try to state the problem clearly and in a limited way, and be careful to move from what one knows better to deal with a question whose answer is less well known (or hardly known at all!). Aristotle admitted, however, with Plato, that in searching for such an answer one must proceed dialectically, by eliminating possible but improbable or obviously false answers so as to find the more probable ones. Nevertheless, such a dialectical procedure, though essential in

research, cannot of itself yield a certain and satisfactory answer. What it can do is ultimately uncover a principle of solution. Such a principle would be better known than any of the possible answers to the problem, not because it actually contains the answer in such a way that a previously unknown truth could be deduced from it, but because by its generality it can order other previously known but fragmentary truths into a consistent, explanatory system.

For example, William Harvey discovered an answer to his question, "What is the function of the heart?" when, after considering many possibilities (including Aristotle's erroneous view of the matter), he realized that all the facts that he already knew to be true by observation were given a consistent order by a more general truth he knew from practical experience, namely, that a pump in a closed set of vessels circulates a liquid. He knew this about pumps in the same way that he knew the structure and beating of the heart, namely, by repeated sense experiences; but he knew it better, and hence could use it as a principle of explanation. It was a first principle only relatively to the problem at hand.

The problems that confront us, moreover, are of different types, some theoretical, some practical; and there are subdivisions of these. Consequently, in each science there are first principles in the sense of what is most evidently true of the subject matter of the science. A science does not proceed, however, by drawing rabbits out of a hat of first principles. It has to continue its observations that supply new data that impose new "facts," which in turn demand new (or further) attempts to unify the facts under the first principles already established or still to be formulated.

Though the *Cogito* of Cartesian Idealism is not to be trusted, as I have already argued, neither is there any need to accept Locke's empiricist supposition that what we know with certitude are not real, mind-independent objects but merely "ideas," that is, "representations" of such objects. As was earlier explained, I know that I am thinking, but I know this only because I first directly know the existence of objects that I have no reason for supposing are merely mind-dependent. Thus, by reflecting on this

fact that I know them, I come to realize *indirectly* that I am thinking and that I am a subject that can think abstractly. What this human act of thinking consists in is, of course, a difficult problem for psychology (not to mention Metascience), but Locke's theory that it consists in more or less vivid sense impressions is patently inadequate, since the abstract universal concepts which even he had to use to formulate that theory differ essentially from concrete particular sensations. Thus Lockean Empiricism falls into all the dilemmas of medieval Nominalism. No wonder, therefore, that Hume, starting from Locke's empiricism, ended in Skepticism.

Nor can this Skepticism be adequately avoided by the Scottish School's appeal to "common sense." No doubt these thinkers were right in maintaining that we have an intuitive knowledge of certain general truths prior to reasoning, since all reasoning must be based on premises directly evident from experience. But simply to call this "common sense" does not provide a critical analysis of such intuitive knowledge capable of providing the foundations of any science. As Aristotle shows, intuitive knowledge is necessary not only at the level of the first principles of a genus but also at every step from these generic principles to more specific principles. Hence there must be a method of establishing these new more specific premises that exceeds common sense.⁶³ We know in a common sense way that the universe contains both living and nonliving things, but this does not tell us whether a virus is a living organism or merely the fragmented remains of some living organism that infects a genuine organism. To know that a hippopotamus is a vertebrate animal is essential to understanding it, but to know what a hippopotamus is *specifically* requires the gathering of a great deal more empirical data by observing such animals. No one can deduce the reality of that beast from more general truths. Cenoscopic knowing, in short, may be foundational, but, as the judges of Galileo inadvertently demonstrated for all to behold, it cannot be the whole of science nor in anywise a substitute for the ideoscopic development of further knowledge.

It is important to note also that the Aristotelian Thomist epistemology would agree with Locke's statement that, anterior to

sensation, the human mind is a *tabula rasa*, but only with some qualifications. The principle that “Something is received only in keeping with the condition of its receiver” applies to human cognition, since the state of the human organs of sensation must condition the information that these organs receive. Hence it must also condition the activity of the intelligence that depends on these sense organs as its natural instruments. Therefore, some information is “co-natural” to human knowing, while other information is not. Since “a thing is received according to the condition of the recipient,” the human sensory organs, and the human intelligence as it is correlative to the human body, are ready for some information, less ready for other information.⁶⁴ For example, “the whole is greater than its parts” is a truth immediately evident to us from seeing and feeling extended objects, including our own bodies. Thus, connatural knowledge is immediately and directly known from experience, without demonstration and even without extensive dialectic (such as the axioms of arithmetic are known at least in their “common sense” mode of counting sensible objects).

Moreover, if all our knowledge arises from the senses, even the consciousness of the mind-dependent relations formed by our own minds must somehow be derived from our knowledge of extramental sensible objects. Aristotle does not actually discuss this point,⁶⁵ but later writers have pointed out that these mental relations are formed by the mind by analogy to real relations between physical objects.⁶⁶ Thus, the relation of predication is understood as if the predicate was a form that specifies the logical subject analogously to the way that physical form specifies matter. Certainly there can be illusions or hallucinations with regard to judgments about even the object of the sense of touch, and even more deceptively with regard to the objects of our other senses. For example, some amputees experience pain in the limb that they no longer possess. Such illusions, however, are not errors in *sensation* strictly speaking, but rather errors in *perception*, that is, they are erroneous *judgments* to be attributed first of all not to the intellect but to the internal sense, especially the *vis cogitativa*, which evaluates sensations, memories, and

imaginings alike according to the interaction categories of desirable or undesirable.⁶⁷ The amputee actually has a pain in the stump of the amputated limb that somewhat resembles the normal sensation of the former normal limb. In such cases of sensory illusions we ordinarily recognize that we are not experiencing a normal sensation and take measures accordingly (if only attitudinal ones!) to correct the impression at least at the level of judgment. Amputees, though they may be much tormented by this illusion, can touch their other remaining leg or arm and then see the difference between that normal sensation and the pain in the stump of the lost leg. Again, in optical or auditory illusions, we quickly learn how to discriminate normal sight or hearing from the appearances that at first confuse us.

Moreover, the sense organs are proportioned to the qualities of substances only within certain ranges and with a certain fineness of discrimination. Our eyes cannot see infrared or ultraviolet light, nor our ears hear notes of certain pitches that are yet audible to dogs. Our eyes discriminate only some six colors in that part of the spectrum to which they are sensitive. Not every one has perfect pitch. It follows that the same is true of our intelligence, dependent as it is on the senses for its data.

Recent experimentation by linguists and sociobiologists seems to show that, although human languages are cultural inventions, human children are genetically and neurologically adapted by evolution to learn any language. Evolution has also probably adapted us to learn with special ease certain other modes of behavior.⁶⁸ Yet these linguistic facts are not incompatible with Aristotelian epistemology. They only disclose a certain connaturality of the human subject with what Noam Chomsky has called the “deep structures” of language, that is, the logical relations that must somehow be reflected in any form of human communications that involves abstraction. Thus Chomsky is mistaken when he contends that such facts about language learning imply the “innate ideas” of Plato and Descartes.⁶⁹ Children have to learn a language to mature, and they are predisposed to learn it in a certain manner. Only “languages” that are adapted to this innate mode of human learning could have

survived as practical modes of human communication.

Thomists can also agree with the appeal of Analytic Philosophy to “common sense” and “ordinary language,” because they too are convinced that sound philosophy ought not contradict reality as we know it prior to critically systematized knowledge. Sophisticated, technical knowledge must ultimately be grounded in naïve human experience that is adequately expressed in ordinary human language, otherwise our species would have never survived its long history of dealing with reality. Thomists can agree with the Analysts also in rejecting Kant’s notion of synthetic *a priori* truths. But they part company when the Analysts retain Kant’s division of truth into *a priori* or analytic truths and *a posteriori* or factual truths, and they part company for reasons that are much the same as those given by the empiricist Quine.

For Analysts, as well as for the now discredited Logical Positivists, all knowledge is divided between analytic truths that are purely formal and pertain to logic (to which Russell then reduced—or, rather, tried to reduce—mathematics) and factual (or “empirical”) truths. The latter pertain exclusively to a natural science that Analysts restrict solely to assertions about the objective material world or to ethics that they often reduce to a description of subjective emotional attitudes (“emotive ethics”). The result is that, for Analysts, the scope of “philosophy” is narrowed to a “clarification of language,” a humble task indeed, which shades into the Sophists’ theory of truth as public consensus (or, now even more disastrously, into untrammelled Deconstructionism). In saying this I by no means, of course, intend to minimize the importance of the clarification of language so essential to interdisciplinary and multicultural dialogue, but only to stress that serious dialogue cannot be reduced merely to the overcoming of semantic confusions.

In this postmodern era, Aristotelian Thomism must also deal with the existentialist, phenomenological, structuralist, and deconstructionist tendencies of later modern thought. It has already been said that Thomism is not essentialist, since only in existence is essence actual and complete. Hence only existent objects can be known essentially. As Karol Wojtyla (Pope John Paul II) and others have argued, the phenomenological method is

not only compatible with Thomism but is somehow essential to it, though it has only recently been adequately developed. It is essential to Thomism because Aristotle and Aquinas begin all researches with careful descriptions of human experience that are presupposed to any essential intuitions required as the first principles of a science. Yet, Thomism cannot, as Husserl wished, “bracket” existence in order to search for essences, since, as just stated, essences are unknowable until the first scientific question of Aristotle, “Does it exist?” has been answered affirmatively.

Structuralism and Deconstruction can either be understood negatively, as new varieties of skepticism about the possibility of attaining certain objective truth, or positively, as subtle techniques for uncovering the real meaning of truth claims so that they can be subjected to critical testing. These approaches to knowledge, however, like those of Analytic Philosophy, do not go beyond raising interesting hermeneutical questions about how to read texts, and it remains to be seen whether this sophisticated reading has significantly improved on any of the classical epistemologies I have described.⁷⁰

Even in the views of anti-foundationalists and those still advocating the primacy of a coherence view of truth, Thomists find much to agree with. They agree with antifoundationalists that our knowledge is not grounded in *a priori* truths. They also agree with coherency theories as regards the dialectics required in research. It is quite true that our knowledge advances by testing new proposals by their coherence with an already established system, and that this system increases in certainty as this coherence is enriched and intensified. Yet Thomists reject anti-foundationalism because its claim that knowledge can only be probable leads to a *reductio ad absurdum*, since probabilities that involve a regress to infinity result in zero probability.

The mere fact that a system of thought seems consistent and coherent is no guarantee that it is not fundamentally fallacious. The grandiose system of Hegel has toppled like a house of cards. The reason that the empiricist advocates of the coherency theory of truth can make a plausible case is the reverence we all have for modern quantum physics and its evolutionary cosmology. But, as I have been arguing in this book, the system of modern

science is imperiled precisely because it lacks a sound foundational theory based directly on the certainty of natural sense observation.⁷¹ Moreover, those who have other worldviews do not share the confidence felt by coherency theorists in modern science in its present condition. Consequently coherentism tends to shut off genuine dialogue with other worldviews. It is true, as antifoundationalists insist, that sense observation and the intellectual insights based directly on them always take place in the context of the worldview of the observer. Yet critical thought and the interdisciplinary and intercultural dialogue that promotes it cannot proceed within one system of thought, no matter how coherent. It must instead seek common ground in the elements of each of the systems in dialogue that are to a degree *independent* of the systems themselves.

What can these common elements be if not the experiences of our world and our bodies that have at least a certain priority to the ways we talk about them and explain them? I am sure that, when I watch the sun rise, I see it in a different context than does a Parsi sun-worshipper, a Hindu Vedantist, or a Secular Humanist cosmologist. Yet there is something in that experience that is common to us all and hence foundational to whatever worldview we may have inherited or have constructed for ourselves. To insist that the experience of a sunrise is absolutely contextualized in its truth is an exaggeration plausible only to those ideologically committed to coherentism. Thus a Thomist, while agreeing both that many notions of the foundations of thought are mistaken and that these foundations are always open to reexamination, continues to recognize their necessity.

It was the singular merit of Aristotle as against Plato, as I argued in chapter 2, not to fall into the “holistic” notion that all human truth is reducible to some single universal truth, or Idea of the One. Aristotle held that questions or problems (*aporiai*) are raised in our minds one by one, and can be answered one by one if we formulate the successive questions accurately as they arise. Moreover, there is more than one relatively autonomous science, each with its proper principles. The unity and holistic coherence of thought is only gradually achieved, as the coherentists quite rightly claim, but it is built up from relatively independent problems

and answers. Indeed it is difficult to understand how coherence in a set of beliefs can be achieved simply by the fact that they are “mutually explanatory,” as Dancy defines coherence, unless effects are explained by their causes and ultimately by their primary causes. Moreover, if these explanatory causes unify a set of beliefs, they too must be causally unified, and thus we come to foundational truths in the system. To argue that the justification of these foundational truths is to be found in the coherence of the rest of the set of truths they justify is to assume what is to be proved, the ultimate logical fallacy.

Thus the Aristotelian epistemology seems both more critical and more comprehensive than the others developed so far, since it allows for a certain truth in the various forms of Idealism and Empiricism, yet proceeds by relatively independent steps while facing up to the limitations of human reason pointed out by the Skeptics. Yet it transcends their one-sided accounts of the powers of human thought. It makes no claims for the *a priori* power of the human mind, as do the Idealists; nor does it too hastily limit the human powers of knowing to the material world. Thus it renounces metascientific claims that are not grounded in sense experience while keeping the way open to the possibility of a Metascience that extends to immaterial reality. This Metascience, however, as we will see more clearly later, leaves room for an Other who is Mystery. In sum, the Aristotelian Thomist epistemology has all the advantages that Empiricism has over Idealism, while remaining open to the possibility that the human mind cannot only in a mystical but also in a rational way know whether there are immaterial realities and something of what they are through their effects. In particular, this makes possible an answer to the question whether the human mind is merely a brain function, a problem that Idealism at least tackles but that Empiricism generally evades.

5. Personalism and Thomism

After the foregoing discussion of Aristotelian Thomist epistemology, it is important to give some special attention to the

twentieth-century development of what is sometimes called “Thomist Personalism” which, along with phenomenological methods, has had important influences—especially on the Polish or Lublin school of Thomists and, through them, on Karol Wojtyla, who, as Pope John Paul II, gained worldwide influence.⁷² “Personalism” (which is by no means confined to Thomist thinkers) can be defined as an emphasis in philosophy on the role of human self-knowledge and freedom in the formation of our total worldview and value system. Two famous sayings, the Greek “Know thy self ” and St. Augustine’s “To know only myself and God,” show that this is not a new theme. Yet it gained prominence in the twentieth century for at least three reasons: (1) the influence of modern philosophy’s “turn to the subject,” (2) the need for a reaction to the reductionism of modern science, and (3) the need to defend ourselves against the brutal attacks on the dignity of the human person by totalitarianism.

Thomists (with the notable exception of some of the Transcendental Thomists) did not want to go the way of Kant, whose rationalism hardly did justice to the complexity of the human person. Rather, some thought that, by use of the phenomenological method, they could provide a richer picture of the human person. Since, for Aquinas, the human person is the culmination of the visible universe, and the mediator between it and the spiritual realm, a good understanding of the human person can be considered the key to the knowledge of all Being for which the human person serves as the analogical microcosm. Thus personalism is central to a Metascience, since beings with intellect and will are the supreme form of Being.

It is obvious that modern individualism fails to do justice to the human person, since persons attain their perfection only in *relationships* with other persons. For Thomist philosophers, this concept resonates with the Christian theological doctrine of the Trinity in which the analogy of One God in Three Persons is based not only on the inner psychology of the human person as Being, Intelligence, and Will, but also on the community of human persons and the still larger community of human and angelic persons centered in the Triune community of God.

Unquestionably, such personalist considerations—based as

they are on various themes in St. Thomas's writings—have enriched Thomism and helped to overcome the misperception of it as a cold, rationalistic system of deductions from so-called self-evident first principles. Nevertheless, in my opinion, personalist approaches to knowledge present epistemological difficulties that must be carefully handled if Metascience is not to be diluted by an excessive subjectivism and introspectionism.

For Aristotle and Aquinas, we do not first come to our knowledge of ourselves as persons by introspection, but by everyday sensible experience of the things of the material world around us. This contact, of course, arouses within us various mental activities, both cognitional and affective. We imagine, remember, and reason, and have positive and negative feelings *about*⁷³ these sensed objects. Among these “objects” are other human beings with whom our contact is often very intimate, beginning from the time of a child at its mother’s breast. Even children empathize with other persons, trying to understand what they are thinking and saying and doing and feeling in relation to what the child itself is thinking, saying, doing, and feeling. Yet, for Aquinas, the proper object of our intelligence is material, sensible beings. Whatever we know about the interior life of other persons *or our own selves* is learned through external, material signs. Thus introspection and consequent self-knowledge becomes possible in the first place only by virtue of the knowledge of what is *not* the self.

As we come to recognize that the human person somehow transcends the material world, because it knows and feels and chooses in ways that cannot be explained by the material world, we enter into a new level of awareness. Scientifically, as I have argued in this book, this new awareness becomes fully and critically objectified only when natural science reaches the level of human psychology and demonstrates that the human intelligence and, therefore, also the soul that informs the human body cannot be material. To go further, it is necessary then to enter into a Metascience that deals with Being as it is both material and immaterial. Thus it is perfectly true that the perfected knowledge of the human person precisely as person, that is, as endowed with spiritual intelligence and free will as faculties of a spiritual

human soul, is a task of Metascience.

Since Metascience works by the use of analogies, the analog of the human person (the spiritual being best known to us) has an essential and fundamental role to play in metascientific thought. This role, recognized by Aristotle, more fully developed by Aquinas, and now emphasized in Personalist Thomism, must be still further explored. Nevertheless, this exploration, if it is to remain scientifically critical, cannot bypass its roots in the natural science of the sensible world. Its use of the phenomenological method must not be permitted to degenerate into subjectivism (as happened with Husserl himself ⁷⁴). This is all the more necessary if we are to think of the human person always in relational and communitarian terms. Fortunately, this fact has been noted and remarkably developed by Karol Wojtyla, in his "philosophy and theology of the body."⁷⁵

C. FORMAL CAUSALITY AND PARTICIPATION

We have seen that in natural science the analysis of our experience of changeable beings shows that their observed actuality and changeability is evident even in the very act of our observation of them since they must interact with us or we cannot sense them: *de nonexistentibus non datur sensatio*, to coin a phrase. From this analysis it is also evident that sensible objects must be essentially defined as composed of matter (potentiality) actualized by form. Thus the two intrinsic causes of material things (their material and formal causes) become evident to our intellectual insight and can be used in demonstrating their properties. Moreover, material substances have properties distinct from their substantial matter and form classified in nine categories, of which the property of quality is an accidental form, while the other eight kinds of properties, although not strictly speaking "forms," are related to the substances in which they inhere somewhat as forms to matter.

Once natural science has established the existence of immaterial things as the causes of the existence of material things and their changes, Metascience becomes possible; it proceeds at once to consider immaterial things in relation to the material things that are their effects. This leads to the conclusion in Metascience that God is Pure Act. Moreover, as I argued in chapter 4, natural science not only demonstrates the existence of human souls as the immaterial forms of thinking yet embodied human persons, but also considers the possibility of the existence of pure spirits as prime movers of independent though coordinated lines of causality in the physical universe. If these pure spirits do in fact exist, it would seem that their essence and existence are related as really distinct potential and actual principles, analogous to matter and form, in contrast to the absolute identity of essence and existence in the First Cause.

Thus, the notion of *formal cause* applies variously to (1) the substantial forms of purely material substances, (2) the properties of substances, (3) the immaterial form of the soul that also actualizes the human body, (4) the pure forms (if such there be) that are spiritual intelligences needing no bodies, (5) the formal character of existence in relation to essence in *all* contingent things, and (6) in a very special sense the First Cause as the Pure Act of Existence. These various senses of “formal cause” are obviously not univocal but analogous.

It is essential to see that formal causality, though it is not efficient causality, is, nevertheless, true causality, because the existence of something depends not only on the efficient cause that produces it but also on the form that the efficient cause gives it. An animal is efficiently caused to exist by its parents, but it does so only because they have given it its matter and form, and its matter exists in the animal only because it has the animal form by which that animal is a living organism of a certain species. Thus, the form of something is a true cause of its existence not by reason of efficiency, but by reason of its actuality.

While primarily a “formal cause” is an *intrinsic* actuality of some being, it can also be the *extrinsic* cause of the similarity of one thing to another.⁷⁶ Thus, a blueprint as the extrinsic form is a

cause of the structure of a house, but it is not part of the house. Taken in this sense, one can speak of a “model,” “pattern,” “exemplar,” or “exemplary formal cause.” When an act of cognition (whether of sense or intellect) or of the will is specified by its proper object as its extrinsic formal cause, that object is called its “objective formal cause.” Thus, when one sees the color red, this color is the objective formal cause of sight by which the seer is identified with the object, yet the seer does not become red in the way that a form is received in matter—for example, as white paper is reddened by a red marker—but as the form of redness qualifies the act of the eye in seeing. This is why cognition is defined as “the reception of a form in a form” (that is, the form of the object of sight in the faculty of sight, which is itself a formal active quality of the one seeing—who, however, does not himself become red, as was discussed in chapter 6).

Such objective formal causality implies a real relation of *similarity* or *equality* between something and its measure, or between two things having perfectly or imperfectly the same essences. It is called “objective” precisely to indicate that it is *extrinsic* formal, not efficient, causality; that is, that a formal objective cause is a true cause even though it does not act upon something to effect change. A2 similar in form to an existing A1 can exist without any efficient action of A1, although the existence of both A1 and A2 must ultimately depend on yet some other A or A’s of which each are effects, respectively. For example, building a house according to a blueprint does not mean that the blueprint does anything to efficiently build the house; yet the blueprint is truly an objective formal cause of the house without which it would never have come into existence. Thus the existing similarity between blueprint and house is due to the fact that the architect had in mind a certain plan that he expressed, first in the blueprint and then (using the blueprint as a model) in building the house. Yet, in the manner of a model, the blueprint is truly a formal cause of the house without which the house would not exist as it does.

It is typical of Platonic thought to neglect both the material and the efficient causes as explanatory principles and to emphasize explanation through the formal (and especially the exemplary

formal) cause. Thus, in Plato's famous "Allegory of the Cave" in *Republic* VII the cave dwellers see only the shadows on the wall, much as we watch a movie or a TV screen. When one of these ignoramuses is dragged out of the cave into the sunlit world he is utterly dazzled and has to grow accustomed to the bright light of the upper world. At first, he sees the shadows best; next, the reflections of men and other objects in the water; and then the objects themselves. Later he gazes on the moon and the stars that he sees better than objects in the glare of sunlight. But finally he will be able (supposedly) to look on the sun itself, and not just on its reflections in the water. He will see the sun in its own proper place and will (it is to be hoped) contemplate all things as they really are.

Thus the notion of "imitation" or "participation" plays a major part in Platonic thinking since the things of our experience are viewed as *imitations* of a more perfect reality. St. Augustine defined time as "the moving shadow of eternity." Indeed, Aquinas used this feature of the Platonic tradition to form the fourth way of proving the existence of immaterial things from extrinsic formal causality, in which, from the degrees of formal perfection in created things, it can be argued from effect to cause that there must exist something possessing every form in a perfect degree unlimited by any potency. This argument is often thought to be the least plausible of the five ways of proving God's existence. Yet it is strictly valid, though less evident than the first three proofs from motion and efficient causality, since it presupposes that they have already shown that the actuality (form) of material things is received in matter (or some analogous kind of potentiality, in the case of angels) and hence cannot be self-explanatory.

In the 1950s especially much attention was given to the question of participation. A notable controversy arose between Cornelio Fabro and Louis Geiger, O.P. Modern Thomists had put great emphasis on the real distinction of essence and existence in opposition to Scotus and Suarez. In view of this emphasis, Geiger seems to have been especially concerned to avoid implication that essences are in any way prior to their acts of existence. Hence he maintained that "participation by

composition” in creatures (that is, the participation both of matter in form and of finite essences in *esse*) is only secondary in Aquinas’s view. What is primary, he claimed, is “participation by formal hierarchy”: God, who is Pure Act, freely imitates himself in creatures in more or less perfect ways that constitute a formal hierarchy of finite beings. Thus their composition from form and matter, act and potency, *esse* and *essentia*, while it is a correct explanation of their limitations, is also a consequence of God’s will to form a hierarchy of beings that participate in his divine plenitude by formal imitation.

Fabro strongly criticized Geiger’s view in two very extensive works on the subject.⁷⁷ Fabro argued that Aquinas, by his metaphysics of existential act (*actus essendi*), was able to synthesize the Platonic concept of participation with his Aristotelian epistemology, and thus overcome Aristotle’s antipathy to that concept in its Platonic guise. Fabro rejected Geiger’s demotion of the composition of finite beings by act and potency to a secondary role since this would open the way to pantheism. Fabro denied that this composition, as Aquinas understood it, could in any way imply a priority of essence to existence. The analogy of *essentia-esse* to *materia-forma* composition cannot be understood as if *esse* specifies *essentia* as *forma* specifies *materia* since the exact opposite is the case: *esse* is specified by *essentia*. The relation signified by the analogy is that of limitation, so that the *actus essendi*, although it is the act of the essence, is yet limited by it. Therefore Fabro retains the composition of act and potency that Geiger reduces to a secondary place, and speaks of it as “predicamental participation” necessary to explain the limitations of finite beings. Then he introduces the term “transcendental participation” to manifest the doctrine of Aquinas that such finite beings are real precisely by their participation in Pure Act, who is God. Thus, as Plato saw, all things *imitate* the One; but, unlike Plato, Aquinas synthesizes this view of transcendental participation with Aristotle’s argument for the First Efficient Cause, converting a static imitation into a dynamic one. Thus the danger of monism (inherent in Neoplatonism) is removed, and creatures are seen to participate in God’s *esse* not

by being somehow parts of God, or mere imperfect copies of his infinite riches, but by a pure gift of dynamic existence through creation out of nothing.

More recently, Rudi A. te Velde has reviewed this debate⁷⁸ and pointed out that the First Cause creates by willing beings to exist that are *other* than himself, and necessarily (by that very fact) limited; yet, as an effect of the First Cause, each creature imitates some “part” of the First Cause, that is, they “participate” some form of the plenitude of God’s perfection that is his *Esse Subsistens*. Since, according to Aquinas, God’s plenitude can be better imitated by a universe of many ordered creatures than by any one creature, this produces a hierarchy of more and less perfect beings.

All contingent beings are limited by the fact that their natures or essences fall more or less short of God’s plenitude, and this limitation is manifested in their own diverse modes of *esse* (that is, as different imitations of God, each having from God its own proper existence). Since every created essence is a form, although the essences of material beings are forms of matter, while the essences of immaterial beings are forms without matter, yet all these created forms are finite, and hence are inseparably both positive and negative. They are positive in that they independently exist (have *esse*) as a particular imitation of the Divine plenitude; but they are necessarily also negative in that they are imperfect imitations, lacking those perfections possessed by other actual and possible creatures. This negativity results from their composition of limited act (*esse*) and the potency (*essentiae*) that limits it, yet since this limitation by essence also correlatively specifies the perfection that they positively have, it is, in fact, the actuality of that very essence.

Formal causality plays a major role in modern science that so relies on mathematical models. Such science talks much of “structures” and “systems,” and more recently of “information theory.” In mathematics, as we have seen, abstraction is made from all the properties of physical bodies except that of a quantity abstractly idealized as the parts of a homogenous whole that is nothing more than an undifferentiated, empty “space.” What

remains are a set of geometric or numeric relations that constitute a “structure” or “system,” that is, an abstract form. This form can be physically embodied in various kinds of matter. Hence a mathematical equation can have many different physical applications. Thus the famous “wave function” of quantum physics is interpreted not as a real wave, like a wave on water or a sound wave in air, but as a set of probabilities for locating an elementary particle that exists only at a point.

To speak of a physical “probability” is to imply that some “force” (efficient cause) exists that will produce certain effects that will be more or less frequently observed. For example, we can think of the batting average of a baseball player as a measure of the probability of his hitting the ball in the appropriate way with a certain frequency. To speak of these “probabilities” except in terms of his batting skill would be meaningless.

Information theory is taking on more and more importance in current science and technology.⁷⁹ Thus the genetic code or genome in living things is the minute package of information that suffices to construct an entire, vastly complex living organism. On the Internet our computers can find and download for us all the information in the *Encyclopedia Britannica* by decoding from a digitally written program. Thus we are coming to see that formal causality in the sense of sets of relations is the order of the universe that makes it intelligible.

One immensely important example of the significance of formal causality as *information* is found in modern genetics. Science is showing that the capacity for many living organisms to develop from a single to a differentiated whole with many distinct members, each with special functions, is guided by the information packaged in the genome in the nucleus of the zygote from the moment of fertilization.⁸⁰ If this information is defective, as in the many types of genetic disease, the organism dies or remains partially incapacitated for its vital activities.

It is this embryological analogy that, for some thinkers, is implicit in the great synthesizing concept of modern science, *evolution*. For a philosopher-scientist like Teilhard de Chardin, the universe was best pictured as a self-developing organism in

which even intelligence and freedom would eventually emerge.⁸¹ This seems to be the notion of evolution that has been most popularized. Yet for Metascience it raises many questions.

Current cosmology seeks a Grand Unified Theory (GUT) according to which for not more than 10^{-39} seconds a single natural force existed. Soon, however, it differentiated into the four fundamental forces of gravity, electromagnetism, and the weak and strong nuclear forces that have operated in the cosmos during its subsequent 15 billion years of evolution.⁸² Scientists generally accept these four forces simply as “natural,” and hence requiring no further explanation. In other words, they accept them as material prime movers of relatively independent lines of causation. Once differentiated, these forces have been independent of each other through almost all the history of the universe.

The only information that science attributes to the original state of affairs at the Big Bang are the laws of quantum theory that only state probabilities not inevitabilities. As the Nobel Laureate in physics, Murray Gell-Mann writes,

The fundamental laws of physics allow in principle only the calculation of probabilities for various alternative histories of the universe. . . . Above and beyond these presumably simple principles, each alternative history depends on the results of an inconceivably large number of accidents. . . . Each alternative history of the universe receives a tiny contribution from the simple fundamental laws, along with a gigantic contribution from the quantum accidents. . . . The rest comes from the numerous regularities resulting from “frozen accidents.”⁸³

By “frozen accidents” Gell-Mann means the stable entities or systems of entities, such as the solar system, that we now observe that have as a matter of fact been produced by evolution through a sequence of largely chance events. Perhaps, indeed, the development of the universe as we observe it has resulted from inevitable reactions between its fundamental forces in a

broadly predetermined evolutionary sequence. Thus cosmic expansion, the formation of the simpler elements, the condensing of nebulae, the formation of stars and nebulae, the formation of some 92 elements in the stars, and the formation of simple molecules can be broadly explained by the quantum laws present in the original singularity.

Aquinas thought that even simple forms of life could be spontaneously generated from inanimate matter by the energy of the sun.⁸⁴ Yet at each step toward complexity, the dominance of chance increases and the adequacy of this kind of explanation lessens. To explain this history, so largely due to unique, chance events, it is imperative to seek the source of the *information* ultimately embodied in complex substances.

I do not doubt that as chemists can now produce relatively complex organic molecules that have not been ever observed to occur naturally, so someday the chemists may be able to produce living organisms. To do so, however, they will need, but do not yet possess, the requisite amount of information to guide them in applying the four fundamental forces in just the right way and the right sequence. Contrary to Aquinas, Louis Pasteur showed that, under present terrestrial conditions, spontaneous generation of life never occurs. According to quantum theory, the outcome of natural processes is predictable only in a range of probabilities. For Aristotle also, the laws of material substances are always subject to chance interference, and hence hold only *in pluribus*. Hence to produce a complex substance there must be an agent having information proportionate to that complexity. This can be an agent who is conscientiously intelligent, like the chemist in his laboratory, a bird building its nest by instinct, or an inanimate agent with a natural force that is predetermined to regular effects. Where then is the agent intrinsic to the universe as a total system that has the information required to produce life and the complex human brain used by human intelligence?

The Darwinian answer, of course, is that the environment and its “natural selection” of chance mutations supplied this information that guided living things to evolve toward complexity.⁸⁵ Certainly Darwin’s explanatory principle, “the

survival of the fittest,” has been extremely fruitful for the investigation of the fact of biological evolution; but that it is the whole explanation, or even the principal explanation, remains, after a century and a half of investigation, still uncertain. Its general acceptance by the scientific community seems due chiefly to the lack of anything better.

Darwinism only moves the source of the required information from the organisms to the terrestrial environment that supports and selects the evolution of life. Scientists have shown that the so-called anthropic cosmological principle makes clear how extremely improbable has been the sequence of environmental events required to select our human genome programmed to produce the human brain.⁸⁶ Consequently a “creationist” pseudo-science has gained popularity.

Scientists have proposed various answers to this dilemma. A fantastic one is to posit the existence of an infinite number of universes and then claim that we “just happen” to be in the one in which intelligent life has emerged by chance. Steven Weinberg⁸⁷ and others hope for an Ultimate Theory of Everything for a universe that develops according to a mathematical formula requiring no initial conditions. That would mean, however, that the universe is not contingent but necessary, and such a necessary being is what all understand as God! Teilhard de Chardin and others also have supposed that there is a “law of evolution.” But this would seem to demand (in modern scientific terms) that the information required to produce life was already present with the Big Bang. On the contrary, current views of evolution are not lawlike but historical, *post factum* explanations of the form “if in this situation these forces were acting in a certain way, then this would explain why this followed.” Evolutionary explanations so far have not provided deterministic predictions. Thus a very knowledgeable although controversial writer in the field, Stephen Jay Gould, is quite frank in acknowledging that evolution is, in the main, like history, a matter of *chance* that might have almost any result we care to imagine.⁸⁸ No wonder, then, that “Intelligent Design Theories” are being widely proposed, although, since they leave the matter in the hands of the Creator, they pertain to

Metascience rather than to natural science.⁸⁹

The question remains open because Darwinism supposes that environmental changes will favor this advance in complexity. Since, however, the environmental changes also are a sequence of chance events, it is less probable that natural selection will favor complexity than that it will destroy complex organisms and favor simpler ones, or extinguish life altogether.

Somewhat more plausible is the concept of “self-organization” or “the spontaneous emergence of order” favored by Stuart Kauffman⁹⁰ and others. Chance can produce order, as every gambler knows, but only briefly. A sequence of cards can be dealt, or a sequence of dice thrown, that have a desired order; but from this winning sequence no prediction can be made about subsequent deals or throws. Kauffman supposes that natural selection will guarantee that a sequence of chance mutations leading to a more ordered complexity of an organism will be preserved (as one of Gell-Mann’s “frozen accidents”) and that disorganizing sequences will be eliminated. “Selforganization,” as he explains it, is based on the fact that proteins are able to “selfcatalyze” their interactions. Moreover, these interactions rapidly multiply when the number of different kinds of intermingled proteins reaches a critical point. Hence Kauffman believes that such a complex chain of interacting proteins may have reached homeostasis and began to reproduce itself as simple living cells. While this hypothesis helps to explain how the interactions within an organism are facilitated, it does not explain how the unity of an organism can originate in the facilitation of an increasing number of interactions that might simply result in disintegration of the complex.

Nor again has this problem of explaining the unity of a living organism been solved by “chaos theory,” as some popular writers suggest.⁹¹ In fact, this interesting theory exacerbates the problem, since it is based on observations that show how very small differences in the initial conditions of a change can make an enormous difference in its ultimate outcome. It is also true, however, that chaos theory has shown that the random repetition of certain random processes often uncovers an unsuspected

order. For example, swings of a pendulum when carefully observed are actually random in their length and timing, yet they converge on an average that makes it possible for a pendulum clock to keep time.

Chaos theory, therefore, does not mean that order can arise spontaneously out of absolute disorder, as the term “chaos” might seem to imply, but only that random repetition of an event can make manifest some hidden determinism. The random character of a pendulum’s swings results from chance currents in the air and other factors that cause minute differences in the initial conditions of each swing. Yet the averaging of the swings and their eventual coming to rest results from the deterministic law of gravity in conjunction with the probabilistic law of entropy.

Thus, surprisingly, the fact that the information required to produce the complexity of the human brain cannot be scientifically located in the original singularity or in any of the subsequent states of the universe means that modern science is *more* favorable to Aristotle’s argument for the existence of immaterial spirits than was his own astronomy! Such spirits, like a chemist in a laboratory producing by a complicated series of natural processes a complex chemical never found in nature, may have the information necessary to guide evolution up to the production of a human brain as a fit instrument of a spiritual intelligence, somewhat like their own but not quite so good.

Some might be tempted to escape these puzzles by positing the existence of a *single* created spirit, like the Platonic Demiurge,⁹² who would not be a creator but a World Soul that possesses all the needed information to guide cosmic evolution. But pure contingent spirits, if they exist, are finite intelligences that, unlike God, are not omniscient. Consequently, to posit a single Demiurge is far less likely than the existence of a society of spirits such as we described in chapter 6, who, though they cannot create anything *ex nihilo*, carry out God’s plan for the development of his creation according to his purposes.

Thus in every problem we deal with, the explanatory power of formal causality must be kept in mind. No merely material form can exist without its correlative material cause. Nor can created spirits, even if they are pure forms, exist without the actualizing by

an efficient cause. Thus only the First Cause is identical with its existence. To speak of God as a “form,” however, is improper, since the First Cause is not the Soul of the Universe, as monists and pantheists suppose, but is utterly other than any potency to which it would be correlative, and is Existence Itself.

Moreover, contingent (potential) beings cannot enter into existence except through an efficient cause whose form is at least as perfect as what it produces. As for final causality (teleonomy), we will see in the next chapter how efficient and formal causes necessarily imply final causality. Thus Metascience is insistent that all four causes are needed to understand Being; yet formal causality, because it speaks of act, and act is prior to potency, has a certain eminence in all our knowledge. We know things primarily as they are actual, that is, as they have form; and the most perfect form, the form of forms, is existential act. Thus, as Transcendental Unity is the property of Being by which every kind of being in its own special way (in whatever way it has “parts,” and thus is also somehow “many”) has an intrinsic formal order, this ontological “truth” makes that formal order intelligible in its own way and thus renders it accessible to us as expressible in properly *true* propositions. The true appears to us immediately when this intelligibility is connatural to our human manner of knowing, or mediately through reasoning, first dialectically and sometimes (in fortunate cases) scientifically. The human intelligence is open to all truth, but is the weakest of all existing kinds of intelligence. Because it depends for all its information on its body, its power to explore the universe and its First Cause is modest indeed. Yet, as Aristotle says, “A little knowledge of divine things is of more worth than much knowledge of lesser things.”

Truth in the Special Sciences

A. SCIENTIFIC LOGIC

After considering the general metascientific problem of knowing in which I pointed out that each special science has its own proper criteria of truth, we can now proceed to discuss how Metascience compares and correlates the results of these special sciences from the viewpoint of metascientific Being under the aspect of truth. Only if this problem is addressed is an effective interdisciplinarity possible. Since it is the discipline of *logic* that has a general concern for the true and the false, logic will be considered first. I will begin with Aristotle's conception of logic and then consider modern developments.

1. Aristotelian Logic

a. The Kinds of Logic

Before considering how Metascience reflects on logic and relates it in an interdisciplinary manner to the other sciences, it is necessary to sketch the fundamentals of logic as Aristotle developed it in his collection of works called the *Organon* (Greek for "instrument"). The special logic of natural science has already been discussed at considerable length in chapter 3, so that here only more general logical topics need be considered. Aristotle's logic is of two types: that which is an instrument of the sciences, today usually called "formal logic," and the second that has other uses, today usually called "informal logic."

The Scholastics understood by "formal logic" a systematic presentation of logic as a science in itself, as found in Aristotle's *Prior Analytics*, and distinguished this from a "material logic," as found in his *Posterior Analytics*, which deals with the application of formal logic to its use in different sciences.¹ Aristotle himself, however, does not call either of these forms of logic a "science," since he reserves that term for disciplines directly concerned with reality, while logic deals only with mind-dependent relations. Yet the scholastic view, that logic is a science in its own right, can be in a certain sense defended, since it demonstrates that the rules of logic are consistent and necessary for valid thinking. Logic can also be called an "art" (as they did), since it is used to produce good arguments; but this is only an analogical use of the term "art," which properly designates skill in producing something extramental, while logic only produces mental relations.

Aristotle's informal logic is explained in the *Topics* on dialectical or probable reasoning, the *De Sophisticis Elenchis* on fallacious reasoning, the *Poetics* on what is called today "literary criticism," and the *Rhetoric* (often today called "communications") on the art of persuasion. To these can also be added what the ancients called "grammar" and we today call "linguistics" and "semantics." The term "hermeneutics" (from the Greek messenger god Hermes), or the art of interpreting any form of the expression of meaning or communication, is currently used to cover the entire field of logic taken in this broad, Aristotelian sense. Semiotics, or the theory of signs, has even a broader range since besides linguistic signs there are also natural signs; for example, effects are signs of their causes, since a sign is something through which another thing is known, and from effects we can infer the existence and something of the nature of their causes. Yet semiotics, hermeneutics, semantics, and linguistics can be formally reduced either to logic or to Metascience. They reduce to Metascience because they deal with the real relations of the knower to the known (epistemology, a task of Metascience as it deals with the transcendental Truth). But these disciplines also reduce to the mental formulation of the truths (and their linguistic expression) that we know through signs and hence to logic that deals with mind-dependent relations.

Poetics and rhetoric have an intrinsically ethical aspect and will be treated in the next chapter, which concerns values. Dialectics and the closely related critique of faulty reasoning serve broad purposes but

have special roles as auxiliaries for scientific logic in the sciences, and more will be said about them later in this chapter. The same is true of semiotics, but semiotics deals not only with mental signs but also with natural signs. In later Hellenistic and medieval education these studies were called the *Trivium* (three ways) and reduced to the “liberal arts” of logic, rhetoric, and grammar.²

b. The Scientific Syllogism

Our first concern here, however, is *scientific* logic, whose aim is principally the distinction between truth and falsity in the sciences. Logical truth, as shown in the last chapter, is the truth of propositions by which what we assert to exist conforms to what really exists. Aristotle, in the *Organon*, proceeds by analyzing the structure of a science but does not indicate whether he had some particular science in mind. Commonly it is supposed that he was thinking first of mathematics, since its logical structure, as later exemplified in Euclid’s *Elements*, is especially clear. Yet, in view of his theory of the order of the sciences, it seems more probable that he began with a successful theorem from natural science such as his demonstration in the *Physics* that all changeable things have the property of quantity.³ To show its logical form it can be stated thus:

A. Major Premise:

<i>Middle Term</i>	<i>Predicate of Conclusion</i>
A substance approaching a place but not yet actually there	is divided into at least two parts.

B. Minor Premise:

<i>Subject of Conclusion</i>	<i>Middle Term</i>
Every substance actually in motion	is a substance approaching a place but not yet actually there.

C. Conclusion:

<i>Subject</i>	<i>Predicate</i>
Every substance actually in motion	is divided into at least two parts

In ordinary language such an argument might be stated as “Every substance actually in motion is divided into at least two parts, *because* it is approaching a certain place but is not yet actually there.” The *because* clause states the middle term, and thus exemplifies why Aristotle says that demonstrations are through causes (in this case, through the efficient cause, since it describes an action, namely, motion). It should be noted also that in ordinary discourse, explicit syllogisms are not often used, but are replaced by statements of the form “C is A, *because* of B” in which the “because” supplies the middle term B. In such statements the major premise “B is A” and the minor premise “C is B” are implicit as obvious. For example, when one says, “Mr. Smith has rights, because he is human,” one implies that “All humans have rights” and also that “Mr. Smith is human” are obviously true.

When this demonstration is analyzed, as in the diagram, it is clear that the ordinary language statement with its “because” clause is implicitly two propositions concluding to a third. The reason that the major premise has that label is that its predicate is the predicate of the conclusion, while the subject of the minor premise is the subject of the conclusion. The middle term, which is both the subject of the major premise and the predicate of the minor premise, yet does not occur in the conclusion, obviously is the factor that links the two premises with each other. Although the middle term does not appear in the conclusion, it provides the cause that unites the predicate to the subject of that conclusion.

Since “science is knowledge through causes,” such a demonstration may either proceed *a priori* (from what is prior, i.e., from cause to effect) or *a posteriori* (from what is posterior, i.e., from effect to cause). In the former case, scientific question 4, namely, “Why does A have this property?” (*propter quid*) is answered, while in the latter case only the answer to the first scientific question, namely, “Does it exist?” (*quia*), or, in other words, that it is a “fact,” is provided. The Aristotelian conception of science is often accused, as we have had repeated occasion to mention, of using excessively *deductive* or a *priori* reasoning, instead of *inductive* reasoning from experience. But this would be contrary to Aristotle’s whole epistemology that is intended always to root science, even mathematical science, in sensibly observed objects. For Aristotle, deductive reasoning is only the last step in scientific research, and is used not to discover new truth but to systematize truths already achieved by showing that all phenomena are to be understood in terms of their causes. He does not engage in a *priori* deduction until he has first established the fact by observation and then the cause of the fact by reasoning from facts to causes (*a posteriori*).

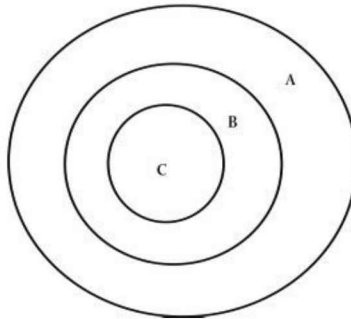
The art of reasoning scientifically consists primarily in the discovery of middle terms, that is, causes that explain the effects stated in the conclusions of a syllogistic demonstration of the kind illustrated above. The

basic unit of reasoning is called a *syllogism* (from the Greek for “calculation,” itself etymologically *syn-logos*, “a word that unites,” that is, the middle term). Its simplest form is the *categorical* syllogism in which the two premises are either both affirmative, or only one is positive while the other is negative, such as “Humans are rational” and “Humans are not trees.” The example demonstration given above is said to be a “universal, affirmative syllogism in the form Barbara,” a mnemonic word in which the three a’s (bArbArA) stand for three universal affirmative propositions. The corresponding universal negative proposition is given the name “Celarent” (CEIAREnt, in which the two E’s stand for universal negative propositions, the A for a universal positive proposition).

Barbara must be valid, because if C (the predicate of the major premise and of the conclusion) *is not* included in A (the subject of the conclusion), yet C is said to be included in the middle term B that *is* included in A, the principle of non-contradiction would be violated. If Barbara is valid, then Celarent must also be valid because if B includes C, but A does *not* include C, then A cannot include B. This is illustrated in diagram 6.

The validity of ten other forms of the syllogism can then be demonstrated to be valid also by reduction to Barbara. To these twelve Galen added four more valid forms, but these are of little importance in actual use. The forms other than Barbara and Celarent include premises that are particular, such as “Some A is B” or “Some A is not B,” that are important in disciplines like history that deal with particulars. Because science, however, is of the universal, the present analysis can pass over all these other forms.

Diagram 6.
Validity of Argument in Barbara and Celarent Syllogisms



Thus a syllogism as the simple unit of scientific reasoning is made up of three propositions, and each of these propositions is composed of a subject and a predicate. The fundamental property of such a proposition is that it is either true or false or *meaningless*. We have seen that the truth of the conclusion of a syllogism is caused by the truth of both premises, although it can be true even when the reasoning by which it has been reached is false. Yet a false conclusion can never be deduced from true premises if the rules of logic are followed.

c. Premises, Their Terms, and Definitions

Propositions are analyzed into their terms, a subject and a predicate, and their truth depends on the relation between these two terms. In the demonstration above it would be false to say, “A substance actually in motion is resting in its place,” because “resting in its place” is contradictory to “a substance actually in motion.” This relation of predication clarifies the concept of the subject in its concrete existence as real; for example, to say “Water is necessary for life” makes explicit some aspect of water as by observation it is known to exist. Hence, to determine the truth of a proposition, it is necessary to *define* its two terms to see if they are contradictory, or at least agree in some respect, though the definition of the subject will be more generic and the defining predicate more specific. Hence the art of logic must also include a method of defining and distinguishing terms.⁴ In discussing the categories in chapter 3, it was shown that a thing is defined by classifying it in one of ten categories according to the difference of its species from the other species in the same proximate genus. For example, the human being is defined as that species of ape that can think abstractly. Yet besides these categorial and univocal terms, there are, as we have seen, analogical terms that transcend the categories and a single univocal meaning.

Furthermore, it does not suffice, as many modern philosophers suppose, for a scientific definition to be merely *nominal*, that is, only a definition of the way a word is used, either commonly or by the user’s

“stipulation.” As was said to Alice:

“When I use a word,” Humpty Dumpty said in rather a scornful tone, “it means just what I choose it to mean—neither more nor less.” “The question is,” said Alice, “whether you *can* make words mean so many different things.” “The question is,” said Humpty Dumpty, “which is to be master—that’s all.”⁵

To be of scientific use, a *real* definition based on empirical observation and intellectual analysis is necessary. Moreover, it should be not only logically constructed by classifying what is to be defined by its genus and species, as just described, but, for scientific purposes, it should also be more exactly stated in terms of the four causes (formal, material, efficient, and final) that explain why the object really *exists* as the kind of thing it is. Such a definition of a panda, for example, would describe the anatomy or parts of its body (material cause), the structure and function of these parts (formal cause), the male and female pandas that conceived it (conjoint efficient causes), the activity of the healthy panda as it develops itself and continues its adult life (intrinsic final cause), and contributes to the ecology and to the evolution and support of intelligent life (extrinsic final cause).

Such scientific definitions state the *being* of the object known, although only the kind of being proper to a certain science. Thus the way natural objects, mathematical objects, and ethical objects exist or have being is different, and when called by the same name these names can be only analogical in their manner of signifying. Note that although the subject of a proposition is ordinarily known only vaguely (since the reason why we predicate something of a subject is to define it more exactly), yet its *existence* must be known if it is to receive a *real* definition or description. To say, “This thing is a monkey,” means that “this thing” is known to exist and that its predicate supplies information about what it is.

Information cannot be given about what does not exist but only about what at least has existed or virtually exists in some cause as a possible effect of that cause (thus we can assert that a heavy body on a string will fall if the string breaks). The claim of many philosophers to talk meaningfully about the “merely possible,” as I have frequently emphasized in the foregoing chapters, would be rejected by Aristotle for the reason that we only know what is possible from what is actual. How can we be sure that the concept that is *claimed* to be possible or *considered* to be possible does not contain some implicit contradiction that would make it, in reality, impossible? What seems possible to us often so seems because of our ignorance rather than because of our knowledge! If one tried to define “a square circle,” its contradictory character and hence its impossibility would promptly become evident. Yet of course one might also try to define a “centaur” without being sure that a half-horse, half-man is a contradiction in terms, because of an insufficient knowledge of what it is to be a horse or a man. Yet such ignorance of whether something is impossible also implies ignorance of whether it is possible. To define a centaur as a creature half-man, half-horse can only be a nominal definition of a word, not a real definition of a being, and as such has no scientific value.

A definition (defining clause, such as “rational animal”) is a predicate term, not a proposition, and hence is not as such true or false, since it makes no assertion about what exists and what does not. Hence a definition is known to be true only in an act of judgment in which it is predicated of a subject under circumstances that warrant this predication by direct or indirect empirical evidence. This can be the case only when the subject itself is known empirically to exist (answer to scientific question 1) and the predicate makes clear (answer to question 2) what is only implicit and vague in that empirical knowledge of it as existent “fact.” If one says that “water is H₂O,” this definition H₂O in terms of the material cause is true, but we know it to be true only because we can empirically identify certain typical samples of “water” with the information gained by research that shows us this is in fact their *essential* composition.

Predication may also be *accidental*, and then it either predicates a property of the subject or a mere accident. Such mere accidents of a subject that have resulted from chance are outside the proper scope of science. If it is the predication of a property (question 3), the truth of the proposition is initially only *factual* (*quia*), that is, known to be true but without the cause or reason for its truth being yet evident. When a number of such facts are known about the subject, it may become evident to intelligence that the real relations between these facts signify that they are caused by a single essence, and that hence these predicates are properties, not just pure accidents.

Thus, for Aristotelian logic, though “science is of the universal,” the issue of *universality* is secondary to the issue of *essential* definition, and the famous controversies over Realism and Nominalism are often badly formulated. What is required for a true judgment, in which a definition of a subject can be predicated of that subject, or of its subdivisions, is not that its definition be universal but that it be *essential*, that is, one that expresses a real, not a merely nominal, definition of that subject. A zoologist meeting a single animal can sometimes come to the intuitive judgment that this is a new species, since from his knowledge of taxonomy he recognizes that this animal has some different properties that distinguish it from other

species in the category of substances. Of course it might occur to him that these “properties” are not really properties at all. It might be that this single specimen has been painted a color that is not a true property, or it may lack wings but only because they have been clipped. Yet careful examination can reassure him that these odd features are not true essential differences but pure accidents, or the reverse.

In seeking assurance that the special traits of a specimen indicate a truly essential difference in the substance, he may again be puzzled, but it is not beyond possibility that the close relationship among these traits may make it entirely certain that they reveal the unique character of a new species. Thus, such difficulties common to all research are not proof that genuine insight into the essential character of an object cannot at least sometimes be gathered from a single specimen. Many examples in the history of science show that in fact many discoveries of this sort have been made, such as the identification of extinct species of animals from single fossils.

d. Univocal, Equivocal, Metaphorical, and Analogical Terms

I noted in chapter 5 that the term “Being” as it designates the subject of Metascience applies to or designates many kinds of being that have nothing strictly in common. Although they all exist (have *esse*), we must also acknowledge that, because their natures are so different, their correlative *ways* of existing are more different than alike. In any science we seek a terminology that limits one name to one precise concept, so that we always know just what we are talking about. Yet, because of the inadequacy both of human language to thought and of human thought to reality, this univocal way of speaking is not always possible. (The various ways of speaking, discussed below, are also illustrated in diagram 7.) The human mind has many more concepts than human language provides to express them. Consequently, a word used originally to signify one kind of thing is often transferred to signify other things. Furthermore, much of our knowledge is indirect, in that we must answer new questions in terms of what we already know better. Thus newly discovered realities are given names derived from the previously and better known things related to them and through which they were discovered. David B. Burrell has pointed out that this constant shift in language reflects the ongoing human search for truth as it moves from one insight to another.⁶

Unfortunately, neither Aristotle nor Aquinas dealt systematically with the question of ambiguous naming. Their disciples have been forced to synthesize their masters’ scattered statements and have not agreed on how this is best to be done. Ralph McInerny has shown how confused the discussion of the “analogy of names” as distinguished from the “analogy of being” became in the Thomistic tradition.⁷ This confusion was in major part due to the fact that the great commentator on Aquinas’s works, Thomas de Vio, Cardinal Cajetan, in his *De Nominum Analogia* misread certain of these texts of St. Thomas on this topic. Thus McInerny insists that, if we are to avoid such confusion, it is essential to keep distinct the linguistic and *logical* question of how words are used univocally, equivocally, metaphorically, or analogically, from the *ontological* question of how the *realities* named by such texts are related to each other. Thus, for example, the term “analogy” when applied to the use of names in linguistics, and when applied to the relations of the things that are studied in the real sciences, is itself analogical!

For the sake of precision every science develops a technical terminology. It may succeed in establishing univocal terms, that is, terms that have one, unambiguous meaning, instead of equivocal or ambiguous terms with more than one accepted meaning. A glance at a dictionary will show that most words have several definitions and are thus equivocal. We have seen, however, in chapter 3 that it is possible in natural science to classify the things we observe by genus and species in the category of substance, and also to classify the various properties of these different kinds of substance in another nine categories. A generic term applies to its entire species univocally, and a specific term applies univocally to all the members of that species. Thus “animal” applies to oysters and ducks in exactly the same sense, in spite of the great differences between these species. Similarly, all human individuals belong to one species and are “human” in the same way. It was noted, however, that natural science also shows that the nine categories of accidents are too different to be reduced to a univocal genus, and that all of them depend for their existence on substances and hence cannot be reduced univocally to the category of substances that have independent existence.

Moreover, it was noted that the post-predicaments *oppositio*, *prior*, *simul*, *motus*, and *habere* (opposite, prior, “together with,” “motion or change,” and “to have,” e.g., to have a property), including this very distinction between univocal and equivocal terms, have meanings so different that they cannot be reduced to univocation. Thus, as a science advances, it is forced more and more to use ambiguous terms. In chapter 7 it was shown that this problem also affects the mathematician. The definitions of a line, a circle, or a solid are univocal, as are the meanings of 1, 2, 3, and so on, but when in analytic geometry lines are defined by functional relations between pairs of numbers, and when in arithmetic the notion of a “negative number” is introduced, ambiguity in terminology begins.

When a word is used in more than one unrelated sense, we encounter *pure equivocation*. Thus, for example, according to a dictionary, the written word "grate" has the unrelated meanings of "to rub two things together" and "a frame of metal bars." Moreover the spoken words "grate" and "great" are the same in sound, but their meanings are entirely unrelated. Such pure equivocations in a language arise simply from chance and are of little significance for critical thought. Since we come to know new things through more common experiences, human language tends to give new meanings to words based on the relation of something better known to something less well known. The Greeks called words used in this derivative manner *metaphors* (Greek for "transferred"), and today the term "metaphor" is often used in this very broad sense for any equivocation that is less ambiguous than pure equivocation. In this broad sense, however, ambiguous usage can be distinguished into two types: metaphor (in a narrow sense) and analogy.⁸

The metaphorical use of a word gives it several but *related* or *similar* senses without concern for the precise kind of relation or similarity between them. This relation is sometimes quite vague, as when an adolescent uses the term "cool" for both a kind of music and a kind of haircut.⁹ While this is sometimes due to linguistic carelessness or lack of an adult vocabulary, metaphor can be purposeful. Thus Aristotle noted that a good poet is one who uses metaphorical language so as to stimulate the imagination to relate images and concepts in new and interesting ways through unexpected resemblances.¹⁰ For example, in Song of Songs 2:1, the Bride sings, "I am the rose of Sharon, and the lily of the valley," thus raising images of an oriental garden that suggest her rare beauty. Similarly, a rhetorician draws the attention of his audience through vivid, metaphorical language, as when Lincoln in the Gettysburg Address speaks of the United States as "conceived in liberty and dedicated to the proposition that all men are created equal," calling up biblical images of the conception of Christ and being offered up in the Temple. In both arts, metaphor is especially used to give something the connotation of being desirable or undesirable, as the metaphor in Song of Songs pictures the desirability of the bride, while to have called her a "cow" or a "bitch" would have made her seem to be someone to be avoided. Similar to a metaphor is a *symbol*, which can be not only a word but also an object or an action and is characterized by the richness of the many images and ideas it arouses (polyvalency).

Aristotle used the Greek term *analogia* in the ontological sense, and not with regard to linguistic usage, for which he uses other terms entirely. The Latins, including Aquinas, however, distinguished analogy as a linguistic usage from metaphor, but in many cases this distinction is not very clear. Analogy more closely approximates univocity, just as metaphor in the narrow sense approaches pure equivocity, because analogies are based on more precise relations between the different senses of a word than is metaphor. This is why so much confusion has arisen between linguistic and ontological analogy, since when words are used analogically in critical thought it becomes necessary to define more precisely the nature of the real (ontological) relations between diverse things to which a common name is given.¹¹

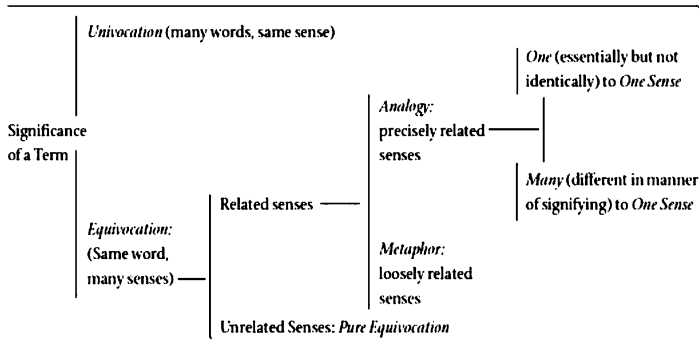
One-to-one analogy transfers a word from its proper use for A to name something else B similar enough to A so that the knowledge of A helps to understand B in a way useful for critical thought, yet is not similar enough to B for A and B to be reduced as species to a single univocal genus. This kind of analogy generally arises from knowing a cause through its effects, or vice versa. While in some cases a cause produces an effect that is essentially the same as itself (a hot thing heats other things to the same temperature; organisms beget their kind), it may produce different effects, no one of which exhausts its possibilities (the sun causes many kinds of effects, on earth). The cause referred to may be any one of the four kinds of causes (material, formal, efficient, final). For example, a light wave is analogous to a water wave, because both are efficient causes of vibrations though in different kinds of media, while a beam of light is analogous to a bullet in that both are directional (final cause).

Many-to-one analogy differs from one-to-one only in that it transfers a word from its proper use for A to several other kinds of things, B, C, D, and so on, that have different relations to A but all share that same name. For example, the term "wave" that properly refers to a movement of water has been extended to mean the shape of hair, the gesture of a hand, or a trend (such as "the wave of the future"), which should probably be classed as metaphors, but also for sound waves, light waves, gravity waves, and probability waves, which are by no means species of water waves, yet have certain mathematical similarities thereto that prove useful in physics.

Cajetan tried to distinguish between analogies based on a single relation (proportion) from those based on a comparison of the relations between two pairs of terms, that is, a similarity of one relation to another (proportionality). But this is not an essential difference, since any analogy can be displayed as a proportionality. Thus, the one-to-one analogy of an effect to its cause can be displayed as a proportionality—the cause A is to the perfection B that it possesses, as the effect C is to the perfection D it possesses—thus comparing the relation X between A and B to the relation Y between C and D as similar yet different. Again, a many-to-one analogy can also be displayed as a set of such proportionalities. Finally, even a metaphor in the strict sense can be displayed as a proportionality: "As an advancing water wave is to water, so an advancing cultural wave is to culture." Thus, to interpret any metaphor or analogy, we must

always seek to determine how the transferred uses are related to the one proper use of the word. Aquinas speaks of this as the *res significata* (the proper sense of the word) and the differences in *modus significandi* (the relation of similarity that each of its various applications have to this one proper sense).¹²

Diagram 7.
Significance of Terms



It is often objected that demonstrations using analogical terms are invalid because a valid syllogism must have only three terms. Hence if an analogical term—that is, one having more than one meaning—occurs in a syllogism, that syllogism has more than three terms and becomes an invalid argument. Thus it is sometimes objected to the demonstration of the Unmoved Mover in chapter 4 that it is based on the principle of causality yet uses the term “cause” in two different senses, since the immaterial First Cause Mover whose existence it claims to demonstrate cannot be a cause in the same way that a material substance is a cause. The Creator must have an utterly different relation to creatures than created causes have to their effects.

This objection holds only if the two uses of “cause” in the demonstrations are *purely* equivocal or *merely* metaphorical. But they are in fact analogical and based on an important similarity that helps us in knowing one thing through another better known thing. Of course, the fact that they are still more dissimilar than similar must be also acknowledged. The Unmoved Mover causes motion without being moved, while the movers we can observe must always be themselves moved if they are to move anything else. This is a greater difference in the two ways of causing than there is any similarity between them. Even so there is a definite relation between the two types of causality, namely, that both produce an observed effect, even though in utterly different ways. The force of the demonstration of the existence of the First Cause is to show that moved movers cannot move anything without such a First Cause, because without its causality there would be an infinite regress in moved movers, and this would be a violation of the principle of non-contradiction.

Such analogical arguments are common in natural science. For example, microscopic particles behave very differently than do macroscopic objects, and hence the two kinds of behavior must be caused in very different ways. Yet, because microscopic particles have macroscopic effects, we are sure that their causality has at least some similarities to those macroscopic causes that we can observe. Thus natural science, although it strives for univocity in its terms, also makes a cautious and unavoidable use of analogical arguments in order to arrive at a deep understanding of nature.

e. Judgment, Dialectics, and Scientific Demonstration

Once an adequate definition of some object of scientific exploration has been achieved, this definition can be predicated of that subject by an act of judgment. Only in judgment is truth in the strict sense attained.¹³ In judgments, the copula “is,” since it signifies “to be” and since “being” is of many kinds, also can have different senses.¹⁴ It can signify a merely *nominal* relation between the subject and predicate, as when the dictionary says, “A centaur is a creature half-man and half-horse.” This is true of the usage of the word “centaur,” but false if understood to mean that centaurs really exist. As already indicated, the copula can also signify a *real* relation between a really existing subject and its essence (essential predication: e.g., “water *is* H₂O”); or it may signify its accidents (accidental predication), either its properties (e.g., “water is transparent to light”) or its mere accidents (e.g., “this water is cold”). Finally, the copula can be used without an expressed predicate, as when we say, “God is,” meaning “God is an existent,” or simply “God exists.” Moreover, God and creatures “are” in different ways, as different kinds of creatures vary in their “to

be,” since “to be” as the act of an essence is proportionate to its correlative essence as form is to its correlative matter.

In declaring the truth of a proposition, the explicitation of the subject term by the predicate term and the exact character of this explicitation as nominal or real (or something else) must be made clear. Truth and falsehood, therefore, are properties of such propositions made up of a subject and predicate joined by a copula that must usually be taken to indicate that the subject is both real and real in the specific way indicated by the predicate. Later logicians were also to propose “many valued logics” in which propositions could have degrees of truth. Aristotle recognized that propositions not only can be simply true but may have *modal qualifications*, which indicate that a proposition is only probable (with a greater or lesser degree of probability), necessarily true (i.e., true under all circumstances), or contingently true (true in certain designated cases). A discipline properly called a “science” must contain at least some necessarily true conclusions. If it makes only probable statements it remains dialectics or research, not science in a strict sense.¹⁵ Any science begins with first principles that are accepted as true but not demonstrated in the science itself. Some of these principles are the rules of logic, but the chief principles are the *axioms* of the science that are used to answer scientific questions 1 and 2, as we have seen in chapter 3.

Obviously, therefore, these first principles specific to a given science must be known to be true since they cannot be *directly* proved by that science. This does not mean, however, that for Aristotle these principles are *a priori* either in the way Hume spoke of so-called analytic principles, such as “A is A,” or in the way Kant claimed for “synthetic *a priori*” principles. For Aristotelians, all first principles are somehow *posteriori*, that is, are immediately or ultimately based on sense experience. But they are not known *a posteriori* in the way Hume claimed, since they are known not merely from sense experience but also from an intellectual analysis of that experience. Hence it is misleading to say, as is often done, that the first principles of a science are “self-evident,” since that amounts to accepting Hume’s and Kant’s views that they are analytic or synthetic *a priori* independently of experience (since they condition the possibility of our having any experience at all).

Even in what Aristotle calls an *a priori* syllogistic demonstration, in which the existence of an effect is proved from premises that assert the existence of the cause of that effect, these premises themselves are not known *a priori* but either have been previously demonstrated to be true in terms of the first principles of the science or are themselves such first principles. In the latter case they are known by intuition based on an analysis of sensory experience. They are not self-evident simply from the terms, since these terms may have a merely nominal meaning, but are evident from some real experience when subjected to intellectual analysis. For Aristotle, the first principle of natural science is “changeable things are composed of matter and form.” This is not known by a merely nominal understanding of how the terms “changeable things” and “composed of matter and form” are used in speech, but by a knowledge derived from sensory experience and intellectual analysis of really existing, actually experienced objects. Our intelligence tells us that a thing could not change if it were pure act (form), but only if it also has a potentiality (matter) for change.¹⁶

In more difficult cases, analytic insight can only be achieved by the use of the kind of logic called *dialectic*, which corresponds to what we today call “research.” In researching a given field, one gathers such data as appears relevant in view of preliminary hypotheses about that kind of object. Aristotle called such a collection of raw data a *historia* (Greek for “inquiry,” or “research”), as in his work, the *History of Animals*.¹⁷ Our English word “history,” of course, has a different meaning; but the relation between the two senses of the word is that both begin with a collection of facts.

Once raw data has been gathered or, rather, even as it is being gathered, it must be roughly classified, using schemas that need not be proper to that special field but that have a broad, analogical character, such as “the whole is greater than the parts” or “effects resemble their causes.” Hypothetical reasoning is used to consider alternative models of the reality under study, arguing for and against each possibility, to eliminate obviously false models. This process may finally lead to a sufficient clarification of the data. Then the object can be exactly classified and defined, and thus the truth of a statement that identifies it with its definition can be intuitively seen to be certainly true. Thus definitions and the principles in which they occur are not as such known by an *inductive* demonstration, since they are presupposed to any demonstration. Inductive arguments (abductions) can only be used dialectically to prepare such insights. Hence the “problem of induction,” so controverted ever since Francis Bacon pleaded for a natural science based on “induction,” is only of minor importance for an Aristotelian logic of science.¹⁸ Essences are not found by argument, but by observations and dialectics aimed at eliminating irrelevant, accidental features of the objects under scrutiny. Thus the Aristotelian approach is truly *phenomenological*, although, as we have previously noted, it eschews Husserl’s bracketing of existence, because such a detachment of an “essence” from its correlative existence inevitably leads to idealism.¹⁹

That the intelligence can sometimes arrive at such direct insights is taken by Aristotle as certainly verified by the fact of scientific successes already achieved in his time, such as the explanation of eclipses.

He makes no claim that such intuitions are *fully adequate* to the reality, because there is always more to be learned about any kind of object in the real world and our knowing powers are limited. What he claims is that *some* certain truths have been achieved that can form the basis of truly scientific reasoning. Hence, to accept the notion of analytic *a priori* truths, even in the science of logic, would lead disastrously back into Platonic Idealism. The only propositions that can be said to be analytically true are tautologies, like *A is A*, which convey no information and hence are of no value in a science of the real.

That Aristotle was true to his convictions in this matter is evident from his works, in which the principles are constantly prefaced by an extensive dialectic used to ground them. This is true also of Aquinas's work, but the fact that he often assumes that his reader has studied Aristotle, and has already seen how this groundwork has been so carefully and empirically laid, has often led Neo-scholastics to present Thomism as a deductive system based on arbitrary or merely stipulated definitions.

Note again, as I have many times already cautioned, that this need of direct evidence holds not only for the very first generic principles of a science but for every step of descent from genus to subgenera to species. The subdivisions of a genus are only potentially known in knowing the genus. Hence, if we are to know that a thing is an animal, we must have evidence that it is not just a body, but also a live body; and to know it is a vertebrate we must have evidence that it is an animal with a backbone. This evidence must be directly known from sensory observation and intellectual analysis of observations: it cannot be "deduced" from knowing the genus "animal." Thus all the sciences must keep in constant contact with deepening experience. Even Metascience, because its experiential contact is mediated through the special sciences, deepens its concepts and understanding of principles as the special sciences progress.

f. The Distinction of Metascience from Logic

Given these basic elements of Aristotelian demonstrative and dialectical logic, what problems do they raise for Metascience? The following important issues immediately present themselves: (1) How can logic be about mind-dependent relations, and yet be of value to science that is about mind-independent being? (2) How can the controversy between Realism and Nominalism be resolved? (3) What is the relation of logic to psychology? (4) Does logic presuppose the principle of non-contradiction?

As to the first of these questions, Aristotle did not consider logic a "real science," that is, about real things. Clearly such logical terms as "predicate," "therefore," and "definition," do not refer to any real things simply but only to relations between *objects as known*, that is, *as thought*. Since these relations are constructed by the mind, logic could be called an "art," yet unlike other arts it produces nothing real, not even a product in spoken or written words. Yet nevertheless logic is something that can be taught and learned, and when used in the real sciences it enables them to arrive at true knowledge. Thus mind-dependent relations are completely immaterial, and their study belongs to what Cajetan called "the third degree of abstraction," as does Metascience.

How then can purely mind-dependent objects of knowledge, such as mind-dependent relations, be reconciled with the Aristotelian view that all knowledge is derived from our senses? We all use logic in thinking and speaking, yet, just as we are not ordinarily conscious that we are abiding by the rules of English grammar, we seldom recognize that we are following the rules of logic. While all normal human beings tend to think logically, Aristotle seems to have been the first thinker to attempt to systematize logic and demonstrate its validity as an "art of critical thinking." Pythagoras or, more likely, Eudoxus of Cnidus (400–347 BCE), an associate of Plato, had perhaps initiated this systematization in a limited way for mathematics; but Plato, although he discussed particular logical problems, did not attempt to reduce these reflections to a system.

It is often supposed that Aristotle was primarily inspired by mathematics in developing his conception of logic. But in view of his emphasis on the priority of natural science, it seems to me more likely that he worked out his system of logic chiefly as an instrument for systematizing his natural science, since it is so well exemplified in his *Physics* and *De Anima*. Without these treatises, as I have argued in previous chapters, there would be no foundation for holding that human intelligence is immaterial, or, indeed, for concluding to the immaterial Unmoved Mover. In the *De Anima*,²⁰ it is shown that intellectual cognition is the presence of the form of an object as a form in the knower, yet received as form in form, not form in matter. Hence even in the sense cognition the object sensed is immaterially received. Yet sense cognition still depends on a prior change in sense organ caused by the object. In intellectual cognition the object is known in complete abstraction from matter. Thus our knowledge of logical relations that exist only between objects as intellectually known cannot exist outside the human intelligence.

Although it is proper to Metascience to distinguish between such mind-dependent "beings" (*entia rationis*) and mind-independent beings (*entia realia*), yet, since mental relations are not real, they do not properly fall under the subject of Metascience (*ens commune*) except by an analogical reduction. As the great Thomistic commentator John Poinsot explained,²¹ the mental relation of predication is analogous to

the relation of form to matter, since the predicate actualizes or clarifies the subject: the proposition “man is rational” makes the vague concept of “man” clearer by bringing out what is implicit in our experience of human beings. Since the whole fabric of reasoning is made up of propositions formed by predication, human thinking is a dynamic process of gradual clarification moving from what is vaguely known in observation to what is clearly known, like the gradual resolution of the visible appearance of a distant object as we focus our binoculars.²²

This process, however, would not be possible if intelligence were simply the combination of items of information; it requires, as we have seen in defining “truth,” that the intelligence “know that it knows” the conformity of what it knows to the object observed. The intelligence, as shown in chapter 4, section B, totally reflects on its own act, and such a total reflection is impossible to a physical quantified object having parts. Later in the history of logic John Stuart Mill was to defend an empirical basis for logic against Hume and Kant, who believed logic deals with *a priori* rules. Although Aristotle and Mill agree on this point, they differed profoundly in their epistemology, since Mill supposed that all we know are our sensations. For Aristotle, we must first sense an object and develop it perceptually even in order to conceive it intellectually, that is, immaterially, and to assert its existence, nature, and properties in a process that entails an implicit awareness that it is being known abstractly.

The second of the above questions is the famous controversy, which raged throughout the Middle Ages and is frequently revived today, between Realism and Nominalism. “Realism” in this controversy meant some version of Plato’s doctrine that “universals,” such as “plant,” “animal,” and “human being,” have real existence outside the mind. Since Aristotle maintained both that “science attains reality” and that “science is of the universal,” he would seem to have contradicted himself when he also maintained that “only individuals really exist.” Consequently, some experts in Aristotelian logic, such as William of Ockham, proposed to interpret the word “universal” to mean nothing more than a collection of individuals to whom one name is given not because there is in them anything that is univocally common, but simply because they are in some particular respect similar. This in effect eliminates univocity and makes all terms analogous names. Hence this position is called “Nominalism,” although Ockham is more correctly called a Conceptualist because, for him, the issue was not precisely the name but the application of a single concept to many similar individuals.²³ Many modern philosophers are avowedly “nominalists” because they are materialists or relativists (Ockham was neither), for instance, Nelson Goodman (1906–1998)²⁴ and Willard Van Orman Quine.

Aristotle and Aquinas found a middle position between Realism and Nominalism as extremes. Aquinas stated this most clearly by arguing that the “universality” of our concepts is a mental relation that enables us to predicate a term of many species or individuals in a univocal manner. Therefore, Aristotle was right in opposing every form of Platonic Realism that would attribute extramental existence to universals. On the other hand, Aquinas supported Aristotle’s contention that in natural science we can distinguish the essential character of a thing from the mere accidents that it has suffered from chance, and hence we can also find its unity as explanatory of its several natural properties. The verification of such real, existential definitions makes evident that, in the real world, the essences of some individual things considered abstractly are identical, although they differ in their concrete existence, matter, and individuating characteristics. This is the ground for Aristotle’s assertion in logic that, although only individuals exist, science is of the universal.

Therefore, Nominalism (or Conceptualism) is contrary to fact since it claims that although real individuals are “similar,” it denies, contrary to the observed facts, that they are ever essentially identical. As a result, Nominalism is never able to admit a sufficient similarity between individuals in a species to justify a valid demonstration of their properties, the principal task of any science. For example, if one sample of water were merely “similar” to another sample of water, then the essential definition of water as H₂O could not be used to explain the properties of water. Also, the ethical thesis that all human beings have the same basic rights becomes doubtful, and so on. In my opinion, however, it is misleading to call this Thomistic position “moderate realism,” as is often done. Aristotle and Aquinas were neither Realists nor Nominalists, but agreed with Nominalism that only individuals exist, yet explained the possibility of scientific knowledge in an entirely different way than did Plato.

Thus Plato’s notion that an Idea of Man has real existence, like the Native American myth that, besides little rabbits, there is a Great Rabbit in the Sky, mythologically confuses a mind-dependent object with a reality. Metascience enables us to keep the mental constructions of logic clearly distinct from the mind-independent world and at the same time see their value in the dynamic process by which the intelligence clarifies what it knows. Therefore, logic is in a sense metascientific since it is able to transcend all the sciences and be of service to them all, yet, since it is not about the real but only the mind-dependent, it is not yet Metascience.

For Aristotle, logic must remain in contact with the sciences as they develop through deepening experience since that is its whole *raison d’être*.²⁵ Thus, the general laws of logic are applied through the

Posterior Analytics to each science, but each science also has its proper logical methodology that may require certain adjustments and qualifications in view of the questions that this or that science explores. Hence the meaning of discovered laws is colored by the science in which it is used and the degree of advancement that science has achieved. Thus, to qualify as a science, any discipline must attain some certainly true conclusions; but the kinds of certitude achieved in different sciences (and perhaps even in different fields within a science) are different.

For example, the certitudes of natural science, mathematics, and a practical science like ethics are of different types. In natural science we can attain certitudes about the behavior of real bodies, in mathematics about the relations of abstract idealized quantities based on images derived from real quantities, and in ethics about what we should usually do in a given practical situation. The certitude of logic as a discipline is not attained *a priori*, any more than in any other discipline; yet while the certitude of other sciences depends on the reality of their objects, the rules of logic are verified by their success in attaining intuitive or reasoned certitude in these real sciences.

The third issue about logic with which Metascience must deal is to explore its relations to psychology without confusing the two disciplines. Aquinas fully accepted Aristotle's development of logic as a science of relations between logical entities, yet he further connected logic with psychology (a part of natural science) by explaining how these relations are produced by the mind. Thus he distinguished the "three acts of the mind": (a) the act of *simple comprehension* by which the mind forms universal concepts by an analysis of its sense cognition, (b) the act of *judgment* by which it forms a proposition from subject and predicate terms and sees the proposition to be true or false, and (c) the act of *reasoning* by which it forms syllogisms and thus from two propositions used as premises arrives at a third proposition as a verified conclusion.²⁶

The first of these two acts pertains to human intelligence precisely as it is an abstractive cognitive power having insight or intuition (Latin *intellectus*) into the essences of the things presented to it by the senses. The second act forms propositions that actualize a subject by a predicate, as already discussed. The third act, that of reasoning (Latin *ratio*), is required because of the weakness of our human intelligence that depends on sensation, and hence is unable to grasp all truths by direct insight. Hence the human mind must work *discursively*, using known truths to pass to unknown ones. It is primarily in this respect that human intelligence differs from the intelligence of pure spirits who do not reason but always know through direct intuition (although the lower the spirit in the hierarchy of intelligences, the more extended the series of intuitions it requires, as we discussed above²⁷).

Obviously, the most difficult point in the foregoing account is how, in forming a judgment, we know it to be true or false and not merely a combination of ideas that bear on mind-dependent objects but do not attain real being. The Aristotelian answer to this depends on his notion of the *real* definition of an extramental object, as contrasted to a merely *nominal* definition of the ideas signified by our language. In intellectual cognition of the intuitive type, judgments assert that the predicate makes more evident what the subject really is. But the subject is known to exist by the fact that we are aware (even in simple comprehension) of this fact because it has been apprehended by an external sense—primarily by the sense of touch that is in actual contact with the real object.

The fourth of the above problems about logic that especially concern Metascience bears on the validity of the principle of non-contradiction. In chapter 3, it was shown that this principle is first verified in the foundational part of natural science by the fact that we cannot observe by the sense of touch what does not exist. Natural science, however, makes use of logic, and the validity of logic rests on this same principle, since we used it in demonstrating the validity of syllogistic reasoning earlier in this chapter. Is this not circular reasoning?

I have already, however, argued that the first steps of natural science can be taken without explicit reference to logical rules, and in fact Aristotle probably first formulated these rules on the basis of successful reasoning in natural science. The human mind is naturally logical, and can proceed logically without knowledge of the rules of the art of reasoning, just as we can speak correctly without studying grammar. Aristotle saw that to proceed very far in critical thinking it was helpful to formulate such rules and show that to violate them would violate the principle of noncontradiction already discovered in the foundations of natural science, as well as in mathematics that presupposed the existence of quantities demonstrated by natural science. Once natural science had proved an immaterial First Cause and the immateriality of the human intelligence, and hence the need and possibility of Metascience distinct from the various special sciences, the principle of non-contradiction can be validly extended not only to all real beings but also to mental relations that imitate real beings, as a strictly necessary and metascientific principle.²⁸

Thus the strength of Aristotelian logic can be summed up by saying that it shows the immaterial mental dynamism by which through predication we clarify one concept by another, and then, on the basis of adequate experience, proceed through syllogistic reasoning to verify the *existence* of facts (*quia*) and the

causal explanation of these facts (*propter quid*). Thus we see how from an initially vague intuition we can proceed through intellection to an enriched intuition. As we will see next, this view of logic is in sharp contrast to that of modern logic, which deals only with a combination of abstract elements represented by stipulated signs, much as does modern mathematics. In such a system the dynamism of the mind clarifying itself disappears.

g. Semiotics

A sign has as its vehicle either a real being (a material structure) or a mind-dependent being (arising from a psychological state) through which the existence and /or essence of something else is known. Semiotics deals with *signs* taken in the broadest sense that includes not only signs of human invention and those used by animals through instinct or learning, but all kinds of signs, including natural signs such as the familiar example of smoke signifying a fire. Thus linguistics, semantics, and logic are only restricted parts of the larger field of semiotics. It should be noted that to argue from effect to cause as regards the existence of the cause pertains to efficient causality, while to argue from the essence of the effect to the essence of the cause pertains to formal causality. Since final causality is the predetermination of the efficient cause, and is the assimilation of the effect to the cause, it includes both types of causality.

Therefore, the notion of "sign" has a transcendental character, since *everything* but the First Uncaused Cause is an effect. Every effect as such is a natural sign of its cause or causes, since from the existence of an effect we can know the existence of its cause, and from the essence of the effect we can know *something* of its cause, since whatever is in the effect must first be in its cause somehow. This transcendental, utterly inclusive sense of "sign" requires that semiotics be considered primarily a task of Metascience, which is the only discipline that can deal with the whole range of Being as such. Even our knowledge of God as the Uncaused Cause is a knowledge through signs, since all of creation is a sign, though a very imperfect one, of its Creator. Thus John Deely, in his remarkable *Four Ages of Understanding*, which I have had repeated occasion to cite in these pages, has been able to write the whole history of philosophy from a semiotic perspective.

2. Logic in Indian and Chinese Culture

The closest parallel to Greek logic originated in India, from independent but roughly contemporaneous sources.²⁹ One of the six systems (*darshana*) of Indian philosophy mentioned in chapter 1 is *Mimamsa* ("to investigate"), closely associated with another system, the *Vedanta*, that eventually has come to dominate Hindu thought. *Mimamsa* was developed as an exegetical method of interpreting the prescriptions of the Vedas relating to sacrifices in order to insure their correct performance (*dharmā*), because the rules of sacrifice had become increasingly obscure in the course of centuries of oral transmission. The chief author of the system was Jaimini, who may have lived as early as 600 BCE or as late as 200 BCE.

Jaimini, in each section of the manual he wrote, in a manner similar to Western scholasticism, states a thesis, then the difficulties against it, then a counterthesis, and finally a synthetic conclusion. He carefully distinguishes between the Vedic text and the authoritative explanations of it given by the ancient commentaries, called the *Brahmanas*, and among these explanations he again distinguishes ten types. He also provides detailed grammatical rules for interpreting the words, sentences, and large units of the Vedic prescriptions. Besides the sources of knowledge recognized by other Hindu systems, namely, intuition, reasoning, analogy, and authority, *Mimamsa* recognizes two others: postulation or assumption, and negation. The importance of negation is evidenced by the fact that *Mimamsa* commonly proposes a proposition as true and then argues that it is false, somewhat as Plato has Socrates expose the inadequacy of the answers that his interlocutors give to his questions.

The *Nyaya* ("right reasoning") system is closely associated with *Vaisheshika* cosmology. It owes its main formulation to Gautama (c. 150 CE?) and goes beyond the exegetical interests of *Mimamsa* to develop a general logic. It distinguishes the knowing subject from the known object and the state of cognition from both, and then expounds the process of right reasoning by which cognition is valid or true. It presents a system of classification through genus, difference, and species for defining objects known in an immediate manner. Also, it distinguishes immediate knowledge from that achieved by deduction, and develops a quite detailed analysis of the former into sense perception and the intellectual intuitions that, through *Yoga* meditation, culminate in the trance experience.

As for deductive reasoning, *Nyaya* provides a logical theory that includes a five-membered syllogism: (1) the thesis to be proved, for example, "The volcano [A] is on fire [B]"; (2) the reason for its truth, "The volcano [A] is on fire [B] because it is smoking [C]"; (3) examples illustrating this reason, "The wood in this stove [X] is on fire [B] because it is smoking [C]"; (4) the application of this argument to the case in

question, "The volcano [A] like this stove [X] is also smoking [B]"; (5) the thesis restated as the conclusion of the argument, "Therefore, the volcano [A] is on fire [B]." From the viewpoint of Aristotelian logic, this argument is valid; but in steps 3 and 4 it inserts an abductive proof of the minor premise instead of formulating it as the universal statement that "All that smokes is on fire." Actually, the core argument is already found in step 2, which gives the reason or middle term for the conclusion.

Nyaya tends, however, to a kind of pragmatism, by insisting that certitude in knowledge comes not from reasoning but from the test of action. It also acknowledges the validity of arguments both from analogy and credible authority, and analyzes many kinds of logical fallacies. Thus *Nyaya* developed—probably independently of Greek thought—a successful system of logic, although (according to modern standards) one less advanced than Aristotle's. It should be noted, moreover, that its purpose was subordinated, like that of all six Indian systems, to the attainment of salvation from suffering rather than, as was Aristotle's logic first of all, to the advancement of understanding in natural science.

In China the School of Names and especially the Mohist School gave considerable attention to logical questions, though mainly from a semantic and linguistic point of view.³⁰ Mo Tzu taught that a doctrine could be validated by three tests: traditional authority, common observation, and pragmatic effect, with emphasis on the last. In the following century the Mohists opposed the radical skepticism of the Taoist Chuang-Tzu by developing a systematic dialect formulated in the "Mohist Canons." The special character of the Chinese language was reflected in these studies, but the dominance of Confucianism with its ethical and political concerns seems to have deflected Chinese thought from logical questions. Moreover, although the Chinese were experts in mathematical calculation and at a very early date proved the Pythagorean theorem, they never developed mathematics as an axiomatic system as had the Greeks, but rather were concerned mainly with practical topics such as the calendar, astronomy, land measurement, taxes, and so forth.

3. Modern Logic

After Aristotle, the Stoics put an emphasis on the hypothetical forms of reasoning in which the major premise takes the form, "If Socrates is a man, then he is rational," and then either the minor premise "But Socrates is a man" yields the conclusion "Therefore he is rational" (*modus ponens*, or affirmative), or the premise "But he is not rational" leads to "Therefore he is not a man" (*modus tollens*, or negative). In the medieval schools, Aristotelian logic was generally accepted with such modification as resulted from epistemological controversies, as we saw above in their substitution of the formal/material logic distinction for Aristotle's (and Aquinas's) demonstrative/dialectical reasoning distinction as the basis of advance in scientific understanding. It was boldly challenged in the Renaissance by Peter Ramus (1515–1572), who proposed an essentially rhetorical approach to the subject.³¹ His views were especially favored in Protestant circles, such as Harvard University in its early days.

Generally, however, a rather ossified textbook form of Aristotelianism, the so-called "Traditional Logic," prevailed, as is evident from the fact that Kant derived his *a priori* categories from the logic taught in the German universities of his day. Apparently Kant was unaware that, for Aristotle, the categories are established in natural science. In the last chapter we saw how, in the nineteenth century, mathematics as a science became ever more general and abstract and, as it did so, sought ever greater *rigor* by thorough, formal axiomatization. Thus it became clear that, to really prove a theorem, a mathematician must not only list his mathematical postulates, but must state his logical rules of reasoning as well. As soon as modern mathematics was thus scrutinized for logical rigor, mathematicians were horrified to discover that "traditional logic"—that is, the logic current in the schools of the nineteenth century—was itself not a very rigorous science.³² They attempted, therefore, to improve logic by the same methods of explicit postulation and careful definition that they were using in mathematics. To facilitate this improvement they introduced a mathematical type of notation and thus produced "symbolic logic."

This symbolization of logical terms had precedents in Aristotle's work. It was also later pursued by a Franciscan, Blessed Ramon Lull, in the thirteenth century, and again by Leibnitz in the seventeenth century. The real founder of modern logic, however, was Gottlob Frege, who, in his *Begriffsschrift* of 1879, attempted the first axiomatization of the whole discipline. In recent years this new logic has been developed with amazing perfection and has become essential to the development of computers that are simply complex logic machines.

Because, as was shown in the last chapter, mathematical set theory or category theory deals with collections of undefined objects, just as logic deals with classes and their division into subclasses but abstracts from the contents of these classes, set theory and logic seem very much alike. Nevertheless, since mathematics is a science of the real abstractly considered, while logic is only a science (or art) of mind-dependent being, to identify them is to reduce the mind-independent to the merely minddependent.

We will see presently how this attempt at identifying mathematics with logic has raised controversies about the very foundations of mathematics.

Aristotle would have found difficulty in the definition of a mathematical “set” as *any* collection of items, since mathematics deals only with quantities. Therefore, since the term “quantity” taken in its original and strict sense is a property of material things, it cannot apply either to spiritual beings or to mind-dependent relations that exist only in spiritual cognition.³³ Thus, nonquantitative sets would either be logical (and hence merely mind-dependent and spiritual) or real (and hence also spiritual), and thus the proper concern of Metascience, not of mathematics. Yet a well-known work on mathematics tries to illustrate a set of “angel flights.” In fact, if a number of pure spirits exist, the term “number” becomes analogical, just as when we speak of the One God in Three Persons, the terms “One” and “Three,” as well as “Person,” are all analogical.

In actual practice, most mathematicians seem to cling to what is called the “Platonic Theory” of mathematical objects that holds that they are mind-independent and thus differ from mind-dependent logical entities, although it is not clear in what this independent existence of an abstract object could possibly be.³⁴ These mathematicians show little acquaintance with the Aristotelian view that mathematical objects, though imaginary and abstract, have an empirical basis in sensory experience, which avoids the obscurity of the Platonic theory of such objects as self-subsistent Ideas.

Bertrand Russell at first defended this Platonic theory. Later, however, inspired by Frege’s work, Russell and Alfred North Whitehead, in their famous *Principia Mathematica*, proposed a logistic theory according to which mathematics is identical with logic. In Logicism a “set” is no longer a collection of abstractly idealized though real entities, but is identical with a logical class. Thus Russell defined a number as “the set of all those classes whose members have a one-to-one correspondence.”³⁵ Thus the set of all couples is the number 2, the set of all trios the number 3, and so forth. While this seems an outrageously circular definition, it can be rephrased as, “A number is the class of all classes having each of its members uniquely related to some members of the other classes.” Russell speaks of this relation as “similarity,” but the relation need not be defined except to say that it is “one-to-one,” or consists in “ordered pairs.” Thus, a number stands for all sets whose members are uniquely related to each other, but not to the members of any other set. To specify a number, then, requires that such a class of sets be counted and shown to be different than any other such set—that is, the set of two things is neither one nor three nor any other number. Quine improves on this by saying that “any finite series each of whose members has only finitely many precursors—will do nicely” to deal both with numbers and logical classes without committing oneself to what either numbers or classes are.³⁶

Thus since, in such theories, the notion of “set” applies to anything, mind-independent or mind-dependent, it is properly a term pertaining to Metascience, equivalent to Being considered in its Unity and Plurality. Yet it places the accent not on real being, but on mind-dependent being, which is for Metascience only a secondary consideration. No wonder that Russell made the famous statement, “Mathematics is the science in which we don’t know what we are talking about or whether it is true.” Therefore, many mathematicians have sought to avoid this absorption of their science into logic, and have preferred the formalistic theory of David Hilbert according to which mathematics is simply the science of the formal structure of a system of symbols. This view seems very close to Logicism, yet its proponents deny that mathematics is merely logic. They hold instead that mathematics concerns the structure of real objects, but they contend that it is possible to replace this structure by symbols that represent it. Once this symbolization has been adequately formulated, mathematics proper consists in the study of the structure of these symbols, and only indirectly in the study of the real things.

Although Formalism has been very influential for modern symbolic logic, it has suffered from Gödel’s two theorems, already mentioned. The first of these is the incompleteness theorem, which states that any consistent mathematical theory that includes the counting numbers is incomplete, that is, cannot decide some genuine problems that can be raised in the terms of the axioms of that theory. The second, or consistency, theorem states that no such formal system can demonstrate its own consistency, although this may be demonstrable in some larger system of axioms. From these two theorems it is evident that there are some truths that cannot be demonstrated in any already axiomatized formal system.

To escape such dilemmas, and in particular the problems raised by Cantor’s notion of infinite sets, still another view of mathematical foundations called Intuitionism or Constructivism, was proposed by L. E. J. Brouwer. This view proposes that mathematics must be based on the natural numbers that we are intuitively sure we can construct.³⁷ But Brouwer did not mean Aristotelian intuition, that is, direct, intellectual, analytic insight of certain first principles based on sense experience of real quantities prior to reasoning. Instead, he adopted Kant’s view that our intuition of the natural numbers arises from our inner experience of counting the sequence of events in time. For Kant and Brouwer, however, “time” is not in any way an extramental reality, but a purely mental category imposed on sense data by the subjective nature of our sensing. Therefore Brouwer held that numbers can be constructed only by counting such a

sequence of events in our internal perception of time in the stream of consciousness. Since we cannot count infinite numbers except in infinite time, no proof based on them is practicable. Intuitionism, therefore, excludes all indirect proofs (those by *reductio ad absurdum*) based on the logical rule of “the exclusion of the middle,” which states that “every proposition is either true or false,” so that it is valid to argue that because A is true, not A is false, and vice versa. Thus, Intuitionism invalidates a considerable part of what had come to be included in mathematics, and hence has not found general acceptance among mathematicians, though it remains an important criticism of the foundational soundness of modern mathematics and has been difficult for practical mathematicians to answer.

Thus Metascience has the task of helping mathematicians clear up these conflicting ideas about the foundations of mathematics. From an Aristotelian point of view Platonism, Logicism, Formalism, and Intuitionism all fail. The last three systems unnecessarily cut mathematical truth loose from its existential grounding in natural science and the reality of physical quantity. One is thus forced not only to deny any distinction of mathematics from logic (Logicism), but also to admit that one can never be sure that mathematics is self-consistent except by exemplifying it in the natural number system (Formalism).

Moreover, the consistency of the number system is left dependent either on purely mind-dependent events whose relation to reality remains uncertain, or on Platonic ideas. In either of these two cases mathematics is not only purely *a priori*, but it is also not clear that it is anything more than an ingenious and arbitrary game with symbols. Thus, once again, we are puzzled why, in mathematical physics, this arbitrary game reveals the order of the universe.

For an Aristotelian, three-dimensional material bodies exist and can be discretely counted. Their *being* is mind-independent physical being in a world of change that is attained by the human senses and understood intellectually as physical being by human intelligence. Because quantity is the first accident of material changing things, it can be imagined by the interior senses as a common sensible (common to both touch and sight) in such a way as to simplify lines, planes, solids, and numbers to any degree of perfection desired. These idealized mathematical objects can also be conceived by the intelligence, using these images but abstracting their universal content from physical changes, qualities, time, and so on. Abstract quantity is thus the proper subject of general geometric and arithmetic sciences, and its properties can be logically demonstrated. The various species of continuous quantity and discrete quantity can be proved to exist both by imaginative construction and by existential demonstrations that such specific entities are consistent with the general properties of the continuum or the number series.

There is nothing, however, un-Aristotelian about the just sketched historical development of mathematics toward greater and greater generalization, provided that univocal terms be carefully distinguished from their analogical extensions. Otherwise, contradictory notions may be introduced into the science, as happened when the notion of “infinitesimal” was taken literally or when Cantor’s notion of actual infinite numbers was uncritically accepted.

For Metascience, the principle features of modern symbolic logic can be described as follows. First, modern logic, like that of the Stoics, shifts the focus of the science from the logical relations between terms in the categorical syllogism (a *predicate* logic as in Aristotle) to the hypothetical syllogism and a *propositional* logic in which the logical relations between true and false statements become the chief interest. To this propositional logic, modern logic assimilates a predicate logic in which *quantifiers* (“all” or “some”) become the dominant consideration. The aim is to uncover the variety of possible logical relations that include more than the traditional forms of the syllogism, and then to axiomatize all of these possibilities into a complete and internally consistent and purely formal system of relations. Thus the *extension* of a term, that is, the class of objects a term stands for, eliminates interest in its *intension* (or “meaning,” the description of the objects in that class). Furthermore, these relations and the terms they relate become a kind of algebra, in which special symbols are combined according to abstract rules.

Second, modern logic begins with a small number of axioms expressing basic logical relations. It also has rules of inference, which are similar to the rules of operation in mathematics and permit theorems to be proved by reduction to the axioms. Finally, it may have formation rules that regulate the formation of statements from terms and also combinations of statements from simple statements. All these axioms, definitions, and rules are assumed without proof and without specifying how they are grounded in mind-independent reality. It is taken for granted that, just as a number of geometries or algebras are possible depending on the axioms assumed, so many logistic systems are possible according to a chosen set of rules.

Third, from these axioms, theorems are deduced according to the assumed rules of inference. These theorems are of two sorts:

1. Theorems, which are the various laws of logic, for example, the moods of the syllogism.
2. *Metatheorems*, which deal with the completeness and order of logic as a science. For example, if one proves that the axioms of the system are self-consistent, this conclusion is a metatheorem. These metatheorems are, so to speak, the logic of logic itself.

Once this logistic system is complete, we have a full set of logical rules that can be used to regulate the development of any particular science. The special sciences themselves can then be formulated in the same fashion, by adding new symbols that stand for their special terms, as well as axioms containing these terms. It may also be necessary to provide some special logical rules for a given science, but these can be either postulated or proved in the logistic system. To date it has been found too complicated to formalize in this rigorous way any of the sciences except mathematics. Yet, in a most remarkable way, symbolic logic has assisted the technology of the design and programming of computers so as to make possible the rapid solution of extremely complicated logico-mathematical problems. Thus modern quantum theory cannot progress without computerization.

Modern logic has a notation, similar to that used in mathematics, by which all logical relations found in formal logic can be expressed. This notation includes:

1. Letters which stand for *variables*, just as in mathematics, except that in this case the variables are classes of statements or terms. For instance, the letters p and q may each stand for any statement belonging to a particular set of statements.
2. Symbols that indicate logical relations. For example, the symbol \sim placed before a propositional variable (one standing for a set of statements) *negates* it, so that $\sim p$ is the denial of the statement p . Again, the symbol \supset connecting two variables indicates their *conditional* relation, so that $p \supset q$ means "If the statement p is true, *then* the statement q is true." If there is a need of symbols other than the *primitive* ones, these new symbols are defined in terms of the primitive symbols.

In spite of all this technical elaboration, however, or perhaps because of it, this sort of modern logic has found little use in the sciences, other than in the ways just mentioned. Indeed, the manipulation of symbols in accordance with a set of arbitrary rules, however ingenious, can hardly be an ultimate criterion of truth about the real world. As we have seen previously, it was to escape this arbitrariness that the British Empiricists transformed Analytic Philosophy into Ordinary Language Philosophy. After Logical Positivism failed because Gödel had showed the incompleteness and dubious self-consistency of purely formal systems, Analysts took the position that the business of philosophy is simply the clarification of the language used in the natural sciences and in ordinary discourse. The more radical, such as A. J. Ayer (1910–1989), emphatically rejected what they called "meta-scientific" language as meaningless, because they followed Hume's view that propositions not reducible to sense data or to logical relations and the syntax of ordinary language are nonsense. Analytic Thomists have shown that these techniques of clarification can be employed with profit, but cannot of themselves solve metascientific problems.

B. INFORMAL LOGIC

In his *Rhetoric* and *Poetics* Aristotle wrote respectively on the informal logic involved in persuading others to action and in entertaining others in the contemplation of the beautiful, along with the comic and the tragic, in drama, poetry, fiction, and so on. Though he did not write on the plastic arts or music, the general principles of fine art expounded in the *Poetics* may be extended to these arts too. Though it is evident enough that rhetoric uses argumentation, and hence that the politician, the preacher, or the salesman needs to know at least a little informal logic to sell his wares to others, it may seem odd to think of logic, even informal logic, as relevant to the fine arts. Yet anyone who has studied current literary criticism, particularly in its recent highly sophisticated (but often satirized) form of Critical Theory,³⁸ must recognize that it is precisely the first task of such criticism to uncover the "structure" of such works. This structure is a set of relations between words in literary works and their meanings or, more generally, between *symbols*, whether these are words, shapes, colors, or sounds. Thus, such structures are not simply physical, sensible arrangements, but more deeply mind-dependent structures, and that is what logic is about.

Aristotle presents the liberal art of dialectics in what is usually considered an early work, the *Topics*.³⁹ Dialectics, he says, has three purposes: liberal education, public discourse, and scientific research.⁴⁰ To be liberally educated we must learn to hear and understand different opinions about many matters concerning which we cannot be expert but still need to evaluate, at least in some preliminary way, in order to advance in our own thinking. For public discourse, such as multicultural dialogue and politics, we must be able both to understand the views of others and to sift out serious considerations from trivial ones not worth consideration. For scientific research we need to form and use hypotheses so as to arrive finally at principles of reasoning that are, on the basis of analyzed experience, intuitively evident.

Of course, it is on this last point that many today would suppose that hypothetical reasoning is endless,

so that we never arrive at truths that are evidently certain in the phenomena of experience, that is, from the data available to us. Aristotle, however, as we have seen, was convinced that careful observation and dialectical research can sometimes establish truths that are certain and universal (or better, *essential*), from which scientific reasoning can then proceed to establish causal explanations of observed data. I have argued here that in fact not only in mathematics but also in natural science and other disciplines such certitude is possible, though it is not of the same quality in all disciplines.

A remarkable feature of dialectical reasoning is that it can proceed from opinions—whether these are simply “common sense” or refined expressions accepted by experts—that are *common to all disciplines*. For example, in dialectics one can usually take for granted as (at least warranted by “common sense”) the principle of contradiction, “The whole is greater than the part,” “Things similar to a third thing are similar to each other,” “Everyone wants to be happy,” and so on, either as these are restricted to the scope of natural science or as they have a broad, metascientific and analogical extension. While Aristotle says that dialectics is based on opinions (*endoxa*), and that these are only “probable,” it is perhaps better to say that they are *at least* probable, and that, if in fact they are capable of becoming certain, this certainty is not yet critically established.

We are thus confronted with the odd situation that Metascience, scientific logic, and dialectics all deal with first principles whose generality exceeds that of any of the special sciences. That is the reason, I believe, that, for some thinkers (let us mention only the great Plato), these kinds of primary truths tend to get confused with each other. For example, Plato sometimes seems to confuse these three kinds of principles by speaking of them all as “Ideas” or “Forms.” Thus the observation of some that metaphysical first principles, such as the principle of non-contradiction, are known to even the unlearned⁴¹ confuses the dialectical use of such a principle with its scientific use.

For Aristotle, however, the generality of Metascience, scientific logic, and dialectics is of three different sorts. If we consider the principle of contradiction, we see that it is used in the reasoning of every science as a logical rule of logical truth: “Contradictory propositions cannot both be true.” If employed dialectically, however, its function is to confront one claim against another, and to inquire whether one is more probable than the other, or whether both may be in fact false. It raises questions for further inquiry rather than solves them. One does not have to be an expert in a field to raise such questions about scientific claims. In Metascience, however, the logical principle of contradiction is transformed into an ontological question when, as in chapter 6, it is shown that it is absolutely necessary that all beings have, in analogical ways, the property of Unity or self-identity, so that this principle has absolute certitude and validity in every possible universe and even for statements about the First Cause. Thus dialectics is a search for truth and may contain much that is true, but this remains always a provisional truth waiting to be clarified and critically grounded.

In the discussion of modern epistemologies in chapter 8, it was pointed out that there is much interest today in ways to conduct *rational* public discourse, as, for example, in the work of the Frankfurt School and of Jürgen Habermas.⁴² There is also a much deeper awareness of the problem of multiculturalism now than there was in ancient or in medieval times. Some studies in this area take the form of the analysis of “speech acts” and “audience response” concerns, not to mention simple “salesmanship.” This type of dialectics, therefore, can be put to good use. But a good deal of this intensified awareness of multiculturalism has more to do with *nonrational* obstacles to successful communication and pertains more to the art of rhetoric than to dialectics proper, since dialectics proper is principally concerned with objective argumentation rather than subjective factors.

Rhetoric and poetics differ from both scientific logic and dialectics in that they include attention to nonrational, subjective factors, since they are concerned not only with the truth of reason but also with a “truth” of sensation and affectivity, or, more precisely, with the required subjective dispositions of an audience to respond appropriately to a particular message. There is no use trying to sell paintings to the blind, or books on Metascience to teenagers. As previously argued, logical truth properly speaking pertains to the intelligence as superordinate to the external and internal senses, and hence not to affectivity even as it becomes conscious in “feelings” and “emotions.” In Thomistic psychology, *affectivity*, that is, the “passions” or “drives,” are not as such conscious. We can be hungry without being conscious of the fact. The passions become conscious only when the bodily changes that these drives cause produce bodily sensations that we call the feelings or emotions of hunger, fear, and so on. Yet because of our psychological unity, emotions in the body stimulate images in the internal senses (“phantasms”) and these may lead to intellectual acts that are intuitive. Such intuitions in turn may lead to logical thought. Thus, such intellectual acts can be truthful or deceptive.

The purpose of rhetoric is to persuade others to make decisions and act upon them. Since human decision is the concern of ethics, more will be said about this in the next two chapters. It is clear, however, that free decisions and acts must be *motivated*. Hence rhetoric is concerned with arousing motivation in the hearer and can do this only by presenting arguments that are not merely factually and logically correct

but that have further an appeal to the practical interests of the persons addressed. This often requires the use of narratives, of striking examples, of memorable images and symbols. Thus rhetoric involves a logic that seeks those premises that will resonate in the audience in terms of what is desirable and undesirable.

Aristotle is quick to point out that this does not mean that it is genuine rhetoric to appeal to immoral interests or irrational passions.⁴³ A demagogue who arouses a crowd to action by appeals to racial hatreds, to greed, or to lust by pornography, is abusing the art of rhetoric rather than using it for its true purpose. Aristotle would have deplored much political and commercial rhetoric that is today praised for its "effectiveness." Thus rhetoric, properly used, is in the service of ethics and politics, and its truth is of the *moral* type to be discussed below. A good rhetorical argument is "true" if it persuades the audience to act reasonably, ethically, and for good motives. One important aspect of this art is that, as Aristotle says, "The best argument is the character of the speaker."⁴⁴ Leadership, or the ability to get others to put their trust in the speaker's expertise, honesty, and good will, is essential to persuasion. While this persuasive image can be false, so that we are deceived by a clever "con man," in true rhetoric speakers manifest their trustworthiness in a worthy manner.

The aim of poetics is contrary to that of rhetoric, since successful rhetoric aims at action, the fine arts at contemplation. This contemplation in its lesser forms is simply entertainment, justified as recreation that rests a person for more substantive activities; but poetry in its higher forms facilitates an attainment of truth through its beauty, the "splendor of truth," as will be discussed in the next chapter.

Aristotle, in his *Poetics*, gives the famous explanation of why we take pleasure in witnessing a tragedy, by arguing that it provides us with a *catharsis* or purification of our feelings of pity and fear. I understand this to mean, in modern terms, that every audience has many suppressed, half-conscious negative feelings that depress them, but as they watch a tragic drama these are first raised to a contemplative awareness and then sublimated in the realization that there must be some higher order in which justice and truth will be victorious over injustice and illusion. Thus, the truth of the fine arts, whether literary, musical, or visual, is ultimately the contemplation of reality (a worldview and value system), that is, *wisdom*, "ultimate meaning," such as that sought in its own way by Metascience.

Religious liturgy corresponds to poetry at the level of a faith or mystical experience, and this is why the fine arts in most cultures are intimately associated with liturgy. In the secular humanism of the Enlightenment epoch, as I argued above in regard to Romanticism, the fine arts tend to replace religion and its liturgy. Yet this contemplative wisdom differs from Metascience in that it is expressed not in scientific ways but in sensory symbols. This is why Plato wanted to exclude the poets from his ideal community, the Republic, since this dependence on the sensory can easily lead to a corruption of transcendent truth by the illusions of matter and time. Aristotle, however, in accordance with his own epistemology, recognized a proper role for the fine arts in human life, although he held that they require to be guided by ethics and rightly interpreted by Metascience. Thus, the truth to be founded in the fine arts is principally a moral truth, but it also extends to a contemplative wonder about the beauty of the creation and of its Creator.

In ancient times the art of rhetoric was much cultivated, and besides Aristotle's work there were many other works on this art, including notably that of Quintilian (fl. c. 50 CE). There were also excellent literary critics, such as Horace (65–8 BCE) in his *Ars Poetica*. The Middle Ages saw many treatises on the art of preaching with the title of an *Ars Praedicandi*. The great scholastics, however, wrote little on rhetoric or poetics. Aquinas was himself a liturgical poet, and he recognized, though only in scattered references, the value of rhetoric and the fine arts. In the Renaissance, the emphasis shifted from the scientific writings of the Middle Ages to *belles lettres*, and much was written about these subjects without, however, adding much to the classical sources. In the modern epoch the treatment of texts of a literary and rhetorical character has often been largely historical and biographical, although Romanticism placed a great emphasis on the notion of the subjective "expressivity" and "creativity" on the part of writers and artists, as if the goal of these arts was the manifestation of the personality of the artist rather than of the beauty of the object or the good of the audience. Such an emphasis, as exemplified in some recent "confessional" poetry, tends to reduce artistic enjoyment to a kind of perverse voyeurism. Yet this phenomenon can also be understood benignly, as a sort of confessional "self-portrait of the artist" that enables the audience or viewer to contemplate the artist as a human character known from the inside out. The problem with this, of course, is whether the writer or artist is really all that interesting as an object of contemplation. Yet, just as the emphasis on subjectivity in modern philosophy has added something to our knowledge that the "naïve" objectivity of classical and medieval philosophy lacked, so with modern art.

On the other hand, after World War I there was an increasing interest in the "formal" aspects of the fine arts.⁴⁵ Some began to claim that neither the historical aspects of a work of art nor what Aristotle would have called *mimesis* or representation of a moral action were of major importance in evaluating a work of art. Such a work was to be judged purely as an "object" having aesthetic qualities of order and structure. By the end of modern times, these forms of artistic criticism were under attack by Heideggerians and

Deconstructionists who declare that “the writer does not make speech but rather speech makes the writer,” that is, writers and their works are formed by the culture within which they live. Rhetorical analysis, especially under Marxists and Freudian influences also often becomes a “hermeneutic of suspicion” in which the professed goals of the persuasion at which the writer seems to aim are treated as only a “cover-up” for his true goals that are in fact a manipulative domination of the audience. Deconstruction of this type, whether of rhetoric or the fine arts, assumes that all such works are, in effect, lies (just as Plato thought they were).

The cultures of India, China, Japan, and the Islamic world had, of course, very remarkable achievements both in literature and the fine arts, and developed aesthetic and critical theories of the fine arts as well as considerable sophistication in rhetorical analysis. These, however, will be discussed later in connection with aesthetics, since it is under that heading that their major contribution to modern culture best fits.

C. TRUTH IN NATURAL SCIENCE AND MATHEMATICS

While Plato, like Parmenides before him, denied certitude to natural science because it deals with changeable things, Aristotle held that the fact that things are changeable and changing does not mean that substances lack a *relative* stability and permanence that makes it possible to define them and demonstrate their properties. Hence natural science can arrive at some certain conclusions, though this becomes increasingly more difficult the further the science descends from generic propositions toward specific ones. We can successfully define the genus “animal,” but it is not easy to define the species “oyster.” Furthermore, since the material universe is a complex system of material things whose activities interfere with each other, and in which the individual substances, because of their material potentiality, do not have absolutely uniform actions or receptions, natural laws hold only *in pluribus*—for the most part.⁴⁶ Actual events are the result of deterministic laws of nature, but also of chance and the freedom of spiritual beings.

Thus the nineteenth-century notion that the aim of natural science was to discover deterministic laws that would permit certain prediction of future events would have seemed absurd to Aristotle. In the twentieth century, scientists themselves came to recognize that natural laws only state probabilities, they are merely *stochastic* (from Greek *stochos*, target, that at which one aims but may miss by various distances). Furthermore, at the microscopic level of the universe studied in quantum theory, it has been discovered that not only are natural laws probabilistic, but this indeterminism is also mind-independent, not due merely to a lack of adequate data on the part of the human observer. When the observer attempts to make more precise measurements on one quantity, his intervention renders measurements of other quantities less precise. Aristotle would not have found this odd, since he held that we know the existence of the world only through touch, and this always involves some change on the part of what we touch.

As was shown in chapter 7, it is entirely in keeping with an Aristotelian account of the foundations of natural science that, at the level of microstructure of material bodies, the distinction of their parts (and consequently the behavior of these parts) should be found to be less and less determinant. We cannot, of course, conclude from this that the quarks and leptons that now seem the most elementary kinds of particles are in fact such. Further observation may reveal further structure. What we can say is that no actual structure is perfectly actual since there can be no change in physical bodies unless they are to a degree potential to forms that they do not yet actually possess. Aristotle would have supposed the quarks and bosons of matter to be only imperfectly actualized since they are the parts of actual entities. Since they exhibit much of the potentiality of matter, it is not at all surprising that their behavior can be predicted only statistically, that is, *in pluribus* (for the most part).

Indeed, for Aristotle, the notion of science as “prediction” of the future is mistaken. Scientific explanation relates not to what may come to be but to what has actually taken place; it is backward looking. Yet he would not succumb to the temptation to turn science into history by making it *merely* a backward review of how the world evolved to its present state. History is of unique individual events, and hence is not capable of explanation in terms of universal laws about what happens for the most part. Hence, the material universe is full of chance, and the explanations of natural science, while legitimate, can only explain the relative uniformity of natural phenomena. We can pretty well predict the time of eclipses of the sun, but only as long as the solar system undergoes no significant changes; and it is clearly liable to quite radical changes. For example, an asteroid might hit the moon and change its orbit.

Great problems, however, are raised today in natural science concerning two problems mentioned at the end of chapter 5. The first is that of “naturalism,” or the contention that the scientific method *excludes* any reference to other than material entities or agents. It is, of course, true that it would be a violation of

the proper method of natural science to resort to immaterial causes as the explanation of observed phenomena without first seeking intermediate, secondary material causes, for example, to attribute the cause of cancer to the devil rather than to seek its biological genetic or environmental causes. Yet provided that this search for secondary causes is always seriously pursued, nothing in scientific method demands that natural science supply the total and ultimate explanation of why anything exists. In fact, as argued in chapters 3–5, every causal chain of material bodies necessarily depends on an ultimate cause that is not material.

The second objection, taken from current quantum theory, is much more difficult to deal with. As Nick Herbert, in his lucid survey and analysis of views among quantum physicists at the conclusion of the twentieth century showed, quantum physicists are in agreement as to the pragmatic, observational predictive success of quantum theory, but are contentiously divided—he lists eight opinions held by prominent theorists—as to whether observational measurements in any way reveal the “reality” that is measured.⁴⁷ This does not mean, of course, that quantum scientists deny that somehow these measurements are grounded in extramental reality, but they have achieved no agreement as to what that ground might be, for example, in what sense an “electron” is an object with innate properties that are independent of the human act of observation.

This quandary arises from the fact that quantum theory predicts only a range of “possibilities,” while what is observed is always the real factual existence of only one of these possibilities. Thus, all we seem to know about physical reality is so “contextualized” by our own act of observation that the physical reality in itself remains not only unknown but also unknowable. Thus quantum theory seems to confirm the Kantian denial that we can know the *Ding an sich*. Yet does not this seeming confirmation raise the suspicion that perhaps Kant has unduly influenced quantum physics?

I agree with Herbert that of the eight views he lists the most plausible is that of Heisenberg, which goes back to Aristotle’s distinction between potential and actual reality and suggests that quantum theory, since it only states “possibilities,” refers to natural tendencies (potentialities) in matter that are actualized only in the act of observation. In a Thomistic perspective, of course, this is the only way that we come to know the substantial natures of anything, since potency, although real and distinct from act, exists as knowable only as it is actualized by form. Thus modern physics has developed in the Parmenidean-Pythagorean-Platonic tradition that refused to admit the reality of the potential and resorted to abstract mathematics to describe our changing world as if it were wholly actual. In fact, the human mode of knowing through the senses always and inevitably causes some confusion between the properties of the extramental reality in itself and the changes wrought in it by our physical act of observation and measurement. Ordinarily, however, this confusion can be cleared up by the use of special techniques of observation. It is not surprising, therefore, that when observation comes down to the minimal parts of matter, such as the elementary particles, the distinction between the properties innate to the object itself becomes so contextualized by our process of observation that it is difficult or impossible to arrive at a clear knowledge of the thing. Whether or not present physics has finally reached this inescapable limit of our human power to make such distinctions remains to be seen.

Special difficulty has been raised in quantum theory by the famous Bell’s Theorem⁴⁸ of “nonlocality,” which seems observationally very well confirmed. This theorem asserts that quantum events are determined by other events so remote in space that Einstein’s principle that the velocity of light is the upper limit of all motion is violated. This debate is beyond my competence, but I would like to make two remarks with regard to the problem. First, what is at issue is not, strictly speaking, “action at a distance,” since once the Democritean-Newtonian notion of “empty space” is replaced, if not by an aether, at least by a “quantum field,” then all events in the universe occur in a material continuum.

Second, Aristotle and Aquinas, who absolutely rejected *actio in distans*, saw no difficulty in what they mistakenly supposed to be the fact that light illumines the whole universe instantaneously without traveling in time. Hence, neither would they have thought it impossible that there exists superluminal action of one event on another, as Bell seems to have proved to be a necessary conclusion of quantum theory. Aquinas maintains that the instantaneity of light, while rejecting *actio in distans*, is possible because the “diaphane” or transparent body that exists throughout the whole universe between both dark and radiant bodies has the property of being *proximately* disposed to receiving the actual quality of light. Consequently, when the diaphane is actualized by a radiant body at any point within the universe, this diaphane, since it is proximately disposed to illumination and hence completely unresistant to illumination, is instantly actualized as a *whole*.⁴⁹ Thus, for Aquinas, sound and heat are transmitted in time, but—as he mistakenly thought on the basis of the facts known to him—not light. Thus for him light did not “travel” through the diaphane, from part to part, a process that would take time. Instead the radiant body *in contact* with the diaphane, and thus *not* acting at distance, instantaneously changed the *whole* diaphanic body simultaneously. Therefore, although he affirmed that light is a quality, not a substance, Aquinas classified the act of illumination as *generation*, rather than of *motion* from place to place. But in modern terms, the

four fundamental forces (gravity, the weak and strong nuclear forces, and the electromagnetic force) are transmitted part by part and hence, according to Einstein, not faster than light. On the contrary, however, Bell's Theorem seems to show that the quantum field that constitutes the whole universe also has the property of superluminally undergoing certain changes not part by part but as a single whole! Aquinas was mistaken in thinking this was the case for light, but perhaps he was not wrong in thinking that some changes might be instantaneous (superluminal) and hence need not imply *actio in distans*. In view of these two considerations it seems to me that, although the exact character of our knowledge of the physical substances whose behavior is observed in confirmation of quantum theory remains obscure, no evident contradiction between the discoveries of quantum theory and the fundamental principles of Aristotelian Thomist natural science has yet arisen.

As I have just indicated, this debate appears to be caused by the tendency of modern physicists to confuse the abstractions of mathematical theory that are actual with the physical reality that has the potentiality for change. They neglect the fact that while natural science is about *ens mobile*, the subject of the mathematical sciences is quantity abstracted from the conditions of change. Though mathematicians often speak of a "rate of change," they actually mean some relation that remains invariant among a group of quantities, all of which are timeless. For the mathematician, "time" is a dimension or function for which there is neither past nor future. For this reason, as Pythagoras and Plato recognized and exaggerated, mathematics has a clarity and certitude not possible to natural science. Two-plus-two equals four, not *in pluribus* but universally and necessarily.

It is wrong, however, to suppose that when mathematics is expanded in an analogical and dialectical manner this high certitude and clarity are simply retained. The controversies about the foundations of mathematics between Formalists and Intuitionists show that the further one moves from simple arithmetic and Euclidean geometry the more problematical mathematics can become. The application of mathematical models to physical reality in a positive sense can only be approximate and dialectical. Thus a considerable proportion not only of mathematical physics but also of what is now accepted as pure mathematics is liable to a "hermeneutic of suspicion" that can only be removed by a critique of its foundations by Metascience.

That the Greek conception of mathematics as a purely theoretical science of abstract quantity (as in Euclid) was a remarkable advance is evident from the fact that the cultures of India, the Far East, and the Americas never took this step, in spite of the fact that these cultures used algebra and trigonometry in a pragmatic way to solve problems of astronomy and surveying. Yet it was in Islamic culture that "Arabic" numerals were invented and in India that the decimal system was first devised in the first century CE.⁵⁰

D. TRUTH IN THE PRACTICAL SCIENCES

In the case of the ethical and technological sciences similar oversight is required. The present discussions on ecology and on human health show that decisions in the use of technology are not merely technical but always involve consideration of how they serve the good life today and for future generations. Yet ethics, individual and social, always involves questions about what is essential to human nature and its needs, which are treated in the "life sciences," which are a part of natural science. For example, the debates about ethics of homosexual behavior and its social effects remain arbitrary and ideological if we do not ascertain exactly why some people are homosexually oriented and others heterosexually.

Obviously, the kind of certitude possible in these practical fields is less than in theoretical matters. Eclipses are more easily and objectively explained than are questions of whether a certain kind of behavior leads to human welfare or not. It is not merely that such ethical and technological problems deal with systems that are more complex than a solar system, but that, besides the factors of natural law and chance interference with natural law, there is also the factor of human freedom. This is why there has always been controversy over whether sociology is value-free, like biology, or normative, like medicine or ethics. Also, since human freedom belongs to the spiritual order, Metascience has more to say about freedom than does psychology. This is apparent from the fact that, in ethical decisions regarding the right uses of technology, the issue of "religion" (including the antireligion of Secular Humanism) inevitably enters in and requires honest dialogue. Such dialogue must be guided by the broader wisdom sought by Metascience.

In the technologies, including the fine arts, there are also problems of truth-value peculiar to these disciplines. Since "art imitates nature" and "art perfects nature," yet involves human freedom or "creativity," Metascience must compare the artificial to the natural. The issue of the fine arts will be left to the next chapter, but we must here note that any technology must respect the material and resources it uses and

not destroy them, since this would be destructive of human well-being. Furthermore, for any technology to prove truly useful to human life, it must meet true human needs and not false ones. This must be achieved in the context of a natural environment that must be perfected as a fit setting for human life, not polluted or violated.

While, as I have repeatedly insisted, the foundations of natural science depend only on the natural observation that is presupposed to the use of instruments of observation, measurement, and experimental isolation and control, most of what we need to know further about nature can be obtained only by an increasing use of complex technology. This of course introduces problems of determining whether what we observe is nature or an artifact. We have come now to the point where scientists can argue that the laws of quantum physics yield definite predictions only when the events are actually observed by a physicist. What is more significant is that the modern scientific world picture is no longer that of a universe ultimately intelligible and predictable in terms of determinant, universal laws. Instead, science now explains our universe principally in terms of its historical evolution in which such laws play an essential role, but the specific scenario is the result of chance. Thus it almost seems that science is being reduced to history. An Aristotelian Metascience, since it grants the reality of chance and human freedom, and considers natural laws to hold only *in pluribus*, can easily accommodate this development.

Thus, in every human discipline, the question of a logical truth founded on ontological truth, that is, what is true by epistemological criteria, must be faced. One should not, however, reduce all kinds of truth to one variety of truth. That again is why truth must be understood contextually. But our reasoning can be internally consistent only when the principles we use and the conclusions we reach correspond to a reality our minds did not construct.

E. TRUTH IN HISTORY

In chapter 2, section D.3, it was shown that Hegel and Marx have been influential in the modern effort to build a "science of history," often also under the influence of biological evolution. Yet since history is not about universals, but about unique events, it cannot be a science in the Aristotelian sense. It was further argued that historical events are efficiently caused not only by deterministic natural causes but are also affected by chance interference of one such cause with another. Moreover, historical events may be affected by the free decisions of human and superhuman persons, and governed by the free providence of God whose precise plans are hidden from us. The question therefore arises whether and how certain knowledge of history is possible.

The sources of our natural knowledge of history are of five kinds: (a) personal memory of an event, (b) trustworthy witness of others who have experienced an event, (c) records of such witness, (d) conjectures based on archaeological or paleontological remains, and (e) conjectures based on natural laws. Certainly each of us has some memories that are certain, but it is notorious and confirmed by empirical studies that human memory often fails. We forget many things, and we sometimes seem to remember what is only imaginary. Yet it would be groundless skepticism to deny that some of our memories are certain as regards their essential facts. Often we cannot recall something we think may have occurred; but we also experience a real difference between an imagined event and one that actually occurred. When we confuse the two, we also usually can see why we made the mistake and how to guard against it in the future.

Our knowledge of history as we have experienced it is very limited indeed, and most of what we know of the past is through *faith* in others.⁵¹ Is it reasonable to trust anyone in a world in which the Psalmist cried out, "Every man is a liar!"? Again it would be rank skepticism to refuse to trust all witness except our own memory. Sometimes we know that another (a) claims to have experienced an event, (b) could have experienced an event, (c) is a person of good character, and (d) has no strong reason to lie. Not to believe that person is then utterly unreasonable. The whole of human social life is based on trust, since we need information possessed by others both to make practical decisions and to make progress in learning. While it is foolish to be credulous, it is also foolish not to have a reasonable faith in the word of others. Thus to refuse to believe that a plane destroyed the World Trade Center towers in New York, or to imagine that perhaps the pictures of the event on TV was a hoax, or that the Holocaust did not occur, or was not the work of Hitler, is the credulity of credulities. Yet it is also true that eyewitness reports of one and the same event often reflect the subjective perspectives of otherwise trustworthy witnesses.

Such difficulties increase when it is not possible to interrogate different witnesses, and faith must be put in written records from the past that are often very fragmentary. In this situation it is even more necessary to *reconstruct* the past on the basis of a few facts that can be certainly established. This problem of interpretation is even greater when the past must be reconstructed not from written records but from

surviving archaeological or paleontological remains. The discovery of a mummy does indeed give us certitude that a Mr. X lived and perhaps even what killed him; but when he lived and who he was begins to involve us in conjecture.

Yet again this does not mean that *all* our historical knowledge is merely probable, as some have asserted. As John Henry Newman brilliantly argued,⁵² historic certitude can arise from a concurrence of probabilities, that is, from the way in which one datum excludes the doubts that may be raised about how to interpret another datum. I may evaluate the testimony of a witness to a crime as merely probable, but when the merely probable witness of another corroborates it, all reasonable doubt may be removed.

Nor need we be troubled by the interesting thesis of David Hume, skeptic that he was, that we can only judge the probability of a past event by what we have experienced *usually* happens.⁵³ Hence, Hume claims, unusual historical events, especially alleged "miracles," must always be judged improbable and those who claim to witness them untrustworthy. This rule of historical criticism rather obviously is only a half-truth. In chapter 3, we rejected Hume's argument that we cannot really know that one event causes another, but only are in the habit of expecting that what we have regularly experienced in the past will keep happening. The relation of cause and effect is not, as Hume supposed, that of successive events, but is the dependence of the simultaneous effect on its proper cause.

Hume is, of course, correct in saying that our senses cannot directly observe this relation of dependence, since real relations are not as such directly sensible but are known by an intellectual analysis of what we do observe sensibly. To doubt that my life depends on oxygen becomes clear, not just from observing the facts of asphyxiation but also from intellectually explaining the facts when I come to understand why I cannot live without oxygen as the source of the energy required for my brain to function. Such observations establish the kind of real relation of dependence of one fact on another that is called "causality."

Hence, contrary to Hume, the probability of an historic event does not depend, as scientific truth often does, solely on the uniformity of events. Historic events never exactly repeat themselves, so Hume's rule would reduce historical knowledge to almost nothing. Every historic event is in some respect unique; but since some historic events are certain, it is not true that their uniqueness makes them improbable. Usually causes are known from their effects, not the other way around. History is a series of observed effects that we attempt to explain, but often cannot explain (indeed can never perfectly explain), by searching for their causes. Moreover, although we often say, "History repeats itself," it never repeats itself perfectly. Hence there remains great room in history for the exceptional to happen. Nothing in natural science excludes such exceptional events, and hence natural science does not exclude miracles that transcend any natural law or free human decision. Historical criticism is not very critical if it assumes that history must have been or will be always what we expected it to be. While true historical criticism is cautious about accepting the unexpected, it remains open to evidence that a miracle has occurred.

Thus the certitude of history rests on human faith, but this may be reasonably credible, even when witnesses testify to unique and inexplicable events. To reduce all credibility of witness to probability would be to deny to the human mind any certitude except as regards events we personally witness. This extreme "Show me!" attitude of the Doubting Thomas has no rational justification, but in fact contradicts human reason, as is evident from the fact that when I have doubts about the accuracy or objectivity of my own observations I often turn to the witness of others to confirm them.

Therefore, historical research can give us some certitude about past events and even some certain explanations of particular aspects of these events, but it is largely forced to reconstruct the past on the basis of reasonable conjectures. Nevertheless, modernity has made a very real contribution by emphasizing the value of historical knowledge, something that the Greeks and medievals underrated. Greater concern for historical truth is of special importance for Metascience precisely because historical knowledge enables us to *contextualize* our worldviews and those of others with whom we want to dialogue profitably. The best way to attain a degree of objectivity and freedom to think critically is to become aware of the limitations that our own personal and social histories ("narratives") impose on our thinking and that of others.

Both the ancients and the medievals looked to history to illustrate the basic principles of individual, family, and political ethics, so that history was grouped with the practical and ethical sciences. St. Augustine, with his *Confessions*, invented the autobiography devoted to the life of an individual in his interior motivation. Previous lives of great men were chiefly political or, in the case of saints, an account of miraculous deeds or martyrdom ("hagiography"). With Augustine, however, the confessional autobiography emerged and, especially after Rousseau copied Augustine, has, in secularized form, become very common in our times when individualism prevails.

Other historians have claimed that the real purpose of historical narrative is not so much explanation but a recovery of forgotten human experience. Thus historical narrative closely resembles the contemplative value of artistic fiction and drama, and would pertain to the Aristotelian genre of poetics.

These views of the aim of history stand in sharp contrast to that which was proposed by the nineteenth-century historian Leopold Von Ranke (1795–1886), and which predominates among scholars today. Ranke maintained that historiography should be considered a strictly objective science, with no other purpose than to reconstruct and explain the past; it should simply discover “what actually happened.” While this effort at objectivity in the service of factual truth should surely be pursued for the reasons given, history can only be said to be “scientific” in the sense of critical; but it cannot truly be said to be a science in Aristotle’s sense. To fully justify itself, therefore, as a laborious human activity, history must also, as the Greeks thought, serve a rhetorical, ethical purpose; or a poetic, contemplative one; or serve as a dialectic for some science, in which it is used to minimize and contextualize ethnocentrism in research. John Deely has recently presented the whole of his book, *Four Ages of Understanding* (2001a), as an illustration of the thesis that history plays a more essential role for philosophical thought than any previous school of philosophy has managed to realize (especially, ironically, in modern times), because the history of philosophy alone provides us with the scale needed to see the playing out of the *consequences* of large speculative ideas that, in foreshortened perspective, may seem more (or less) viable or perverse than they really are.

Thus we can conclude that each of the special disciplines—the strictly scientific, the practical, and history—has its own type of truth and criteria by which it is to be evaluated. History, in particular, serves the objectivity of all kinds of knowledge, including itself, by contextualizing a given achievement of science, philosophy, or society, thus making us more critically aware of the ways our own subjectivity must be guarded against or promoted. This applies especially to ways different cultures have tried to describe the universe in its totality, its Ultimate Cause, and also the nature of humanity with its free will and moral responsibility.

Metascience, reflecting on these attempts to find a unity (“coherence”) in human history by reason, has the task of comparing these proposals of persons usually considered “philosophers” (to wit, thinkers at the metascientific level) with the foundational principles of natural science and its current findings and theories. In light of the foundational conclusion in natural science that the universe has an immaterial and therefore intelligent and free First Cause, it is clear that this Cause governs cosmic and human history by *providence*. Yet reason as such, as stated in chapter 5, cannot know whether this history had a beginning nor what its end will be. The universe is evidently a relatively unified system evolving in time, or it would never have survived and attained the marvelous order that we observe it to have now. Yet this order is not the unity of a single substance, but only of a vast number of rather loosely coordinated substances, most of which are relatively simple atoms of hydrogen and helium distributed in vastly expanded “space.”

In these vast distances exist galaxies of stars in which more complex atoms and molecules are formed. On our earth, at least, life has evolved and risen to the level of intelligence. This evolution has been achieved through the interaction of a few, perhaps only four, fundamental forces natural to bodies and determined by regular laws. Because of quantum indeterminism these laws are merely probabilistic, and thus these bodies interact with each other in more or less random fashion so that the outcome is fraught with chance. The most complex and highly unified bodies are living organisms, and of these the most complex and unified are intelligent human bodies that are capable of free decision and causality. Thus, the history of the cosmos is a matter of interaction between countless bodies, simple and complex, subject to determined laws, chance concurrences, and, on our earth at least, intelligent free causation that makes use of natural forces to overcome chance and produce freely willed results.

History in the stricter sense of the story of humanity as *homo sapiens sapiens* must have begun *at least* some 100,000 years ago, yet written records survive only for the last 5,000 years, so that only about 5% of the human story (or less) is known to us in any detail. It seems sure, however, that the earth’s present human population is the largest it has ever been. It also seems certain that modern technological control over nature far exceeds that of the past. As explained in chapter 7, the world religions each has its account of the drama of history. For Christian faith, the incarnation, crucifixion, and resurrection of Jesus are the center of human history that explains its beginning and its future end; while for Buddhism history is an endlessly revolving wheel. Philosophers and certain sociological historians have also sought patterns in history. But it seems certain that no such theory of history, especially one that seeks to predict the future, can, on the basis of reason alone, enjoy much probability.

We can look backward in time and give partial explanations of unique historical events in terms of natural and psychological laws, but these are essentially imperfect, and very diverse outcomes were possible at every point of the sequence of events. This was increasingly the case as cosmic and biological history became human history in which freedom plays an essential role. One can explain psychologically some of the factors that led John Wilkes Booth to assassinate Lincoln, yet his attempt, although it succeeded, had been very unlikely to succeed!

Of course the fact that human beings naturally seek happiness, knowledge, and control of nature helps explain why there has been remarkable scientific and technological progress since 1600, but this fact may not in the near future prevent an asteroid from destroying all this progress and our human race as well. A

unified understanding of human history is possible only in utterly vague outlines. We are left with a mystery of human existence that forces us to ask whether the providence of the First Cause that transcends our reason may be somehow revealed to faith.

Since, according to the foregoing, the writing of history as an intelligible narrative must be a work of reconstruction, it involves not only the scientific mode of logic but also something of the rhetorical and poetic modes. As already mentioned, the Greek historians thought that history should be written to honor the great deeds of the past, and thus promote patriotism, or to entertain by reporting marvels. Thucydides emphasized the former aim, Herodotus the latter. On the part of the historian, the former aim especially requires rhetorical skill, the latter poetic skill. Something like this ancient view was well argued by R. G. Collingwood (1889–1943),⁵⁴ who held that history must be written empathetically as a “re-enactment” of the experience of the past.

It is characteristic of modernity that it is both skeptical about the possibility of historical certitude and at the same time anxious to discover what it has to teach us. We hope that it will help us to self-understanding. Martin Heidegger has even maintained that the essence of the human person is *historicity*. We are indeed historical beings, but not only such. Logically Heidegger’s view implies that we are purely material beings existing only in our becoming. If, however, we are also spiritual beings, as we have shown has been well argued by many thinkers, then we essentially transcend the order of changeable being and are capable of abstract, intellectual knowledge culminating in Metascience. Thus the human person and all spiritual persons, by reason of their contingency, have an historical dimension. If pure spirits exist, they would probably have a greater or lesser serial existence analogous to time. For monotheism, God has no history except in the inverted sense that he has created, sustains, and will bring to completion an historical universe. Only in a pantheism like that of process theology does Divinity historically perfect itself or, as in Hindu thought, manifest itself in *maya*.

Thus Metascience both defends the possibility of at least some certain knowledge of history and recognizes the limitations of reason in arriving at certitude about “what actually happened” and why it happened. Metascience also calls attention to how our historical convictions enter into our efforts to understand the world and act responsibly. Hence, in interdisciplinary and intercultural dialogue, the assumptions each partner makes about the past should be honestly exposed and critically examined. For example, dialogue between science and philosophy will come to a dead end unless the history and mythology of science is carefully explored. Again, the dialogue between cultures on ethical questions cannot proceed without an examination and admission of past sins committed by one culture against another.

Goodness and Final Causality

A. FINALITY, THE CAUSES OF CAUSES

1. Finality and the Other Causes

The transcendental term “Goodness” is often attributed to things that are only *apparently* good, for example, an alcoholic drink seems very good to an alcoholic but is in fact destructive and bad for this person. This understanding of the term, of course, makes the goodness of things merely relative to human needs. But from this narrow conception of the good, we also come to see more broadly that the “goodness” of anything is the full realization of its potentialities together with whatever preserves it in existence and contributes to its wholeness and perfection, its unity and ontological truth.

Thus we can recognize that the preservation of living species and their health and survival is good, not bad, since it contributes to the order of the universe. This can also be said of inanimate substances as they exhibit various forms of organization needed by the system of the universe in its development and marvelous order. To the contrary, we recognize as bad or evil the destructive events in the universe that seem to return it to chaos. The main argument of the atheist and the cynic is the evident evil in the

world. Thus the notions of “good” and “bad” or “evil” can be meaningfully, though in analogous ways, applied to everything that exists in the contingent universe that is the subject of study by Metascience.

That “good” and “bad” have many senses that are only analogous is evident if we consider how different is the sense to say that a child is “bad” from the sense either that food can be said to have gone “bad” or that the destruction of biodiversity is “bad” even when pursued for human benefit. Thus the notion of goodness or value is connected in Aristotle’s thought with that of final causality or teleology (from Greek *telos*, goal) or, as we might now prefer to say for the reasons earlier discussed, teleonomy. Aquinas quotes Aristotle’s definition of the Good “as that which everybody desires.” This definition is not contradicted by the fact that some people desire what is bad, because they desire the bad only because it *appears* to them to be good or because, even if they know it is bad, they find something good in it to justify their evil desire.¹

One of the major features of the development of modern natural science was the rejection of such teleology or explanation through final causality. As early as Francis Bacon, teleological explanations in science were said to be anthropomorphic projections of human purposiveness onto inanimate things and hence scientifically useless. “The research into final causes,” Bacon suggested, “like a virgin dedicated to God, is barren and produces nothing.”² Causal explanations were reduced to those from efficient and material causality. Formal causality was not recognized, yet actually entered into natural science through its use of mathematical models, because mathematical explanations are made through formal causality.³ Kant seemed to settle the question by arguing that all causal explanations (and especially those through final causality) are due to the imposition of the categorial structures of the human mind on the data of experience.⁴ This rejection of teleology by natural scientists seems to have been principally the result of a persistent misunderstanding of the Aristotelian concept of finality.⁵ Aristotle’s natural science has changeable being (*ens mobile*) as its subject,

and this subject is analyzed into its intrinsic material and formal causes. Since, however, as shown in chapter 3, “Nothing can change itself,” change will not take place without the action of another substance, the efficient cause. If then we are to formulate universal natural laws about efficient causality, we must determine that a given kind of efficient cause has a determined and specific effect—unless by chance another natural or free agent interferes with the production of this effect. This implies that the agent is *predetermined* by its nature to produce this specific kind of effect and not another. For example, the law of gravity states that massive bodies are predetermined by their mass to attract other massive bodies with a precise force. On the other hand, while bodies with opposite electromagnetic charges always attract each other, those with similar charges repel.

This *final causality* or teleology, as understood by Aristotle and Aquinas, is not some kind of conscious purpose in a body, as we saw earlier,⁶ nor is it some occult kind of efficient cause. It is nothing more than precisely this predetermination of a natural efficient cause to produce a specifically determined effect *provided that this effect is considered in its productive rather than its destructive character*. This qualification is added because, in natural changes, the production of one entity is the destruction of another. Thus the growth of a plant to maturity from its seed is a good example of final causality (teleology), since in proper conditions this happens naturally (regularly) and results in a relatively stable entity that can function for its natural lifetime.

It would be wrong, however, to consider the death of a plant (although all plants die) as final causality; yet the fact that, in dying, plants make the soil fertile for a new crop or are eaten to sustain an animal can be considered a kind of extrinsic “ecological teleonomy,” albeit less evidently so (considerably less evidently) than the plant’s growth. We might, therefore, call processes considered as they destroy order and stability in nature “anti-teleology,” and we can see that anti-teleological processes are correlative to teleological processes. Both processes enter into scientific explanation only in so far as the material world continues to survive. Thus material and formal causes are

intrinsic to a substance and keep it stable, while efficient and final causality pertain to extrinsic agents that cause another substance to change and whose effect is not intrinsic to an agent but is in another substance on which it acts.

Aristotle never claimed that all observed processes are teleological. Some observed events are best explained by reference to their material or efficient causes without reference to any final cause. Thus, in his treatise *On Dreams*, unlike Freud and other moderns who seek a *function* for dreaming, Aristotle concluded that dreams are merely the residual activity of waking sensations that have not yet quieted down.⁷ In any case, since we have already established that *chance* is an objectively real type of efficient causality, not all events are teleological, but only those that occur regularly and result in the existence of relatively stable entities.

Just as matter and form are correlative so that they complement each other, so efficient causality, if it has regular, productive effects that maintain the natural order, is correlative to final causality; and all natural science explanations through law-like efficient causality must also be through final causality, that is, they must be teleological (or “teleonomic”). As a matter of plain fact, therefore, in current natural science, explanation through final causality is not only actually used covertly (under such other terminology as “directedness,” “function,” “adaptation”), but it is always the *ultimate* mode of explanation. As Aristotle said, “Final causality is the cause of causes,” since nothing occurs in natural processes except through efficient causes that are predetermined to produce effects that have the regularity of a predictable probability.⁸ Thus, in biology the physiology, anatomy, and psychology and life functions (respectively the material, formal, and efficient causalities) of an animal are ultimately explained in terms of its survival in its actual environment, and thus by the predetermination or final cause (teleology) of the efficient forces that keep it alive and functioning.

Since mathematical objects do not change, final causality is not a general mode of explanation in mathematics.⁹ It is absurd to ask whether 3 is better than 2, or a circle better than a square. As

shown in chapter 8, mathematics, because of its abstract character that omits questions of change, generally defines and demonstrates only through material and formal causality. This does not mean, however, that mathematical objects, as imagined and understood in their orderliness, are not, at least in certain ways, “good.” They can have a unity, clarity, and wholeness, in contrast to lack of order or incompleteness. I will speak of this later in this chapter, as well as of the central place of teleology in the practical sciences where it is obvious that the purpose or goals of action are fundamental principles.

2. Intrinsic and Extrinsic Finality

In chapters 3 and 6 it has already been shown that the universe is a unified system of substances that have a relatively independent existence, and that each of these substances is a more or less complex and unified system of material parts or, in the case of spiritual beings, a system of spiritual powers. We must, therefore, distinguish between an internal teleology of a substance by which these differentiated material and spiritual parts are hierarchically ordered so as to serve the good of the substance, and the external teleology of systems of substances that have relatively independent existences. Yet even the prime matter of the universe has teleology, since as pure potency it is ordered to all the actual things that can be produced from it. Thus, far from being a principle of evil, as some Platonists and Neoplatonists thought, matter, though it is not actually good, is potentially good.¹⁰

Natural science studies each kind of substance to explain how its parts function for the preservation and perfection of the whole. Such practical disciplines as medicine are especially concerned to remedy any dysfunction of parts that may cause disease of the whole body. Natural science also considers how systems of substances lead to the preservation and dynamic evolution of the substances that in these systems are connected causally by extrinsic relations. Thus we can speak of ecology (from Greek

oikos, household), concern with the preservation of biodiversity and the balance of life forms, as something good and of the destruction of ecological systems as bad. Such teleology is extrinsic to the individual substances, but of course intrinsic to the system as a whole.

One of the causes for the bad reputation of teleological explanations has been the failure to recognize that while it is rather obvious that there is an internal teleology or functional unity in living things, and even in atoms and molecules, external teleology is more problematic. In the nineteenth century there were naïve attempts to show that various features of animals, plants, and minerals were designed by God to make them suitable for human use.¹¹ Such theories are now replaced by evolutionary and ecological accounts of how the human species has survived by adapting to its varying environment. Yet this leaves unsolved the question of why in fact the human species has been the extremely improbable outcome of this evolution.

Errors in explanation by external teleology are rooted in the deeper error of supposing that the service of nonhuman substances to human life and to the good of the universe is merely utilitarian. In fact, while this service is necessary for human survival, the higher teleology of the system of substances, material and immaterial, in the universe is the manifestation of God to spiritual beings. Biodiversity, for example, is not just good because it has practical uses for human beings, but also, and in a superior way, because the human study of the diversity of living things gives us a contemplative joy that exceeds utility. An entomologist delights in the vast variety of insects, not for any practical purpose, but because of their wonder and beauty. Aristotle answered those who laughed at his interest in “the entrails of worms” by saying, “The work of the Divine Artist is evident even in these lowly things.”¹² Hence if, as I have argued in chapter 4, pure spirits exist, they surely must praise God for the variety and order of the universe and know him naturally through their contemplation of its order, as they must also take pleasure in serving God in the governance of his creation.

B. BEAUTY AS A TRANSCENDENTAL

1. *The Concept of Beauty*

In chapter 6 only three transcendental properties of Being (unity, truth, and goodness) were listed. Many have argued that “beauty” should be added to this list. Hans Urs von Balthasar pointed out that while theologians have paid much attention to God as Unity, Truth, and Goodness, they have said little of him as Beauty. Is this not odd, he asks, considering that the Jewish and Christian Scriptures constantly speak of the divine “Glory” or Beauty? He believes that

We no longer dare to believe in beauty and we make of it a mere appearance in order the more easily to dispose of it. Our situation today shows that beauty demands for itself at least as much courage and decision as do truth and goodness, and she will not allow herself to be separated and banned from her two sisters without taking them along with herself in an act of mysterious vengeance. We can be sure that whoever sneers at her name as if she were the ornament of a bourgeois past—whether he admits it or not—can no longer pray and soon will no longer be able to love.¹³

Others, for purely philosophical reasons, have asked if beauty ought to be ranked among the transcendentals as a property of all Being, and this topic is often considered to be a special branch of metaphysics under the heading “aesthetics.”¹⁴

Aquinas, in speaking of beauty as the *splendor veritatis* or *splendor formae*, and describing it with the terms *claritas*, *proportio*, and *integritas*, provided us with a profound metaphysical analysis of this question.¹⁵ Ontological truth of itself has *integrity*, or the wholeness of transcendental unity, and this requires the *proportion* of its parts. In itself, it also has *clarity*,

since it is intrinsically intelligible and selfconsistent. It is in this clarity, or splendor of the ontological truth of being, its relation of conformity to the conditions of the knower (logical truth), that beauty principally consists; while the integrity (wholeness) and proportion (of its parts) are the necessary conditions of this ontological truth.

Hence it is only a half-truth to say, as many do, either that beauty is purely subjective (“Beauty is in the eye of the beholder,” “There is no disputing about tastes”) or that it is purely objective. Beauty “in itself ” consists in a *relation* between known and knower. Thus, what appears beautiful to one may not appear so to another, either because of some condition of the knower, faulty perception, lack of trained sensitivity, and so on, or because of disappointed expectations, as when a work of popular art pleases an average audience but a trained sophisticated connoisseur finds it crude or trite.¹⁶ Moreover, some things that really have little beauty are thought to be so by greedy shoppers because they are rare or expensive, by lustful voyeurs because they promise sensual pleasure, or by vain spectators because they are “in style.”

Thus, to speak or show the truth so that it is beautiful is to express it in a way that it can be easily and deeply grasped by the one to whom it is spoken or shown. To God’s perfect intelligence, his own being and that of the creatures he creates are perfectly known without any shadow of obscurity, and hence are seen as wholly beautiful (except insofar as they are injured by accident or sin, though even then, God sees them in contrast with their pristine beauty that he as Creator intended for them to have). To created intelligences, however, God’s Truth is mysterious and imperfectly understood, and so is the ontological truth of his creation to a greater or lesser degree as it depends on the power of a particular created knower to understand what God has made. That is why all creatures have to search for truth and come to know it gradually as its obscurity is clarified and its splendor unveiled.

When we see some truth clearly, when it becomes perfectly related and fitted to our minds, then it appears to us as beautiful. Good mathematicians thus find much of mathematical truth very

beautiful because of its clarity, though to the nonmathematician it may be most obscure. Beauty is, therefore, a kind of truth because the good of the knower is to seek what he or she desires to know, and this is attained perfectly when at last the truth shines out in his fullness. When the poet John Keats said in his *Ode on a Grecian Urn*, “Beauty is Truth and Truth Beauty,” he was profoundly right, but when he added, “That is all you know on earth / And all you need to know,” he was sadly mistaken, because there are in fact many and sometimes very important truths we know or need to know that “on earth” remain very obscure to us, and hence whose intrinsic beauty is for us veiled. Thus we can define beauty as it is a property of Being as “the goodness of truth,” truth as we desire to enjoy its contemplation.

2. Physical Beauty

Since human cognition begins with the senses, and essential intellectual knowledge depends on what the senses show us, objects, if they are to seem beautiful, must first of all fit our senses and thus make a vivid impression. The senses of touch, smell, and taste present their objects to us too vaguely to reveal their beauty. It would be odd to speak of an appetizing steak as “beautiful” rather than “tasty,” yet its visual “presentation” on the plate surrounded by colorful vegetables might be called beautiful. Sight and hearing, however, provide specific information that is more easily used by the intelligence. Hence visual and audible objects can be beautiful.¹⁷ A color that is vivid to the eye is beautiful. A sound that is uniform (musical) and easily audible is beautiful.

Yet beauty is found not only in particular sensible qualities but in complex patterns of shapes and colors and sounds of varied pitches and timbres that provide objects with a proportion, symmetry, and wholeness of their parts, and a clarity of relationships and contrasts. Thus a flower is beautiful, not only because of its pleasing color but also because of both the symmetry of its petals that form a pattern of balanced relations

and the contrast in shape and color between its flowers and its leaves. The objection could be raised that in landscapes sometimes mist or fog seems to enhance the beauty of the scene, or that soft sounds of waves and wind can have a special beauty, since such vagueness seems to obscure rather than enhance clarity. The reason for this fact, however, seems to be that human observers often prefer external sensations that, rather than show an object clearly, simply *suggest* beautiful images to the *internal* senses. In this way observers, by filling in the details of the suggested object by the activity of their own imaginations, enter more intimately into the experience of the beautiful. Thus beauty that is too obvious can in fact conform less well to the knower (that is, have less clarity) than something subtler. A clear, sunny day is generally perceived as more beautiful than a gloomy one. Yet some observers, such as those in a mood that resonates with a misty scene in which the outlines of trees and mountains are mere suggestions of form, may find its mystery more beautiful than it would be on a clear day.

The archetype of the beautiful for us humans is the human body in its integrity, proportion, and clarity (color and “clean-cut-ness”) because our human powers of cognition are especially constructed to help us know other human beings, particularly those of the opposite sex or our small children. Generally beauty is attributed to women’s bodies and strength to men’s, but this is a matter of emphasis only, since both female and male bodies have their appropriate kind of both beauty and power. While physical beauty obviously contributes to sexual attraction, the two kinds of goodness should not be confused. The attitude of the observer looking at the nudity of the opposite sex in search of a sexual mate is by no means the same as that of an artist observing his model in order to make a beautiful painting, or of an aesthetically sensitive person enjoying a representation of that nude in an art gallery.¹⁸

The latter kind of observer is said “to maintain an aesthetic distance” from the object so that it does not suggest sexual fantasies.¹⁹ If this distance is disrupted and the observer becomes sexually aroused, the experience of beauty is likely to be

overwhelmed by sexual appetite, just as an observer at an athletic game would be overwhelmed if his enjoyment of the contest turned into thoughts of shooting the opposing team. In such cases the contemplative attitude is disrupted by a controlling attitude that wants to act on the object rather than simply to enjoy it as it is. Hence, as already mentioned, pornography and scenes that arouse violent impulses are not seen as beautiful, but as satisfying other kinds of desires (goods) that are in fact ethically disordered and evil.

The saying that “great beauty must have a touch of strangeness” indicates that although the beautiful is essentially the clarity of truth, nevertheless, for us humans too much clarity quickly palls. This is because we know instinctively that the greatest truths and their beauty transcend the human level. They remain mysterious to us, and this suggestion of mystery in a beautiful object leads us beyond the ordinary to the extraordinary. Therefore, the element of ugliness and tragedy found in many great works of art and literature does not contradict the definition of beauty as clarity or splendor. These negative features both make the positive features stand out more clearly by way of contrast and suggest a mystery by summoning us to envision a higher beauty beyond our immediate grasp. Eighteenth-century critics made this point by emphasizing what they called the distinction between “the beautiful and the sublime.”²⁰ The ugly elements in some great and beautiful works of art, however, do not justify the tendency of some modern artists to shock their audience with mindless ugliness.

3. Spiritual Beauty

Plato, in his dialogues the *Symposium* and the *Phaedrus* (themselves marvels of literary beauty), shows how through the visible physical beauty of the human body one can come to appreciate the beauty of the invisible virtuous human soul. Thus from the erotic (sexual beauty) one can ascend in contemplation to spiritual beauty, of which, for Plato, bodily beauty is a mere

imitation. Physical beauty fades, spiritual beauty is ever new and fresh. In human beings this spiritual beauty is that of character formed in the virtues, and will be discussed later under the heading of ethical beauty; but the human soul itself, and certainly the realm of pure created spirits, has an ontological beauty analogous to that of the structure of the body. Spiritual entities, although not material and hence not sensible, have active qualities of intelligence, will, and the power to act on material bodies, as well as to communicate with other spirits (see chapter 6).

According to Aquinas, the human soul when separated from the body at death will, like the angels, become directly self-conscious as a pure form that is self-transparent.²¹ This separated soul will know itself directly as a spiritual creature far more beautiful than any physical thing. This will be true, according to traditional Catholic doctrine, even for those who have died in mortal sin, as it is for the fallen angels, though in these spirits this original beauty is tragically distorted by sin so that they are like ravished masterpieces of art. Thus the medieval artists who pictured devils as hideous or even comic monsters missed the point of this tragic ruin of what was once so glorious, and Milton was closer to the truth in making his Lucifer *magnificently* evil.

While we can only know spiritual beauty through its analogy to the physical beauty that we can sense, in First Philosophy “beauty” as a transcendental signifies this whole range of degrees of beauty up to the ultimate and infinite beauty of God the Creator. The Creator has produced many things to form an ordered universe, because such an *Unum in Pluribus* can better reflect the divine plenitude of Being than could any single creature, no matter how perfect. This holds also for creation as it reflects God’s beauty like a mirror.²² The order of a universe of creatures, each one having a unique beauty but hierarchically ordered in a harmonious whole, is like that of orchestral music made up of the coordinated harmony of instruments making different sounds, yet all united by the conductor.

C. DIALOGUE WITH THE AESTHETICS OF OTHER CULTURES

Only in the later eighteenth century with the adoption of motifs from Chinese art did European culture begin to appreciate the art and literature of the East, so different in its style and aesthetic emphases from “classical” Greco-Roman art and literature. Indeed it was not until the beginning of the twentieth century that the art of sub-Saharan Africa, the Americas, and other preliterate cultures was appreciated as more than “savage” or “barbaric.”²³ It is not possible here to say much on this vast topic, but only to indicate the kind of issues that arise when the fine arts and literature of cultures having different worldviews are compared.

In the art of preliterate cultures, architecture is not highly developed, although around the world there remain ancient monoliths, used as tombs or as markings of sacred places related to astrology, that are forerunners of the monuments and temples of Egypt, Mesopotamia, and the pre-Columbian Americas. Even cultures having only the simplest of technologies create dance, music, and oral literature that is often quite refined and expressive of their mythological worldviews. Such art is often unappreciated by Western viewers, because it is much less concerned to represent natural forms than it is to manifest the hidden *power* of natural forces. For example, in the wonderful art of tribal Africa and of the Mayas and Aztecs in Mexico, what eighteenth-century Europeans saw as primitive barbarity is, in fact, as Picasso and other twentieth-century artists were to discover, a very sophisticated distortion of literal representation in order to display the hidden power of spiritual presences. Yet these twentieth-century artists for the most part replaced the expression of these natural powers with the expression of their own personal powers as artists.

In early Europe, the mythology of many cultures—Minoan, Celtic, Germanic, Greek, and Roman—along with the Judaic Bible, provided the Western Ecumene with a symbolic heritage that underlies all its art. Central to the development of that

heritage, however, was the Greek art from the time of Homer in the seventh century BCE to the rise of the Roman Empire in the first century BCE, which created the “classicism” that still remains central to Western culture. This classicism is characterized by two elements that reflect the cultural tendency that became manifest in Aristotelian and Platonic philosophy. On the one hand, classical art is attentive to the exact representation of nature and hence its dynamic, changing aspects; on the other hand, it tends to idealize or intellectualize such representation by seeking the essential rather than the accidental details of changeable realities, and hence their timeless spirituality.

Yet these two tendencies are also found, but with different emphases, in the art and literature of other cultures. Thus India, like Greece and its Homeric poems, has the great epics of the *Mahabharata* and the *Ramayana*. The *Mahabharata*, however, differs from the Greek epics in that it includes much explicit philosophical and religious reflection, notably in the *Bhagavad Gita*. Yet, as in Homer, the many eloquent speeches in these epics provided Indian culture with models of rhetorical discourse. Many manuals of rhetorical figures were also produced. Eventually the whole range of lyric poetry, drama, fiction, and the plastic arts of sculpture, painting, and architecture, as well as music and dance, developed in extremely rich and varied styles unique to India. The Gandhara style of sculpture that especially influenced Buddhist iconography, however, manifests strong Greco-Roman influences. Musical theory was extensively studied with an emphasis on the *raga* or traditional modes, each of which was thought to have special expressive qualities. As early as the first century BCE Bharata, in his *Natya-sastra*, discussed all the fine arts, especially sacred drama with its dance and music.

Art historians have noted three especially remarkable features of Indian aesthetics. First, the common conviction of the religions of India that the phenomenal world is no more than a veil for the eternal Absolute has led Indian artists to portray this world as a kind of fantastic dream of shifting images, human and animal, in contrast to gods and heroes often posed in silent *Yoga* meditation. The result is an art that is very sensuous and dynamic yet always centered in some silent, motionless symbol of ineffable

mystery. Yet mystical devotion (*bahkti*) to some god that symbolizes the Absolute is often expressed with an amazingly frank eroticism. A second notable element of Indian aesthetic, evident especially in its highly developed theater, as in Kalidasha's (fl. c. 375 CE) famous play, *Shakuntala and the Love Token*, is that it largely ignores the theme of tragedy so prominent in Western literature. Its heroes and heroines virtuously rise above the conflicts and perils that beset them, much as do the sages who achieve *moksha* by indifference to the passing things of this world. A third element is the notion of the gift of aesthetic sensitivity (*rasa*) not possessed by all. Abinavagupta (c. 1000 CE) taught that such sensitivity is a reward of the merit gained by the possessor in a previous existence.

In China and Japan also, literature and the arts, including poetry, fiction, music, dance, theater, architecture, painting, and sculpture, have richly flourished and have received critical analysis in such works as Luc Chi's *The Art of Letters* (c. 302 CE) and Liu Hsieh's *The Literary Mind and the Carving of the Dragon* (c. 550 CE). In contrast to India, literature in China also extended to important works of history, such as Ssu-ma Ch'ien's *Shih-chi* or *Historical Records* (c. 85 BCE), purporting to cover some 2,000 years.

The influence of Confucianism was felt in the arts in a conservative traditionalism in style and subject matter. Taoism at first frowned on artificiality but later, under Buddhist influence, favored a remarkable mystical emphasis in the arts.²⁴ Landscape painting, which as a principal subject was a relatively late development in the West, became in China a chief way to express a meditative transcendence of the phenomenal world. Thus, in Chinese and Japanese art, a characteristic subject is a scene of mountains looming above mist, with a small figure of a monk in meditation under a lone tree, leaving much of the space blank. Similarly in sculpture, the human figure is largely depicted only as a decorative architectural feature, except for the icons of Buddha or other figures in silent meditation. This emphasis, however, does not exclude many works depicting lively scenes of the daily life of the court or even of common people.

Yet this tendency to transcend the personal and individual is also reflected in the remarkable attention given to the crafts of exquisite design and workmanship in bronze, ceramics, and lacquer. In such objects, there is often an expression of abstract feeling that approaches that of music. Also, because of the peculiarities of Chinese script in which the letters stand for concepts but not always for the same sounds, calligraphy (beautiful writing) was remarkably developed by the Chinese, as well as by the Koreans and Japanese who used the same Chinese script for their own different languages. In Japan the “tea ceremony” is a ritual that in its setting, gestures, and implements is directed to creating an indescribable atmosphere of serenity and sensitive sociability, while the operatic No drama developed by Zeami Motokiyo (1363–1443) often expresses a Buddhist spirituality.

While the Indian and Chinese cultures, due to their monistic worldviews, favored a kind of abstraction in art, the monotheism of the Jews led them to *iconoclasm* (rejection of visual images as tending to idolatry), although they produced a rich literature and music.²⁵ After the fall of the Temple in 70 CE, however, Jews were so dispersed that, as a minority in many different countries of varied cultures, they tended to take on the styles of their particular locations. When Arabic Islam arose and conquered wide territories, it developed (with some borrowings, especially in architecture, from Byzantine Christianity) strictly aniconic styles in which the visual arts emphasized patterns rather than representation, although in Persian Islam some representation in exquisite miniatures was permitted.²⁶

Christianity accepted monotheism from the Jews, but as it spread it assimilated a variety of cultures. Still, no doubt because it first came to dominance in the Greco-Roman world, Christian art adapted the “classical” style of that culture even while retaining the Judaic fear of idolatry. This suspicion of figurative art led to the iconoclastic crisis that was overcome only when the Seventh Ecumenical Council (Nicaea II) in 787 CE condemned iconoclasm as heretical because of its inconsistency with the Christian doctrine of the Incarnation. Yet the Eastern Church

continued to venerate only painted icons, while the Western Church, although it permitted sculpture, did not fully adopt the realistic imitation of nature until the Renaissance.²⁷ It was still influenced by the Platonic philosophy that regarded the visible world primarily as a symbol of invisible, spiritual reality. Prepared by the increased interest in natural science that the Aristotelianism of the High Middle Ages had fostered, the Renaissance became much more interested in representation in art. It quickly developed the theory of perspective in painting and of accurate anatomy both in painting and sculpture.²⁸

Thus European art became skillfully representational, and a parallel realism entered literature both in drama and the novel. This scientific attitude also led to innovations in musical techniques that became ever more elaborate. Naturalistic tendencies were further advanced by the Enlightenment, which on the one hand emphasized natural science and on the other began to treat art as the expression of personal creativity and systems of value—that is, “life styles.” In the Romantic movement that was at once part of and counter to the Enlightenment, the aesthetic contemplation of nature and fine art is sometimes seen as the *summum bonum* of human existence, replacing the traditional religions.²⁹

Ultimately these tendencies led, at the beginning of the twentieth century, by way of extreme realism and impressionism, to abstract expressionism in which naturalistic representation was minimized in painting and sculpture, and remanded to photography, the cinema, and television.³⁰ By the end of the twentieth century, postmodern “critical theory” had led to the view that art is a political statement against domination and in favor of individual freedom. It must, therefore, be “disturbing” and is often marked by violence, dismemberment, repulsive bodily fluids, and blasphemy against all claims of the sacred. There is a widespread sense that “modern” art is coming (or has come to) an end, and it is not clear what are the future possibilities.³¹ In brief, the comparison of artistic traditions is not only a matter of art history but of the underlying ontologies or worldviews that these manifest. Precisely because different styles in art and

literature are so visible and tangible, they provide points of entry for contextual dialogue.

It would seem that what is needed is the recovery, already to be noted in the ecological movement, of a sense of *nature* as the origin of human art, as Aristotle maintained. This is not to be understood as mere photographic representationalism, as in the so-called Realism of the nineteenth century. *Mimesis* as Aristotle used the term meant an attempt through art to manifest the *essential* natures of things that make them intelligible to us, not simply in the abstract manner of science but as these natures are phenomenologically revealed through their sensible appearances and actions. Thus certain of Picasso's drawings of animals in a most delightful manner and with all the freedom from mere representation characteristic of modern art shows us the wonder and humor of these creatures in such a way as also to help us understand our own animality. Unfortunately, Picasso did not use his genius to open that way to a future art but preferred to occupy himself mainly with the kind of modernism that has now led to a dead end.³²

D. THE PROBLEM OF EVIL

As we experience goodness every day, we also experience bad things, frustration, pain, and, not infrequently, the destruction or death of things or persons we love. Much of the greatest literature is tragic or seeks to transcend tragedy by laughter. The book of Job poses the problem of evil in the starkest of terms, without attempting any final answer. While in the end things turn out well for Job, it is never clear why God permitted him to be tested by Satan, as if God needs to prove anything to Satan! Thus, the existence of evil is properly classed as a profound mystery, that is, a puzzle that reason needs to explore yet knows it cannot expect to solve to its complete satisfaction. Yet it is possible at least to clarify this problem, so as not to draw false conclusions

from its existence as a mysterious fact.

One such false conclusion has been stated very plainly in recent time by Jean Paul Sartre, when he reasoned: "Either God exists or the world is absurd. But the world *is* absurd. Therefore, God does not exist."³³ In part 1 of this book I argued for the existence of God from natural science, leaving questions of the divine nature to Metascience, which we will examine in chapters 12–13. There are really only two serious arguments against God's existence.³⁴ The first is that the universe is selfexplanatory. This argument was refuted in chapter 4, by showing that changeable material beings cannot change and exist without a First Cause that is not material and whose essence is to exist—a necessarily existing nonmaterial being.

The second argument is that if God existed he would be perfectly good, but a good God could never cause or even permit evil. Yet the First Cause could not be totally evil but would have to be totally good, since it is Pure Act, in no way deficient. In fact, the notion of an existent being that would be totally evil is simply self-contradictory, since existence as such is something positive.³⁵ In fact, by "bad" or "evil," we mean not merely a lack of some goodness (otherwise only God would be good), but a lack of some perfection in a thing whose nature requires such perfection, for example, a crippled animal that needs healthy limbs to survive. Some, like the Zoroastrians, held for a dualism in which a Good God and a Bad God struggled together, although they believed the Good One would eventually conquer.³⁶ Others, like the Gnostics and Manicheans, believed the Good God had hidden himself, and that the world in which we now live is the work of the Evil or a Foolish God.³⁷ Spiritual monists claim that the evil in the world is really error and illusion.³⁸ Many moderns believe our world is the work of evolutionary chance indifferent to what humans consider good or evil. Others even think that the distinction of good and evil is arbitrary.³⁹

To expose the fallaciousness of all such views, we must first distinguish between two very different senses of the term "evil" that are often confused, namely, the distinction between *physical*

and *moral* evil.⁴⁰ The argument against God's existence from evil assumes that God is *morally* good, since it seems contradictory for a morally good person to cause what is *morally* evil. It is not contradictory, however, to suppose that a morally good person can sometimes cause *physical* evil, provided that by doing so a greater good is accomplished. Who would consider it morally evil to eat good food for the sake of health? Yet when I eat an orange I cause a physical evil because I destroy the orange which will never achieve its own natural (teleological) physical good by producing an orange tree.

Thus, as we have already seen, it is of the very nature of finite, changeable, material things that the production and welfare of one physical thing necessarily entails some physical evil, namely, the destruction of some other physically good thing. Hence if God is to create a material universe, it is physically necessary for God to *cause* some good things in the universe to destroy other things, if he is to create a material universe at all. Moreover, it is *morally* good for me to eat an orange in order to maintain my life, or even for some moderate recreative pleasure, because human life is a greater good in the hierarchy of being than is the good of an orange tree and its fruit.

It follows that it is entirely compatible with, and indeed an exemplification of, the moral goodness of God that he has created a hierarchy of beings and brings about more perfect beings by the destruction of less perfect ones. Thus a theory of the evolution of the cosmos and of life is wholly consistent with it being the work of a good God, even though it means that the species of things that pertain to one stage of evolution are destroyed by the next higher stage.⁴¹ We may regret that an asteroid collided with the earth and wiped out the dinosaurs, but they had to go to make room for us. Thus Dostoevsky's famous cry, "How could a good God permit the suffering of a single innocent child?" was a sentimental refusal to face the reality of physical life. Physical life involves some pain, and it is better to suffer some pain than never to have the possibilities of life.

Moral evil, on the other hand, is a lack of perfection in the free act of intelligent persons, embodied and purely spiritual, who

choose to do what they recognize will result in making the world *less* good morally (and usually also physically) in situations where it is their responsibility at least not to make things worse.⁴² If, as the argument supposes, God is totally good, such acts are impossible for him. They are possible, however, to the finite, intelligent, and free persons whom he has created. What is not possible is for a good God to be the First Cause of the free acts of created persons *insofar* as they are lacking moral goodness.⁴³ Thus, when a human being chooses to murder another, though God is the First Cause of the person's physical act of murder, the moral evil of that act, namely, the killing of an innocent human being, makes the world less perfect but is due only to the free will of the murderer, not to God.

Yet God, because he is totally good, will certainly find a way to bring about a greater good to compensate for this lessening of the cosmic good. But when or how God will do this need not be apparent to us now, since we do not know the final outcome of the cosmos. That it is possible for an all-powerful God to bring a greater good out of any evil, no matter how great, is certain from the analogy of our own experiences.⁴⁴ For example, we have all experienced cases when, because of one especially heinous murder, the public is aroused to protect other likely victims whose safety would otherwise have been neglected. Indeed, in human history we see that a greater part of all human progress has been occasioned by lessons learned from tragic events, and each one of us can testify that some bad events in our lifetime have led to greater goods.

Yet, of course, many bad things have also happened to us that seem not to have led to a greater good; and in such cases it is necessary with Job to await God's answer, saying, "God gave; God takes away," perhaps waiting even to the end of time. As God says to Job, the goodness and wonder of creation ought to be enough to make us trust God's wisdom and in humility to admit the limitations of our own understanding. Job shows his own wisdom by admitting, in spite of his puzzlement, that what God says is undeniably true.

Since God never causes moral evil, but only permits his

creatures to evilly abuse the freedom he gave them, it does not follow from the fact that he permits this only for the sake of bringing out of the evil a greater good that we can “do evil so that good will come from it,” as some moralists have claimed. A good end does not justify the use of a morally evil means because by definition a “morally evil means” is one that cannot achieve but rather contradicts the attainment of the true goal of human life. When this ploy is used as an excuse, what is really being said is that to achieve some good that seems more apparent one has chosen to imperil a greater but less evident good. For example, when President Harry Truman dropped the atomic bomb on Nagasaki and Hiroshima to terrify the Japanese into surrender, he no doubt did so to save American lives, just as the Al Qaeda “martyrs” thought themselves justified in attacking the Twin Towers to terrorize us into getting out of Islamic territory; but in both cases the means used, the indiscriminate killing of innocent people, had no real ethical justification. The use of intrinsically immoral means for a good end is immoral for two reasons: (1) it tends to habituate the evil-doer to do evil again, and (2) it is an injustice to those who suffer from the evil-doer’s action. On the other hand, to use only just means, even if they fail to achieve the end desired, (1) develops the virtue of justice in the person who makes this effort, and (2) at least makes some headway in achieving the good purpose.

Thus the argument that the evil in the world shows that a good God does not exist is logically false and cannot disprove the arguments for that God’s existence. On the other hand, it leaves us with a great mystery, namely, given the immense amount of moral evil in the world and also the great physical evils (such as the destruction of the environment and unjust war) that have resulted from these moral evils, how can God possibly bring a greater good out of it all? We can very well agree with Sartre, “The world *is* absurd.” Yet its greatest absurdities are quite evidently the result of the abuse of free will by human (and maybe demonic) creatures.

Moreover, the beauty and order of the cosmos, as well as the existence of such marvelous beings as intelligent and free persons and the many great and good things they do, can only be

caused by a wise and generous God. It is Sartre's fallacious argument, not the cosmos, that is absurd. In fact, there could be neither physical nor moral evil if the world were not as a whole good, since, as was already said, evil is a lack of some good proper to an essentially good being. Thus, no matter how great the evil or absurdity of the world, the very fact of evil shows that the First Cause of the being of the world must be perfectly good. The real problem, therefore, is not to explain evil, but to explain the good in the world, no matter how terribly ruined that good has been. Yet when a physician looks at a horribly diseased and dying patient, the ruin of this living organism is not nearly so strange as the fact that it is able to live at all.

E. LOVE

The last lines of Dante's *The Divine Comedy* refer to the power of God that moves the poet's free will to circle around the Divine Center. That power is "the love that moves the sun and stars," that is, the whole universe. Since "the Good is what things desire," the ultimate goal and reason of all being, the term "love" must be applied to every efficient cause to indicate its predetermination or teleology. Of course it can only be used analogously, since the teleology of beings without cognition, those with only sense cognition, and those with intelligence and free will is extremely different. Yet all beings (transcendentally considered in Metascience) have a single goal, just as they have a single First Efficient Cause, since, as has been shown, any final cause must have a correlative efficient cause and vice versa. This supports Dante's view that God is the Primal Love that moves all things, just as he is the goal to which all move. Moreover, things are able to move toward this Divine Goal only by sharing in his love. A wise God who is Love must love the creatures he has freely chosen to create.⁴⁵ His absolute love for himself includes his free love for his creatures. Many commentators on Aristotle

have denied that he ever came to this conclusion so forcefully developed by Aquinas, but, as we will see in later chapters, Aquinas thought otherwise. Before this problem is taken up, however, something must be said about how this analogical term “love” applies to created beings.

For modern science, it is the four fundamental forces, all of which have both attractive and repulsive actions (except gravity, which is only attractive), that produce all processes of change in the visible cosmos. The fact that, according to modern quantum theory, these processes have only probable, not certain, outcomes would not surprise Aristotle, since he thought that in a material world subject to changes that were more than local motion natural physical laws are true only *in pluribus*—for the most part.⁴⁶ As I argued in chapter 4, it seems at least highly improbable that such forces could produce complex inanimate chemical compounds, let alone life. It would seem that just as the synthesis of complex chemical compounds in a laboratory has to be guided by a knowledgeable chemist, so the interaction of these fundamental forces has to be guided by cosmic spiritual intelligences. Darwinism inadequately explains these processes as chance events guided only by other chance events in the environment. Recent evolutionary theorists such as Stuart Kauffman think that a deeper understanding than Darwin’s can be gained from the concept of “self-organization.”⁴⁷ It is certainly true that natural substances tend to preserve and complete themselves (for example, an atom, deprived of some of its orbital electrons, will tend to recapture them, and crystallizing substances will form more perfect crystals). It has not been proved, however (nor are Kauffman’s arguments without serious flaws), that simpler chemical species have the inherent capacity to organize substances of more complex chemical species, let alone living organisms. Thus natural substances, inanimate or animate, do not appear capable of self-organization beyond the level of their own unified complexity. Aquinas admitted that “spontaneous generation” of very simple organisms might be possible, but only by the action of the sun, itself moved by a separated spiritual intelligence.

Thus the cosmic and biological evolution that we know to have taken place in the history of the universe is teleological, yet exceeds the inherent teleology of matter endowed with the four or more fundamental forces. There is no Cosmic Egg selforganizing itself like an embryo into a mature complex substance as a result of inherent *rationes seminales*, “seed principles,” as St. Augustine speculated. Rather, modern science has so far only revealed a universe made up of very simple chemical substances spreading out or collecting in very chaotic patterns, except for our little earth on which material substance has risen to the level of organic life and, in us, of embodied intelligence. The vast information required to guide this result can only be found in the First Cause acting in creative love. Yet he has probably shared this information with created spiritual causes whom he has directly created, and who in turn act out of love for their Creator. Thus the manifest goodness and beauty of the order that science more and more uncovers in this material universe so subject to chance must be understood, as Dante did, as a manifestation of God’s love, just as the work of any human artist manifests his love for the work he freely produces and for those he hopes will enjoy the product of his work.

From this it follows that the human persons in the community they naturally form, and then intelligently and freely shape, are inclined by nature and thus moved by love to explore the universe. They study it in order to enjoy its beauty and to learn from it something of the hidden wonder of its Creator and the spiritual community that serves him. The endeavors of scientists and their formulation of theories of evolution manifest the power of this love for truth and understanding. Scientists’ concerns for ecological balance and biodiversity are plain evidence of how natural it is for humans to love the truth about their world and themselves as part of their world.

This love of true understanding also issues in the human cultural urge to build an ordered society and to form virtuous members of the community. The virtues are intelligent skills that make it possible for persons as members of the human community to organize their human powers to preserve and develop the culture of this community in accordance with the love

they need and to which they should mutually respond. These virtues, however, incline us not simply to seek the good of others but, as Aquinas insists, to be *united* to other persons by sharing our lives with them. Nothing can so satisfy our natural desire to know as to know other persons, since a person by reason of her spirituality is the most perfect and beautiful thing God has created. Every person is not just an effect of God's creative act, but is an image of God. Thus love between persons is God's greatest gift. It is *friendship* (Greek *philia*) that Aristotle calls "the crown of the virtues."⁴⁸

The Lutheran theologian Anders Nygren, in an impressive book, *Agape and Eros* (1953), started an important discussion by noting that the New Testament term for "love" is usually *agape* rather than *philia* or *eros*, the latter often having a sexual emphasis. Nygren argued that since erotic love is a desire to obtain something that another has and one desires, the love of God *for us* cannot be erotic since God lacks nothing that he could gain from us. On the contrary, our love for God, according to Nygren, is erotic (though not sexual), because God has what we lack and need. Josef Pieper and others, however, have criticized this distinction, because our love of God and neighbor is a participation in God's love for us. Therefore human love can be both agapetic and erotic. Certainly perfect friendship, as Aristotle and Aquinas understand it, is not simply desire for something we need but a love that we share with a beloved friend.⁴⁹

Denis de Rougemont, in his well-known *Love in the Western World* (1983), also raised the question of the seeming opposition between "romantic" love and marital love. He claimed that the notion of romantic love originated in the chivalric love celebrated in troubadour poetry with its exaltation of women, defense of adultery, and the culmination of passion in death. This he attributed to Manichean and Platonic dualism transmitted to the West through the Crusades. Irving Singer, however, in his three-volume study, *The Nature of Love* (1984–87),⁵⁰ shows that Rougemont's theory has little historical support and that this conception of romantic love is largely a product of the Romantic movement of the early nineteenth century.

Another theme that has been given much modern attention is the question of how through love the human being as individual transcends its limits by mutual sharing with the other. This emphasis is called “Personalism,” because it understands the term “person” (as contrasted to “individual”) to imply this inherent transcendence that characterizes human beings through their intelligence and freedom.⁵¹ It would be a serious mistake, however, as has been pointed out already in chapter 7, to go to the opposite extreme of treating interpersonal relationships as superior to the social common good. The intelligence and freedom that enables us to enter into friendships and marriage is subordinate to the common good, which includes friendships and marriage and fosters them. The famous statement I cited earlier from one of the members of the English intellectual Bloomsbury clique who said he would “rather betray his country than his friends” is indefensible. There is an *ordo amoris* that gives us responsibility to those close to us in preference to those more distant, as Aquinas emphasizes, but this does not negate the fact that the common good, since it includes the personal good of all its members, cannot be sacrificed to more partial loves. This is why, for instance, military service can take precedence over family concerns.

Yet the marital love between man and woman effects the fullest possible realization of the natural qualities proper to human nature. Thus human nature is not completely manifest in either male or female persons but only in their permanent, covenanted union. This union, however, is not fully a friendship until they learn to really communicate and share with each other in unselfish love. Moreover, since naturally we are mortal and our bodies will die, the continuation and extension of the species through procreation perfects this marital friendship. The family is the school of love in which children, through the experience of their parents’ and their siblings’ love, learn to love and form a new family. Yet no family is adequate to meet all human needs, and human community in various degrees of love must extend outward to the nation and the whole human race. Thus love in this full sense of love between persons constitutes human society.

Therefore the ultimate goal of our universe must somehow be the formation of a community of intelligent persons who freely give themselves to one another. This is the highest realization of the Good. Whether some still higher friendship is possible between created persons and God remains mysterious for mere reason. That we can love each other is proof that God loves us, but whether we can be so elevated beyond our finitude as to enter into a communion of friendship in the strict sense with God remains unknown to our limited intelligence. Since we cannot effectively will what we do not know to be possible, the “natural desire” to see God face-to-face of which Aquinas speaks must be said to be only conditional. We must remain open to the possibility, but it is not due to our nature nor is it necessary for our nature’s proper fulfillment.⁵²

It is true, therefore, as Dante said, that the love of the Creator calls forth in the universe a movement toward order and beauty that is wonderfully manifest first at the inanimate level of material things, then at the level of animate love, and finally at the spiritual level. The fact that this order emerges out of what is at first a chaotic world of matter supplied with only a few simple forces for change and transformation reveals the Love that moves all things.

Since the splendor of truth is beauty, and for us as human persons beauty is the “fit” of reality to our specific mode of knowing that is at once sensible and intellectual, it becomes clear that natural science, ethics, and the sapiential understanding of the spiritual through its material effects should be in harmony. Dante as a great poet and artist expresses this idea profoundly as the theology or love of creation for its creator. Aquinas, inspired by Neoplatonism, expressed it philosophically as well as in the light of faith as the circle of *exitus et reditus*, the creative love of God and the return of the universe to its Creator through human science and wisdom. That other great medieval doctor, the Franciscan St. Bonaventure, proposed a similar vision.⁵³ The fragmentation of present knowledge, wonderfully advanced as it is by modern science, reflects a universe whose celestial music has been jangled out of tune by human and angelic

deconstruction in the service of a “freedom” that is in fact an enslavement to death. Thus the search for wisdom, if it is in any measure to succeed, must be motivated by the love of the beautiful Good. On this point Aristotle was a faithful disciple to Plato, and the Christian Aquinas in humility learned from both.

Finality in the Special Sciences

A. TELEOLOGY IN NATURAL SCIENCE

In the previous chapter, the concept of final causality as an attribute of all Being was discussed. In this chapter, Metascience is called on to answer certain objections to the explanatory use of final causality in the special sciences, first of all in natural science. While biologists sometimes claim they can do without the concept of “teleology,”¹ they certainly cannot do without the notion of “function” in explaining the various organs of a living thing and their operations. The term “function” indicates a regular process needed to maintain life, and hence requires the scientist to observe or discover how that function accomplishes a certain result necessary or at least useful to an organism’s development, survival, and reproduction. To grant this is to concede that the function of an organ or organ system is *predetermined* to produce a definite and uniform effect that maintains the existence of the organism. This, and no more, is exactly what Aristotle meant by “teleology” or “final causality.” By substituting, as do most biologists today, “function,” “directedness,” “adaptation,” and so forth, for “teleology” as a rejected term, little is gained in intellectual precision, although, as we noted earlier, much excess baggage is jettisoned with the substitution therefor of

“teleonomy.”²

Biologists also often suppose that the neo-Darwinian theory of how organisms have come into existence by natural selection adequately explains them without resort to teleological considerations. Without entering in detail into the hotly debated question of whether neo-Darwinism is an adequate explanation of the origin of life and its species,³ it suffices here to point out that theories of evolution must choose between two main possibilities:

1. If organic evolution is determined by some *innate tendency of matter* to develop into intelligent life, as, for example, Teilhard de Chardin believed, such a theory of evolution is obviously teleological. Only a few biologists today, however, would claim that the evidence favors any such “law of evolution” that would make inevitable the development of life, especially intelligent life, in the universe.⁴
2. On the other hand, if organic evolution is fundamentally the result of the *chance concurrences of various natural processes*, as most neo-Darwinists maintain, and hence might just as probably or even more probably have failed to produce any of the organisms that exist, or even life at all, it is indeed non-teleological, since chance events (as such) by definition are non-teleological. In that case, Darwinism is an *historical* rather than a *scientific* explanation, if “scientific” is taken in the ordinary sense of explanation through universal laws intrinsic to material things.

Thus, for example, geological science can describe the Grand Canyon and reconstruct the history of how it was formed by various natural forces acting in a certain factual sequence, but there is no natural law that made necessary this sequence of events, or the consequent existence of this canyon, or indeed of any canyon at that place or of its vast dimensions. It will not do to explain it by some law of erosion by water, since in a different and equally probable scenario the plateau into which the Grand Canyon is cut might never have been raised to sufficient altitude to have this result. For it to have been produced, various

independent lines of causation had to concur by chance. It is in this way that Darwinism posits no single natural force that could guide these many different forces to produce any particular unique result.

Of course, neo-Darwinists might reply that the notion of “natural selection” avoids this dilemma since it explains the existence of functioning organisms by their “adaptation” to environmental changes. Before Darwin, J. B. Lamarck (1774–1826) hypothesized that this “adaptation” implies some ability in the organism not only to maintain itself in its actual environment but also to meet *new* challenges as the environment changed. He therefore posited an “inheritance of acquired characteristics” by which the achievement of adaptation to small changes in the environment would be inherited by the next generation, and thus adaptation would keep pace with environmental change. Obviously this theory implies that inheritance is teleological at least in one respect, namely, that it is predetermined to pass on successfully adaptive traits to the next generation. Contrary to Lamarck’s theory, however, modern genetics shows that the transmission of the genome from generation to generation is independent of the adaptive success of any particular generation, provided it manages to reproduce. Hence, neo-Darwinians argue that the true causes of evolution are changes in the environment that “select” those mutations that will produce a new and better-adapted species. Yet this presupposes that the sequence of environmental changes is such as gradually to form the more and more complexly organized species that have in fact emerged.

The latter possibility amounts to saying (or can amount to saying⁵) that there is a teleological tendency in the changes of the environment to shape organisms that can survive; and thus we are back to the first of the above alternatives, namely, that a general law of evolution exists. Thus teleology cannot be eliminated from biological explanations except by desperately attributing evolution entirely to chance and thus reducing it to a history of emerging species that provides no scientific explanation in terms of natural law. Nor can it be argued that the “law of natural selection” produced this continuous sequence, since this “selection” is nothing more than the sequence of environmental

changes that was itself not law-like but purely historical and a matter of chance. Thus the failure of neo-Darwinism to take into account the necessarily teleological character of scientific explanations has rendered it a scientifically highly unsatisfactory explanation of the phenomena it attempts to explain.

When we turn to physics and chemistry, and deal only with nonliving entities, it may seem more plausible to explain them scientifically without resort to such concepts as “function,” but in fact this is not the case. The inanimate universe is not, as Heraclitus claimed (or as some modern process philosophers argue), simply a “flux” of matter. Processes can be observed only because they produce relatively stable objects that, for a time, maintain themselves in existence. The universe consists, in part at least, of relatively stable molecules and atoms without which chemistry would have nothing to study. What we know of these objects is that they have a structure that can maintain itself against many kinds of external disruptions.

While homeostasis is often said to be characteristic of living organisms, at least something analogous to it is observed in atoms and molecules. As noted in the last chapter, atoms and molecules maintain themselves in existence even when their structure is somewhat disrupted. It takes considerable energy from outside to destroy most atoms, and when the normal number of electrons is torn from the nucleus of an atom of any element, the atom is so structured that it tends to regain them from the environment. It is true that radioactive elements seem to be self-destructive, but this process of breaking down is protracted and eventually results in the production of more stable elements. Molecules have a similar stability, due to the chemical bonding of the atoms that enter into a molecule as its stably united parts.

According to modern physics, relatively stable atoms and molecules have been formed out of elementary particles that are bearers of various forms of “energy” and that were ultimately generated either in the original Big Bang or later within various stellar objects. Did the chaotic energy of the Big Bang, much of which still remains as the radiation that fills the rest of space, *necessarily* produce the super-galaxies, galaxies, stars, and finally relatively stable atoms and molecules? It is of course the

project of current quantum mechanics as it has been verified in limited present circumstances to construct a model of a Big Bang having certain initial conditions from which it is possible to deduce that this specifically structured universe as we observe it could have developed.

According to Steven Weinberg, "It is possible that eventually the initial conditions [of the universe] will appear as part of the laws of nature"; but he has also admitted that

even if the initial conditions of the universe can ultimately be incorporated in an order deduced from the laws of nature, as a practical matter we will not be able to eliminate the accidental and historical elements of sciences like biology and astronomy and geology.⁶

He goes on to mention how "chaos theory" shows that the future cannot be predicted in any concrete detail. The more modest proposal of finding a theory that, given certain initial conditions, would predict the probable formation of an expanding universe made of galaxies, stars, atoms, and molecules, much as we observe it, is, however, not so implausible. Such a theory might be something like a statement that, from what we know about H₂O, we can predict that if its temperature is continually lowered it will finally produce crystals of ice. Note, however, that such an explanation is teleological (if you like, "teleonomic"), since it is based on an inherent property of water that predetermines that when it is subjected to certain specific conditions the same effect will always be produced without the destruction of the water as water (H₂O). We can establish this, however, by direct observation, while the state of matter and energy in the Big Bang is beyond such possible observation.

To sum up this point, the denial of final causality as a necessary element of natural scientific explanation is due to a gross misunderstanding of the term. To speak of natural forces that, precisely because they are "natural," have in the same conditions uniform effects is to admit that they are inherently predetermined to produce such effects. If these effects also result

in the observable relative stability of certain kinds of bodies, this is what was originally meant by a teleological explanation of the existence and activity of these bodies.

B. TELEOLOGY IN MATHEMATICS

As for teleology in the mathematical sciences, since these disciplines abstract from change and deal with idealized quantity as their proper subject, they do not make use of explanations in terms of efficient causality. And since final causality is correlative to efficient causality, they do not demonstrate through final causality either, but only through formal and material causality, and the latter merely in the sense that the parts of any quantitative whole are its secondary matter. Yet mathematical objects can be *beautiful*, because sensible beauty consists, as shown in the last chapter, not only in beautiful sense qualities but also in their intelligible relations of similarity, contrast, symmetry, proportion, and so on. These relations have a remarkable clarity in mathematics, and beauty is just such clarity in relation to human cognition. Hence mathematicians often speak of a particular mathematical theorem as “elegant” or “beautiful,” and natural scientists similarly praise certain models used in mathematical physics.

Finally, it should be noted that insofar as appropriate mathematical models can be used in mathematical physics to calculate measurements of motion and time as functions or relations between sets of quantities, these models, although they themselves are motionless and timeless, can be used to measure the efficient causality of natural forces. Change moves from potentiality that no longer exists to a new actuality that does not yet exist. A line indicating a vector directed from potency to act, from past to future, but not in the reverse, can *analogically model* this progression from potentiality to actuality; but it would be false to think that, as all parts of the line are actual, so all parts of the

motion are actual, when in fact only one point on the “line” is actual: the “now” or “present.” It is only mind-dependent that past, present, and future are portrayed as equally existent.⁷ Such a vector, however, can be used to *model* a change, with the arrow to symbolize the teleonomic predetermination of the efficient cause of that change (presuming it is a natural, as distinct from a chance, change)

C. MEANS AND ENDS IN THE PRACTICAL SCIENCES

1. Deontology and Teleology in Individual Ethics

In the practical sciences, the good and the bad take on a central position as the first principles of practical reasoning. Two different basic conceptions about what is *ethically* good and bad have run throughout the history of human thought depending on what is supposed to be the criterion of what is morally good or bad.

One view is that of *deontology* (from Greek *deontos*, duty) or voluntarism, according to which the criterion is the will of someone who has authority over the agent’s actions.⁸ This will is expressed in authoritative commands, laws, rules, or norms that ought to be obeyed. Hence morality reduces primarily to obedience to legitimate authority. A familiar example of this type of morality is the Torah or law of the Hebrew scriptures (“divine command ethics”), but it is to be found in most cultures. The Jewish law had its precedent in the laws of the Babylonians and Egyptians. Today also in our law schools the prevailing legal theory is “Legal Positivism,” which rests the validity of law purely on the will, though not that of God but of human legislators.

Experience shows that the danger of this voluntaristic, legalistic deontologism is that it can encourage ethical *minimalism*. As Jesus’s Sermon on the Mount, which begins with

the Beatitudes, shows, the Gospel calls on Christians to become “perfect as your heavenly Father is perfect.” If, however, morality is simply obedience to laws, then we are tempted to interpret the law so that it demands of us the least effort or inconvenience possible. On the other hand, in reaction to this minimalist *laxism*, ethical voluntarism can also generate a scrupulous *rigorism* that makes no allowance for situations not foreseen in a written law.

The other ethical approach is that of *teleology* or an ethics of ends and means according to which law is the expression not just of the will, but also, and more fundamentally, of the wisdom of the lawmaker. Hence what makes an act morally good or bad is not precisely the fact that legislators have made a law about it but the fact that the act belongs to the kinds of acts that will in fact promote or hinder the attainment by human persons of the goal or end of their life, true happiness. Consequently, if in fact the law does not embody such wisdom, it is invalid, and if it is certainly known to be contrary to wisdom, it should be disobeyed. Thus a teleological ethics sees law as moral guidance, but not as the ultimate ground of morality or of moral judgment.

A “natural law” ethics, therefore, as teleologists understand it, is based primarily not on God’s will but on his wisdom as the Creator who has made us to be happy and guides us to choose those means that will lead to happiness. By giving human persons and, if they exist, pure spirits intelligence and free will, the Creator has given to them the capacity to *participate* in his wisdom: to understand their natures and hence the ordered needs of these natures, as well as how they can be satisfied by intelligent, realistic choices. For Jews, Christians, and Muslims, the revealed law contained in the scriptures supports this natural participation in God’s wisdom about good living. For Christians, furthermore, this revelation shows that the perfect happiness to which God has freely called us exceeds (but also includes) the imperfect happiness that is the teleology of our natures. This perfect happiness (according to Christian revelation) is a share in the fellowship of the Trinity of Persons that is the One God.

Pagan Greek and Roman ethics were teleological, since they measured the morality of actions by their relation to happiness (*eudaemonia*, *summum bonum*), but differed in what this goal of

happiness consisted. For the Epicureans, taking a view not difficult for most of us to understand, this goal was simply pleasure.⁹ Yet few if any ethicists have adopted this goal without qualification (including the original Epicureans),¹⁰ because a life of unbridled sensual dissipation is obviously destructive and contrary to human dignity. Actually the Epicureans themselves advocated a simple, quiet life in the country with a few agreeable friends, not unlike the biblical advice of Qoheleth:

Go, eat your bread with joy and drink your wine with a merry heart, because it is now that God favors your works. At all times let your garments be white and spare not the perfume for your head. Enjoy life with the wife whom you love, all the days of the fleeting life that is granted you under the sun. This is your lot in life, for the toil of your labors under the sun. Anything you can turn your hand to, do with what power you have, for there will be no work, nor reason, nor knowledge, nor wisdom in the nether world where you are going.¹¹

Yet while the Epicureans greatly feared the gods and wanted to believe they were remote, Qoheleth thanks God for the good things of this life and warns that our enjoyment of them must be within God's laws. Since at the time he wrote there was as yet no adequate revelation from God of what happens after death, Qoheleth, as a devout Jew, was unwilling to base his ethics on the fantasies of the pagans about such a life.

In opposition to the Epicureans, the Stoics argued that the goal of life was a serenity of mind achieved by discipline of the passions in giving oneself over to heroic public deeds.¹² Yet since, for the Stoics, this freedom from passion made possible perfect obedience to natural law, their system had a distinctly deontological flavor and also assimilated many elements of the Platonic-Aristotelian ethics in their notion of the public good promoted in noble works.¹³

For Plato and Aristotle, however, since they believed in the spirituality of the human intellect, happiness could not be merely

physical pleasure. Hence, they held in common that happiness was to be found in the search for truth, that is, in contemplation. For Plato, this contemplation of truth is attained by the escape of the soul from its entombment in the human body and its return to its eternal vision of the One and the Good. The means to this return of the soul to its original state is the philosophical life of virtue dedicated to the pursuit of wisdom. After death the philosopher hopes to make this return to the One, but for those who lack perfect virtue in this life the reincarnation of the soul is inevitable.¹⁴ Those who die in an imperfect state will be reincarnated in a body appropriate to that state, so that the vicious are doomed to become animals and the less vicious to become human slaves. Only the best will be philosophers on the way to wisdom within that immediate lifetime. Because Aristotle rejected the Platonic dualistic conception of the soul-body relation and the doctrine of reincarnation that Plato held from Pythagoras, his view of the kind of contemplation that is the goal of human life was more compatible, as we will see, with later Christian doctrine.

The Fathers of the Church naturally devoted much time to ethical questions, as did the medieval university theologians who generally followed Aristotle. Yet, under the prevailing Neoplatonic influences, they read Aristotle with a marked Platonic tendency to dualism.¹⁵ In the late Middle Ages a deontological approach to ethics took the lead in Christian universities. Beginning with Duns Scotus, the Franciscan school, in opposition to the Dominican Aquinas, gave priority in ethics to the will rather than the intellect.¹⁶ Hence they preferred a deontological type of ethical system, called "voluntarism," for three reasons. First, because St. Francis had wonderfully exemplified Christian love, it seemed to his followers that eternal happiness must consist principally in the union with God through love, and only secondarily through knowledge.¹⁷ Second, the Franciscans were concerned to condemn the interpretation of Aristotle prevalent in the teaching of philosophy in medieval universities and derived from the Neoplatonic Arabian commentators, because it seemed to deny free will to God as the First Cause. Third, William of Ockham, also a Franciscan but a severe critic of Scotus, nevertheless accepted

Scotus's voluntarism and assimilated it to his own Nominalism, which came to dominate the universities and lay the ground for the Protestant Reformation. This Nominalism raised such grave doubts as to the capability of human reason to understand the nature of God or his purposes in creation that it made it seem that a teleological ethics would be impossible unless confirmed by the revealed commands of God. Hence Protestant reformers, whose theological education was Nominalistic but who, in reaction to the Pelagian tendencies of Nominalism, insisted on the inability of fallen human beings to love God, also adopted a fideistic, voluntaristic, and thus deontological ethics. They found support for deontologism in the dialectical opposition between salvation through obedience to Old Testament Law and through salvation by grace as proclaimed in New Testament Gospel.

The debate between deontologism and teleologism reached a climax during the post-Reformation period in the famous "controversy over moral systems" that, among the theologians of the seventeenth and eighteenth centuries, used up the energy that should have been spent to meet the Enlightenment attacks on Christianity. The principal issue was over the way the traditional legal dictum "A doubtful law does not oblige" should be interpreted. One side, favored by most Jesuits and Redemptorists, was called "probabilism." Probabilism taught that, when the interpretation of a law admits of doubt, it is consistent with obedience to follow any interpretation that can claim a "solid probability" according to recognized experts and orthodox moralists. The other side, called "probabiliorism," favored by most Dominicans, held that the *more probable* interpretation of the law ought to be followed. Back of this difference, obviously, was that between the voluntarist tradition and the teleological tradition in ethics. If the law as such is the basis of morality, then one is obliged to obey it only as it is clearly the will of the lawmaker. On the other hand, if the law no more than provides guidance (hopefully wise) to the goal of happiness, then obviously one should follow the interpretation of the law that will more probably lead to that goal. Unfortunately, the debate seldom touched directly on this fundamental issue, and the Church officially rejected both laxism and rigorism without providing any definitive

resolution of the differences between more moderate positions.

In the Enlightenment period, the Lutheran version of divine command ethics influenced Immanuel Kant, but he gave it a radically new form. Kant spoke in a traditional manner of the moral law of God but also rejected the possibility of a “metaphysical” knowledge of God—taking “metaphysics,” as we saw earlier, to be an *a prioristic* science (in the idealistic tradition in which Kant was educated that went back through Leibniz to Descartes, Suarez, and Scotus, as explained in chapter 2).¹⁸ Hence Kant viewed the concept of “God” as merely a practical regulative idea needed in ethics to provide a fear of punishment and a hope of reward as a motive for moral conduct for the guidance of the less virtuous. Thus the matter of “belief in God” ceased to be a speculative issue and was shifted to practical grounds as a belief necessary for social order. Kant could not base morality directly on God’s will and commands since even the real existence of God was for him unknowable in metaphysics.

Moreover, Kant thought that to make human conscience depend on any authority external to it (*heteronomy*, “other law”) would detract from genuine human responsibility. Therefore he made individual conscience (*autonomy*, self-law) the ultimate determinant of what is good or bad: thus each person is her or his own lawgiver. One might object that if everyone were his or her own lawmaker, there would be as many codes of law as persons, and society would become impossible. But Kant did not see this as a problem, because he thought that reason is the same in every human individual, although he granted that, because the passions war against reason, not all persons make use of this common and evident reason.

Thus, for Kant, true morality is obedience to a “categorical imperative” of the form: “Act so that your conduct is such that you would be willing for everyone to do the same.” For example, lying is wrong because we would not want others to lie to us. The difficulty with this rule, of course, is that it has a purely *formal* character. While it establishes that all moral precepts must be universal, it tells us little about the concrete content of such rules. To give content to a Kantian-type ethics, therefore, one needs to

resort (as apparently Kant himself did) to the theory of Jean-Jacques Rousseau of a “moral sense” by which all humans, when not spoiled by their culture, have true *feelings* about what is right and wrong.¹⁹

In the British tradition, the influence of both Kant and Rousseau was felt, but perhaps the most characteristic tendency was that exemplified by Jeremy Bentham in the form of the “hedonic calculus” of “the greatest pleasure for the greatest number,” a notion basic to the moral theory called “Utilitarianism,” which seems to dominate modern culture.²⁰ Such an ethics is of the teleological type, but puts little emphasis on an intellectual, contemplative goal for life. Rather it concentrates on a state of subjective “feeling” (like Rousseau) and the achievement of purely practical goals that promote such feelings of satisfaction. In the United States this took the form of John Dewey’s Pragmatism or Instrumentalism, in which truth is not a goal but a means to a goal.²¹ In the twentieth century, similar views were propounded, for example, in G. E. Moore’s notion of a “moral sense” and in the “emotivism” of certain Analytic philosophers. Later emotivism, regarded as arbitrary in the extreme, was generally discarded in favor of a “good reason” ethics clearly marked with utilitarian and pragmatic features.

Thus Christian thinkers both Protestant and Catholic were faced in the late nineteenth and throughout the twentieth centuries with the problem of justifying their traditional moral standards in the face of the growing secularism of modernity. Some Protestant theologians answered this challenge by upholding a fundamentalist emphasis on the biblical letter of the law. Others, often influenced by Kantian idealism, moved toward a “liberal” interpretation of the biblical law by an exegesis that emphasized its historical, cultural conditioning that seemed to require a rethinking in terms of modern culture. An influential example of such a theory was Joseph Fletcher’s “situation ethics,” which sought to reduce all ethical decision to a single biblical command: “Do what is most loving.” Only too obviously, as another Protestant theologian, Paul Ramsey, pointed out, this single norm is so vague and can be understood in so many

different ways as to be simply arbitrary. In American secular ethics, a common methodology was that of “principalism,” in which, in a Kantian manner, moral decisions were reduced to a few very general norms such as the “principle of beneficence” and the “principle of autonomy,” or to a much more extended list of “human rights”; but these were generally justified only as a consistent set of norms based on the attitudes and views of a majority within a given culture at a given time. Ethics of this type are often further refined by the methods of Analytic philosophy and its reference to “good reasons.” In such an American philosopher as Richard Rorty we have an eloquent exponent of a pragmatic, moral, and cultural relativism that returns us to the days of the Greek Sophists.

In Catholic circles, beginning with the Thomistic Revival of Pope Leo XIII (after 1879), there was a gradual return to the teleological type of ethics promoted by Aquinas. By the employment of an Aristotelian epistemology Aquinas had provided a remarkably systematic account of Christian ethics in the second part of his *Summa Theologiae*. The first subdivision of this second part (I-II) supplies a very careful analysis of the foundations of moral theology, while the second subdivision (II-II) presents a “virtue ethics” in great detail. By a “virtue ethics,” current moral theologians mean one in which the principal stress is on character formation. A virtue ethics could be either deontological or teleological, but Aquinas’s own view is strongly teleological and begins (in the *Summa Theologiae* I-II, qq. 1–5) with a discussion of what true happiness is. As a Christian, he shows that this is the beatific vision of God possible only through grace; but he also argues that this end is a divine gift which includes, as a *subordinate* goal, that kind of happiness in rational contemplation proper to human nature, much as Aristotle pictured it.

Aquinas, however, maintained that the divine law is not the *will* of God but the *wisdom* of God that guides his loving care of his creation, and that the divine and natural laws are the human participation through our God-given intelligence and freedom in following this way toward true happiness. This natural human happiness consists in the fulfillment of human needs (of which the

chief is contemplative knowledge) that are either freely chosen or naturally given, and it integrates them in an orderly manner into one unified though complex goal. Those needs that are not innate but freely chosen (for example, a need for a particular chosen hobby) must be consistent with those that are naturally given and hence necessary goods per se—that is, valuable in themselves and not merely as means to other goods.

Theologically, Aquinas grounded this teleological ethics in Jesus’s criticism of the Pharisees for emphasis on the “letter” rather than the “spirit” of the law. By “letter” was meant the deontological emphasis on obedience, while by “spirit” was meant the teleological emphasis on the purpose of the law and the need of sincere and intelligent cooperation with that purpose insofar as it is an expression of wisdom. In Aquinas’s theology, this emphasis is understood as the *internalization of the law* by the presence of the Holy Spirit in the Christian soul by grace in the form of the theological virtues of faith, hope, and love.

Aquinas broadly identifies the human needs that constitute the principles of a natural ethics as: (1) physical health, including security and necessary external property; (2) family life for the education of all children and for the sexual fulfillment of those who freely choose to marry; (3) participation in a human community; and (4) true knowledge.²² These goods are thus hierarchically ordered and unified by the supreme good of true knowledge. Aristotle, in the last book of his *Nicomachean Ethics*, argued that, since things are specified by what is best in them and human nature is specified by intelligence, “happiness” is the achievement and enjoyment of true contemplation—that is, knowledge of the highest truths accessible to human beings. The Latin *contemplare*, which etymologically refers to the observation of auguries in a temple or signs of the will of the god, translates the Greek *theorein*, “to know what it is valuable to know for its own sake.”

This does not mean, however, as some have thought, that for Aristotle contemplation is the *exclusive* goal of human life.²³ Aristotle, a thorough realist, is quite clear that the other human needs must also be satisfied, since one who lacks adequate

material goods and health, family support, and society cannot as well engage in contemplation. Nor should we think of this “contemplation” as mysticism or as some rarified kind of knowledge possible only for a few. In modern terms, what Aristotle had in mind was, in general, what today we would call “the search for meaning in life” and, more specifically, the wisdom of Metascience.

It follows, of course, that while the lesser goods of physical life, family, and society are necessary conditions of the highest good, namely, knowledge, they are subordinated to it and can in a measure be sacrificed to it. Yet they can never be totally neglected. Hence Aquinas followed Aristotle in insisting that the contemplative life needs a certain amount of material possessions, though not many, and that, for these to be readily available, there must be some private property, though its use must be regulated for the common good. They both also recognized that many persons are so occupied in the practical life of society that the “contemplative life” devoted principally to study is impractical for them. Hence, to them, Aristotle assigns a genuine but secondary kind of happiness in which the practice of the active virtues predominates, the “active life.” As for the second of these four needs, namely, sexual fulfillment, Aquinas, following the counsel of St. Paul (1 Cor 7:32–35), held that while it was natural for all humans to marry and have a family, nevertheless, in the present fallen and sinful human condition, domestic life is often a hindrance to the achievement of the highest element in happiness, namely, contemplation. Hence it was not obligatory for all to choose marriage, but some can freely choose celibacy, provided that a sufficient number married so as to maintain the species and the education of new members.

To satisfy these human needs in a consistent way requires that each person intelligently follow the natural law and thus participate in the wisdom of the Creator. To do this, certain basic life problems must be solved; and to solve these, each person must develop moral character, the set of skills called “virtues.” A virtue is not a mere “habit” in the English sense of that word (that is, a routine pattern of behavior), but a pattern of behavior consistently embodying excellence. Habit formation (in the

vernacular sense) is necessary for us so that, like animals, we can act in a routine manner without constantly making new decisions; but life presents us with ever-new situations for which a routine response is not adequate and may even be disastrous. A “virtue” is a skill that makes us flexible in adjusting to new situations and solving the problems they present intelligently and creatively, regardless of our “routines.”

For Aristotle and Aquinas the fundamental problems that require virtue are (1) control of biological drives for pleasure, especially for food and sex (*temperance* or moderation); (2) control of biological drives for aggression or flight in the face of danger or the need for endurance in painful situations (*fortitude* or courage and patience); (3) control of the will to respect the rights of others as well as one’s own needs (*justice*); and (4) control of intelligence so as not to act on impulse but to make thoughtful and informed decisions (*prudence* or practical reasonableness). To these major or “cardinal” virtues Aquinas links a number of related assistant virtues. Contrary to Plato, Aristotle and Aquinas did not consider these four cardinal virtues to be simply qualities of any moral act, but held that their objects were different and especially difficult problems of human living.

For Aquinas, therefore, the practical science of ethics is not simply about particular moral decisions, but more fundamentally about the formation of a virtuous character. Ethics is in fact simply the more theoretical, universal, and scientific aspect of the virtue of prudence, since prudent (practically wise) persons are first of all concerned to perfect their own characters by striving always to act in the light of reason, that is, of the general truths about right and wrong provided by ethics as a practical science.

For Aquinas, writing within the worldview of Christian faith, an ethics directed only to the moral problems of the present life, considered apart from the situation of human destiny, is a very incomplete ethics. Though Aristotle demonstrated as part of natural science in his *De Anima* that the human intelligence is immaterial, in his extant works he does not tackle the question of the fate of this spiritual soul after the death of its material body. Yet again, it is very difficult to reconcile the survival of the soul after death with his principle that “nature does nothing in vain.”

According to Aristotle's anthropology, intellectual knowledge depends on the bodily senses; but death seems to render nugatory the attainment of a human being's natural end, namely, true happiness in which the supreme good is intellectual contemplation.

As a Christian theologian, this difficulty was ultimately answered for Aquinas by the revealed doctrine of the resurrection of the body. But even if this view is accepted, the problem of the state of separated souls prior to the resurrection remains a problem. Hence some Protestant thinkers have argued for "soul sleep" and the re-creation of the bodies of the dead at the resurrection, as Muslims also believe. Aquinas, however, thought that Metascience, since it deals with the analogy between material and immaterial Being, assures us that the soul survives and retains an intrinsic relation to the body it has lost, and that the soul requires the body to constitute a complete human person. Hence Aquinas was convinced that the separated soul continues to contemplate but in a manner that resembles that of the pure spirits, because it no longer acts as a form of the matter of the body that, in earthly life, limited the proper and direct object of its intelligence to the essence of material things. Thus, in its separated condition, the human soul's self-consciousness of its own spiritual acts (and hence of the spirituality of its intelligence and of the self for which it is a property) ceases to be indirect and becomes direct by "immediate information," just as it is for pure spirits.

Aquinas, using a term of St. Augustine's, speaks of this mode of knowledge as a "divine illumination," but by this he means the *natural* participation of the angels in divine knowledge through the innate ideas given them in their creation as part of their very natures. Yet Aquinas, as we have seen, holds that human souls, unlike pure spirits, do not have innate ideas. Hence he argued that God must give to human souls at death, in addition to those abstract concepts they have learned during their bodily lives, such ideas of concrete singulars as are necessary for them to know singulars during the time before their reunion with their resurrected bodies.

Those virtuous souls, therefore, who at death are committed,

along with other good spirits, to the true natural end of the contemplation of God will continue this contemplation after death, even more perfectly than in this life, and thus will attain a true natural happiness, although an imperfect one—imperfect both because of the lack of their complete body-soul personhood and also because their natural happiness is limited by their finite natures. Perfect beatitude, Aquinas holds, is possible only by intimate participation in the life of God to which creatures have no natural right, although the Christian Gospel (at least as theologically interpreted over the centuries) assures them it can and should be attained by the unmerited grace of God that transcends creaturely limitations.²⁴

Thus Metascience provides some account of the state of separated souls that permits us to be consistent in saying that the *natural* goal of human life is the contemplation of God as revealed through his creation most perfectly attained after death by those who have lived earthly life virtuously. Moreover, for Aquinas, the achievement of the true goal of life must be made in *one* lifetime—not, as for Plato and the Hindus, after a cycle of reincarnations of an eternal soul—since for him the human soul comes into existence only when God creates it for the human body in the womb. Some Thomists ask, without finding a certain answer, whether the natural end of the human person requires that God will eventually resurrect all human bodies, so that human souls might again in justice enjoy full human personhood.²⁵ What is certain for Christian faith is that the Creator freely produced the world, including its spiritual beings, out of nothing and so ordered his creation that these creatures could reach their true natural ends.

Far beyond any demand of their natures, God has also freely chosen to invite all his intelligent creatures to enter the divine community of the Trinity, whose very existence in God is beyond the capacities of natural human knowledge to understand and can be known only through God's revelation. This comes about only by *grace*. This term "grace" is often also used in describing the *bahkti* devotions to a particular god in Hinduism or to the Buddhas of Mahayana Buddhism to indicate that those who in

this life find they cannot practice the asceticism and concentrated meditation required to achieve release from suffering can do so by the invocation of gods or Buddhas. While this analogy with the Christian term “grace” is important for dialogue, there is a profound difference between the two uses of the term. For the Christian, “grace” is not merely the help of superior spiritual beings to achieve the enlightenment that is the natural destiny of the human spirit. It is also a *transforming* action of God by which a human person is elevated from his or her natural condition (as ordered to a purely natural goal) to a “participation in the divine nature.”²⁶ In this sense, monistic or non-dualistic systems such as Hinduism or Buddhism exclude “grace,” because the human spirit is from all eternity identical with the Absolute.

For Christians, union with God in the intimacy of the community of Trinity is not the innate goal of human nature but is an elevation of human existence that is entirely gratuitous on God’s part. Nor does human salvation result in a loss of the individual existence of creatures given them by their Creator as distinct from the Creator’s own existence. Salvation completes created persons, by enabling each of them to enter into an interpersonal I-Thou relation with God.

2. Revisions of Thomistic Ethics

The Catholic Church’s recommendation of the ethical thought of St. Thomas Aquinas did not exclude the need to revise it in view of developments in modern culture, and the proposed revisions, especially after Vatican II, although generally teleological in orientation, took quite varied forms. One revision, suggested even before Vatican II, was to reemphasize the elements of Aquinas’s ethical thought that were supported by the Church Fathers. A leader in this type of revision was Henri de Lubac, S.J.,²⁷ who argued that since Aquinas speaks of “the natural desire for the beatific vision,”²⁸ he must have held, as the Church Fathers seem to have done, that in fact there is only one goal for human life, the supernatural one provided by grace. Yet de Lubac, in order to

maintain, as Catholic orthodoxy requires, that our supernatural ordination is utterly gratuitous, argued that to save this gratuity it is sufficient to hold that, although there is only one supernatural end for the human person, it cannot be attained by human powers but only by grace.²⁹

In fact, however, for Aquinas as an Aristotelian, de Lubac's thesis that we human persons have no natural end would imply also that we have no human *nature*, since without its own proper final cause no substantial nature is possible. Although this question remains controversial,³⁰ most Thomists came to understand the term "natural desire" used by Aquinas to be *conditional*. Thus our spiritual, intellectual nature desires the absolutely perfect beatitude that only a face-to-face vision of God could provide, *if that be possible*, but only if it be possible. Reason, however, cannot demonstrate that such a vision will occur, but can only answer those who claim that the notion of the beatific vision for a creature is self-contradictory, that is, those who deny that the intellectual creature is *capax Dei*. Yet our nature is not frustrated by the fact that we cannot attain a good that we cannot even know really to be possible. We would be frustrated only if we had no natural goal of life attainable by human powers, since then we would have a free will that could not be exercised, since our freedom cannot be rationally exercised without an ultimate goal that is knowable by reason.

Hence, besides the natural virtues necessary to satisfy the teleology intrinsic to human nature, Aquinas argues that we need supernatural or "infused" virtues to attain union with God as One God in Three Persons.³¹ Some of these are moral virtues that simply elevate the corresponding natural moral virtues; but some are "theological virtues," namely, Christian faith, hope, and love (*agape*) that directly unite the baptized to God in his inner life as Father, Son, and Holy Spirit. Thus Aquinas says that natural happiness, though it is proportionate to human nature, is still an imperfect happiness appropriate to the limitations of a created nature, while the beatific vision of eternal life in which God is known as He is and loved unreservedly is a share in God's perfect happiness. Natural human happiness, on the contrary,

although “perfect” in relation to human nature, is imperfect relative to God’s truly perfect happiness. To share in God’s perfect happiness is a gift that no merely human effort can deserve. It is a gift that can be finally possessed by those who *through grace* cooperate with grace. But, without grace, we can do absolutely nothing to earn a salvation that is the totally free gift of God. Thus, apart from all theological issues, Aquinas on the basis of reason defends the existence of a natural ultimate end as the principle of rational ethics, and thus provides an ethics independent of faith in Christian revelation.

In Protestant circles, the ethics of the Lutheran moralist Helmut Thielecke was especially influential.³² On the basis of the Lutheran *simul justus et peccator*, he maintained that fallen humanity, while always relying on God’s forgiveness for the sin involved, is nevertheless sometimes forced to compromise between Gospel morality and its worldly situation, and thus performs an evil action because, though sinful, it is the lesser evil. In a very different vein, another Protestant theologian, Joseph Fletcher, as mentioned previously, proposed a “situation ethics” that reduced all moral norms to a single precept, “Do what is most loving”; but since this left the meaning of “love” undefined, it provided little real guidance.³³ One of its strongest opponents was still another Protestant moralist, Paul Ramsey, who maintained the primacy of love by a deontological methodology that posited absolute moral norms that one was never justified in violating.

In Catholic circles, Bernard Häring proposed another type of revision. Writing in the Redemptorist tradition of moderate voluntarism derived from St. Alphonsus Ligouri, Häring thought to adapt moral norms to difficult situations by a greater appeal to the virtue of *epicheia*, by which a lenient interpretation is given to the law in difficult cases. His disciple, Charles Curran, somewhat like Thielecke, proposed a “theology of compromise,” according to which original sin produces situations in which what is objectively wrong can be justified by the agent’s good intentions. For example, a homosexual may engage in homosexual acts provided these acts are motivated by sincere and “responsible” love, because no other possibility of sexual fulfillment is open to

him. Yet, contrary to Theilicke, Curran holds that such an act would be objectively moral and free of all sin.³⁴ Curran also is very critical of the interpretation of the natural law found in papal documents, especially ones dealing with sexual morals, on the grounds that it is distorted by “physicalism” or “biologism” because it emphasizes the physical character of an act rather than the intention of the agent, which is what gives any act a human moral character. This has been his constant criticism of the encyclical *Humanae Vitae* and its condemnation of contraception.

On very different lines, the Jesuit moralist, Gérard Gilleman, S.J., urged a return to the teleological ethics of Aquinas with an emphasis on love of God and neighbor as the supreme moral virtue.³⁵ In Catholic circles the nature of this Christian love that commits us to the true goal of life became a central issue. Karl Rahner, S.J., in an influential essay called “A Formally Existential Ethics,”³⁶ renamed Aquinas’s “ultimate end” “the fundamental option” to show the profound level at which this commitment is made by what Rahner called an exercise of “transcendental freedom.” On the other hand, Servais Pinckaers, O.P.,³⁷ emphasized that for Aquinas the natural teleology of the human will in its freedom is not (as Ockham and the voluntarist tradition maintained) indifferent to the moral good and evil, but is naturally inclined to good rather than evil, although it is now weakened by original sin. This fundamental orientation of the will to the good makes the practicality of ethics very different from that of the technologies since their goals are not natural, while the goal of morality is by nature innately determined.

Rahner, unlike Pinckaers, developed his ethical position from the perspective of Transcendental Thomism under the influence of Kant and Heidegger. According to Rahner, the “fundamental option” takes place within the subject in a manner that is *a priori* to concrete moral decisions even though it is made in and through them. Thus, concrete moral decisions take place at the “ontic” or merely factual level, while their real “ontological” moral significance is given by the fundamental option that underlies them. Rahner did not show in any detail how such a

transcendental theory could function for actual moral decision or guidance. Unfortunately (and, I believe, quite contrary to Rahner's intentions), this abstract proposal was interpreted by some to mean that persons might retain their fundamental option for God and neighbor while at the same time committing "serious" sins, as these did not change their fundamental option for God and thus become a "mortal" sin depriving a person of the "state of grace." Thomists would hold that it is not possible freely and knowingly to commit a serious sin without changing one's commitment to God and thus losing the state of grace, because in every free and deliberate act one intends that act as a means to the ultimate goal of life to which one is committed.

Some priests seized on this notion as pastorally helpful in dealing with persons involved in addictive behavior since it would make it possible for confessors to assure such penitents that they remain in the state of grace even when yielding to their sinful addiction. In fact, however, this pastoral aim can only be achieved honestly by recognizing the limitations of freedom and moral responsibility in persons of good will who are striving to be free of an addiction. It is possible that their addictive acts are not free, and hence are not sinful; or at least that their freedom (and hence their sinfulness) is diminished, provided they take the proper means to be freed of their addiction.

Another very different proposal for the revision of Thomistic ethics has been made by Germain Grisez and others of whom he is the leader,³⁸ notably by John Finnis using the methodology of Analytic philosophy. Grisez has always been a strong defender of the Church's moral teaching but proposes two important revisions of Thomistic ethics. First, he rejects the view of most Thomists that ethics presupposes an anthropology. Instead he holds that this is inconsistent with Aquinas's notion of ethics as an autonomous science based on its own evident first principles. Second, Grisez rejects Aquinas's thesis that human morality is to be judged solely by its relation to a single ultimate goal, namely, contemplation. For this ultimate goal Grisez substitutes a set of eight goals, four of which are "substantive" and four "existential" or "reflexive."³⁹

In volume 1 of his principal work, Grisez listed as substantive the goods of (1) physical health, (2) knowledge of truth and appreciation of the arts, and (3) play and exercise of skills. In the second volume (p. 5) he added (4) marriage. Note, however, that, for Grisez, “justice and friendship” are existential goods, while for Aquinas they are substantive. Aquinas would probably have also included Grisez’s third substantive good, “play,” as mainly part of physical health. Since Grisez’s ethics does not presuppose an anthropology, he explains that these per se ends are discovered in moral discourse by asking, “ ‘Why are you doing that?’ Persisting with that question eventually uncovers a small number of basic purposes.”⁴⁰ Grisez’s other four incommensurable goods, the *existential* ones, are: (1) self-integration, (2) practical reasonableness or authenticity, (3) justice and friendship, and (4) religion.⁴¹

These eight goods are “incommensurate” in that they are not hierarchically ordered, since each is an independent good per se that can never be ethically violated. Thus, because it is always wrong to violate any one of the incommensurable goods, Grisez, in agreement with Aquinas (but on different grounds), defends the existence of exceptionless negative moral norms (absolute norms).

In Grisez’s system the unity of moral life consists in the “integral fulfillment” of all these incommensurable goods in a balanced way that preserves them all. This harmony or balance, however, is not the result, as Aquinas maintained, of the relation of all human acts as means to a single end, but is achieved through the pursuit of the existential goods, such as “practical reasonableness” or “religion”(!). This, Grisez claims, improves on Aquinas by providing “middle premises” between the basic principles of ethics and concrete, practical decisions. Thus, Grisez minimizes the importance of “virtue theory,” which looms so large in Aquinas’s own ethics, because he thinks it cannot supply precise middle premises.

On examination, however, this revision of Thomistic ethics presents many difficulties. First of all, like the Gilsonian view of metaphysics, it neglects the “order of learning” that seems to me

an essential element of Aquinas's Metascience. It was shown in chapters 3 and 4 that, just as Grisez holds, every *formally* distinct science begins with principles that it does not demonstrate but that are directly evident. Nevertheless, it is also true that every science except natural science presupposes natural science as its *material* condition, since all our knowledge must ultimately rest on the knowledge of the sensible, the proper subject of natural science. For thus in the epistemological order ethics presupposes an anthropology provided by natural science, since natural law is simply conformity with the needs of human nature.⁴² Ethics' first principles become scientifically evident only after natural science has established the existence of human nature and its needs. While it is true that to reason correctly about ethical matters it is not absolutely necessary to have a scientific and critical understanding of human nature, such an understanding is necessary for a *theoretically developed* ethics. Thus Grisez in the practical order, like Gilson and Owens in the theoretical order, as regards the validity of metaphysics by neglecting Aquinas's ordering of the sciences, imperils the validity of ethics.

Second, Grisez is mistaken in saying that a hierarchy of moral ends would reduce all but the ultimate end to mere means. According to Aquinas, a moral good can be good per se yet still be subordinate to a greater good.⁴³ In Grisez's theory, moral agents are forced, lacking a hierarchic ordering of ends, to achieve unity in their lives by a precarious balancing of the four incommensurable substantive goods with the four incommensurable existential goods, somewhat as in Proportionalist theory they must balance values and disvalues.

Third, to say that contemplation is the true ultimate end of human behavior does not mean that only those who live a contemplative life can attain the ultimate end. For Aquinas the beatific vision is the all-sufficient goal in the life of grace, but the natural goal does not consist in contemplation alone. The natural goal is the integral satisfaction of all human needs according to their hierarchical ranking, with contemplation at the top. Moreover, "contemplation" must be taken, at the natural level, *in the broad sense that includes all kinds of theoretical knowledge.*

Thus, those engaged in the active life can also share in contemplation, although the time and energy they give to it is more restricted than those who live the contemplative life. All human living requires some knowledge of truth exceeding purely practical knowledge. Thus Aquinas defends the “mixed life” when he advises us “to contemplate and then share what one has contemplated with others” (*contemplare et contemplata aliis tradere*).⁴⁴ What Aquinas is saying is that human life cannot be truly happy if it is not centered in a knowledge of the Creator as the source and goal of human life, since without this understanding the world, as Sartre proclaimed, is “absurd,” and, contrary to Sartre, it is hopeless folly for us to try to give it meaning by our own “creative will.”

Fourth, the four *substantial* goods proposed by Grisez are much the same as those that (as we have seen) Aquinas identified. Grisez holds, however, that the four existential goods, since they imply a manner of choice that harmonizes and integrates, provide the unity and balance of all these eight incommensurable goods without reference to a single ultimate goal such as Aquinas maintained was necessary. Yet if one examines Aquinas’s notion of the virtue of prudence, it becomes evident that its eight acts (memory, reasoning, understanding, docility and ingenuity, decision, foresight, circumspection, and caution⁴⁵) provide for all that Grisez assigns to his existential goods. Grisez’s existential good of “practical reasonableness or authenticity” is covered by Aquinas’s prudential “memory, reasoning, understanding, docility, foresight, circumspection, caution,” and his existential good of “self-integration” by Aquinas’s prudential “decision.” As for Grisez’s “justice,” for Aquinas this is a virtue, while “friendship” is the “crown of the virtues,” and “religion” either the virtue of submission to God or our ultimate end of love and knowledge of God. To call these “incommensurable ends” seems to confuse virtues with the ends they enable us to achieve. Thus, prudence achieves the balance and integration of goods that Grisez calls “integral human fulfillment.” It does so, however, by seeking and choosing appropriate means to achieve those hierarchically ordered goods

that satisfy our substantive needs in relation to the true ultimate end of life. To give such integrating acts objective content, however, it is necessary to return, as Aquinas does, to anthropology so as to apply general principles to concrete practical conclusions. Thus Grisez's revision of Aquinas adds nothing except needless complications that lack a firm grounding in anthropology. Grisez has attempted an "integration" or "harmony" of decisions about diverse incommensurable goals without providing a unifying principle of order.

While the system of Grisez, particularly because of its courageous Catholic orthodoxy, has had some influence, this does not compare to that of "proportionalism," which has been favored by "dissenting" Catholic moralists in their criticism of official Church teaching. After Vatican II, proportionalism flourished until John Paul II's encyclical "The Splendor of Truth" (*Veritatis Splendor*, issued August 6, 1993) declared it to be incompatible with the Catholic tradition of exceptionless negative moral norms. Yet some proportionalists still dissent from the Church's teaching on the grounds that the encyclical misrepresents their position.⁴⁶ Here, however, we are interested in this question only as regards natural law ethics, not theological considerations. Since the essential ethical thesis condemned by the encyclical is the assertion that no moral act can be judged evil simply on the grounds of the moral object intended, proportionalists should be asked whether they do or do not accept this proposition. The encyclical rightly calls proportionalism a "teleologism" to be distinguished from the teleology of Aquinas and other classical authors; and it rejects the notion of the "fundamental option" as that is understood by those who claim that serious sins are not necessarily mortal sins. Certainly it seems contradictory for proportionalists to claim to have a teleological ethics and yet deny that some kinds of human acts by their very nature (i.e., their moral objects) cannot lead to the *telos* or goal of human life but obstruct it, and are therefore intrinsically evil. It may be that "all roads lead to Rome," but certainly not all kinds of acts lead to true happiness. Proportionalists also often join Charles Curran in denouncing *Humanae Vitae* for its alleged "physicalist" understanding of natural law.

In fact, it was during the controversy over the morality of contraception that proportionalism first emerged. It was a distinguished moralist of the Gregorian University in Rome, Joseph Fuchs, S.J., in an important article on “absolute moral norms,” who first defended the theory.⁴⁷ He argued that moral decisions can be made more “objective” if not only the moral object of an act but all three factors of the act— object, intention, and circumstances—are taken together.⁴⁸ Of course, Aquinas would agree. But Fuchs meant by this that the nature of the moral object by itself could never make the act essentially evil and thus ground an absolute (exceptionless) negative concrete norm forbidding it. This revision of Aquinas, as *Veritatis Splendor* declares, is contrary to Catholic moral tradition that has always held that certain kinds of acts, such as the direct killing of innocent persons, is morally wrong, no matter in what circumstances or with what intention.

Thus Fuchs dropped the rejection of any species of act as intrinsically evil and reduced the specification of morality wholly to the application of a “principle of proportionality” or, as some prefer to say, “principle of moral preference.” By this principle an act could be judged to be morally good if, when its object, circumstances, and intention were taken together, it had greater positive than negative moral value. This theory attained great influence in the United States through its advocacy by Richard McCormick, S.J., who even claimed it to be “self-evident,” because the *object* could be a *moral* object only if it was *intended* to achieve the best possible results in the *actual circumstances*.

The fallacy of this seemingly reasonable argument becomes clear, however, when Aquinas’s understanding of the “moral object” is taken fully into account. For him, the morality of an act has only two kinds of specifiers, not three. The *intention* of the moral object is the primary and essential specifier, while the circumstances, including any circumstantial intentions, are only secondary and accidental qualifiers. A circumstantial intention is merely some secondary and accidental motive that qualifies but cannot change the essential character of the intention of the moral object; it can only increase or decrease the goodness or

evil of the act. Hence, if the intention of the moral object is essentially evil, it cannot be made essentially good by some accidental motive, although its evil can sometimes be mitigated by such a secondary motive. Thus a murderer, out of pity for his victim (a good motive), may choose to use a less painful way to destroy that victim (his essential intention of his evil moral object). On the other hand, murder can be made still worse by evil secondary motives, such as revenge, greed, or sadistic pleasure. Yet no secondary good intentions can make killing an innocent person morally good.

Furthermore, it must be kept in mind that, for Aquinas, the moral object is itself *intended* as means to the ultimate end. Hence, in every such deliberate choice, an intention of that end is also present, and is in fact the “prime mover” of the choice. Persons committed to the true end of life may not consciously think of their ultimate end in making their choice of means; but if it becomes evident in their deliberations that a certain choice might be seriously contradictory to achieving that end, they will refuse to do it. If they yield to the temptation to make the choice of an evil means, they can do so only by abandoning their commitment to that true ultimate end and making a new commitment to some false ultimate end. Thus a Christian committed to love of God and neighbor who deliberately murders can do so only by abandoning a realistic hope of union with God and neighbor in the common good. By committing himself to a life of self-seeking, as long as he fails to repent, he blocks his path to true happiness.

The error of both situationism and proportionalism is to ignore the fundamental difference between the intention of the moral object that is the essential and primary motive of choice, and other secondary motives or intentions that may be *mixed* with it. Hence, first of all, they fail to determine the moral object before asking about its possible qualification by secondary motives. Instead proportionalists claim that the moral object, if considered concretely, only insufficiently specifies the act morally, and must be supplemented—not only by the circumstances but also by an “intention” that is not the intention of the object, yet is also not a circumstance. The result is that this theory often becomes in fact much like the “intentionalism” of the medieval moralist Abelard

who thought that a good intention can make a bad act good, "Doing evil that good may come from it."

When this objection is raised to proportionalists, they attempt to answer it by explaining that what they mean to say is that the weighing of the positive and negative values of the act is to be decided prior to intending it. Hence these are "pre-moral" or "ontic" (purely factual) judgments of proportional values. Only when they have decided that the act has more positive than negative values do they "intend" it, so that it then acquires an "ontological" moral goodness. Hence they claim that their intention is to perform a good act, not one that is partly evil.

This argument, however, raises several difficulties. Proportionalists say that it is not fair to call them "consequentialists," "utilitarians," or "pragmatists." Yet it is not at all clear what is meant in their system by positive and negative "values." For Aquinas, who uses the term "good" rather than the economic term "value," moral goodness and badness is determined by the relation of the means to the true end of life. Any other evaluation is as such merely "physical" and is not morally specified (hence Curran wrongly accuses Thomists of "physicalism"). For example, to describe an act as "killing a human being" tells us that the act in question is physically destructive, but does not evaluate it as morally good or bad, since killing someone with the intention of self-defense or with the intention of revenge are specifically different kinds of acts morally. Thus, a weighing of positive and negative "pre-moral" or merely physical values cannot of itself ground a moral judgment.

A teleological ethical judgment weighs "values" only in terms of the relation of means to ends. It is true that a good means to the proper end of human life may have some secondary bad effects that are not intended and can yet be justified by the principle of double effect, if these are not proportionally greater than the good intended. It is not possible, however, to morally intend a means that is essentially contradictory to the true goal of life yet to compensate this by weighing up the positive values of secondary circumstances or intentions. These circumstances, including circumstantial intentions, are merely accidental to the primary and essential object intended. Hence it is not possible to

weigh values of two entirely different orders. Thus proportionalists are deceived in thinking this is possible by their failure to understand what “intention of the object” means for Aquinas. Therefore the proportionalist methodology can only result in arbitrary moral judgments. When we are faced by a moral dilemma, only a little imagination is required for us in order to think of circumstances or good “intentions” that might seem to outweigh the essential character of an act.

Thus, President Harry Truman, no doubt in good conscience, found it easy to suppose that, in the circumstances of war and with the good intention of saving many human lives, he was justified in terrorizing Japan into surrender by dropping two atomic bombs on thousands of innocent Japanese. No doubt also Osama bin Laden reasons in much the same way about his terrorist acts piously intended to free Darlslam from the presence of the infidel. But an act of terrorism performed with the direct intention of killing the innocent is essentially contradictory to the ultimate goal of human life. Thus the appreciation given by Metascience of what it means to speak of the moral good, of the teleology of moral decision, and of the difference between what is primarily and essentially intended and what is secondary and accidentally intended, exemplifies its clarifying service to ethics.

Before leaving this topic, however, something needs to be said about morality as it pertains to and is influenced by pure spirits, if they exist, since, like human persons, they would have free will and make choices (although, as shown in chapter 4, section D.2.a, these choices are irrevocable). It is, therefore, reasonable to suppose that while most pure spirits have chosen their own good and that of the universe, some, like some human persons, have chosen evil. In most cultures it is believed that there are both good and evil spirits, although their existence is variously explained. For example, it is not clear in Zoroastrian, Manichaeian, and Gnostic dualism whether spirits are by nature good, and evil only by their own free choice, or whether they were created evil. In some religions even good spirits can become malevolent if not properly propitiated.

In Christianity, and less explicitly in other monotheistic cultures, it is believed that the angelic spirits were all created

good but, from the beginning of their existence, some chose evil and hence wage constant warfare against God's plans for the good of creation. God tolerates these evil spirits in order to test human beings⁴⁹ and to enable them to acquire greater virtue. In the last judgment these demons will be forever subdued. Aquinas argued that evil spirits can never repent, but human sinners by the grace of God can do so. After death, however, human persons, like the angels, have a fixed destiny, although they may not reach their final reward without first undergoing a process of spiritual purification by God (Purgatory).

3. Teleology in Social Ethics

Aristotle and Aquinas emphasize that human persons are by nature social, both in the sense that they need others to achieve their individual goals and in the sense that their happiness culminates in spiritual goods which can and ought to be shared by many. Hence, in addition to dealing with the ethics of individual life, Aristotle, in one of his most remarkable works that beautifully exemplifies his empirical methodology, namely, the *Politics*, treats of human life in community. Both he and Aquinas hold that there are at least three distinct ethical sciences, that of individual life, family life, and social or political life.⁵⁰ Yet Aristotle wrote only a very brief treatment of the second of these as book 1 of the *Politics*, and Aquinas never gave it a detailed treatment. In the writings of recent popes of the Catholic Church, especially of John Paul II, this topic has received much greater attention. From a philosophical as well as a theological perspective, John Paul II has emphasized that good families are necessary to the foundation of the larger society. Good family life is needed for the education of its citizens and is the "school of love" for adults who, by permanent commitment to each other, fulfill their sexual needs and fully develop their ability to form relations of trust and empathy with their children and their fellow citizens.⁵¹

In view of the accusation that the Catholic Church promotes "patriarchalism," John Paul II has put great stress on the equality

of man and woman in marriage. In traditional Catholic ethics, however, attention has also been given to the difference between the roles in the family community of husband and wife, father and mother. Since unity of decision is necessary in any community, whether in a family or in the larger society, there must be an agreement on how if, after consultation and dialogue, a final practical judgment must be definitively made. Aquinas points out against anarchistic theories that, because practical judgments depend on concrete experiences that are never the same for all, and because there are often several ways of accomplishing an end, none of which is without problems, decision by consensus is not practical for common life.⁵² Benjamin Franklin is said to have answered the question, "Who should be head of the family?" by replying, "The husband should rule the roost only if he were the more sensible of the two."⁵³ Well and good, but who is to decide who is "the more sensible?" I am sure Franklin thought he was more sensible than his wife. Nature has itself provided, therefore, for a certain hierarchical structure in the family that does not depend on a debate as to whether husband or wife are the more reasonable.

Parents must decide for the children in major matters, and when after consultation, the parents disagree, the husband must make the final decision, not, of course, simply in his own interest, but for the common good of the family. Hence, while both parents must have the virtue of domestic prudence, this is above all the husband's responsibility because he is usually more free of the restrictions entailed by pregnancy and early child care and hence is more involved in the external affairs of the society that family decisions must also take into account. As sociobiology is showing, human freedom as it seeks to emphasize the equality of human rights based on human personhood must still recognize the limits set by human biology.

The goal of common decision and action in any society must be the *common good*, and this requires obedience according to the virtue of legal justice by all members of the society. The common good is not merely the good of those in authority or of some abstract entity (totalitarianism), but precisely the good of

each and all the members of the society. How is this possible? Is there not sometimes a contradiction between the private and the common good? Aquinas answers that the good of the human person consists both in private and common goods.⁵⁴

Private goods, such as clothing, our homes, and the things we eat and drink, cannot be well shared with others because they are *material* goods that must be divided to be consumed privately. Yet there are as well goods that are essentially common, such as the security of the state. But primarily it is *spiritual* goods, namely, virtue and knowledge, that can be shared without division, precisely because they are spiritual. In fact, these are *best* achieved through sharing. When a teacher shares his or her knowledge with a pupil, neither loses and both gain! Aristotle and Aquinas both argued that the goal for political life, just as for personal life, is the contemplation of truth. Because it is so often supposed that the goal of government is public order, military power, and material prosperity, governments often become totalitarian and abusive of human rights.

Though for Aristotle and Aquinas the goal of government is to promote the virtue and wisdom of its citizens, it needs to do this in harmony with the principle of subsidiarity. Since the virtue proper to rulers is prudence, not speculative wisdom, Plato was wrong in asking for a “philosopher king.” Rather, government should promote virtue by supporting but not dictating to heads of families, schools, and religious centers, and should concern itself not principally with the more private aspects of morality but with those that directly affect justice and human rights.

As in the family life, there needs to be private property in material goods as an instrument, so the state has to regulate the production and distribution of wealth using the architectonic technology of what is today called “political economy” as its instrument. In his times and culture, Aristotle faced the fact that for an adequate civil economy many human beings had to do manual work as slaves (some 50 percent, at least, of the population of most Greek cities). Hence they could not have the leisure necessary to gain a liberal education that would make it possible for them to participate in the common good of society. Moreover, without the work of slaves the free citizens would not

have the leisure for the liberal education necessary to be citizens with the opportunity of attaining to contemplation. Thus the slave, though naturally a member of the human species, could not achieve the natural goal of human life, while the citizens could do so only if they enjoyed the leisure that the existence of a slave class could supply. The seemingly necessary institution of slavery looked inconsistent with Aristotle's general teleological principle that "nature does nothing in vain," that is, that where there is a natural end there is a natural way to it. The only solution to this paradox that he was able to suggest was that at least it was better for a slave to enjoy some of the "trickle-down" benefits of civilization than to be a nomad barbarian.⁵⁵

Aquinas somewhat improved this unsatisfactory solution of Aristotle⁵⁶ by adding the qualification that the enslavement of persons can only be justified as a punishment for crime, for example, for the aggressors in an unjust war. It is more merciful, Aquinas argued, to enslave prisoners of war than to kill them and still more merciful, when this is economically and socially possible, later to emancipate them and their families who share their fate. Aquinas notes, however, that as private property has become "natural" only in the fallen condition of humanity when selfishness and crime has become so common, so it is with war and slavery.

Today we are shocked that these great ethicists with their strong views of the dignity of human nature would have accepted any justification of slavery, since by Aristotle's own definition slaves are human beings who are treated not as ends in themselves but as mere instruments used by free persons to attain their own ends.⁵⁷ Yet Aquinas agrees with Kant that "every person must be treated as an end not as a means." To be honest, however, we must admit that this question still faces us today. Not only did Communism and National Socialism impose slavery on dissenters, but slavery still exists at least marginally in certain countries.

What is even worse, in our own United States, prosperous as it is, a large part of the population does not vote, that is, does not participate as free citizens. As the gap between rich and poor

widens, many of the poor are not able to rise to that level of liberal education that would make it possible for them to vote intelligently. Our capitalistic economy, for all its productivity, leaves the poor to the “trickle down” of prosperity enjoyed by the rich. The United States has only partially implemented the redistribution of wealth that European governments effect by relatively high taxes, stoutly resisted here. History seems to show that the human race, whether by reason of “original sin” as the Christian worldview holds, or whatever other explanation is given to the actual “human condition,” has never made sufficient use of its native intelligence to achieve a level of productivity that would permit all its members to live in a truly human way.

In modern times, science and technology along with higher general levels of literacy and education and participatory government have enabled the so-called First World (the Western Ecumene) to attain a level of production that might make such a life possible for all. But the Second World, that is, what remains of Communism, principally now in China, and even more the Third World, suffer from a desperate poverty that remains well below that level. Moreover, prosperity of the First World has been in a considerable measure built on the exploitation (enslavement) of the Third World. Thus the problem that Aristotle and Aquinas faced is still solved only on paper in the *Universal Declaration of Human Rights*.

It can at least be said for Aquinas, and the Christian worldview generally, that he did not accept the Greek contempt for manual work that in pagan eyes made contemplation impossible for most human beings. The example of the carpenter, Jesus of Nazareth, and of the tent-maker, St. Paul of Tarsus, and the whole institution of monasticism with its Benedictine model of *ora et labora*, a life of prayer and work with one’s hands, opened the possibility of contemplation of divine reality to all. Such a life, however, requires the pursuit of moral “virtue,” that is, those practical skills by which the general norms of morality can be applied in a *consistent* manner to the concrete particular situations met in actual life. The discipline of manual work and such poverty as suffices for a simple lifestyle can in fact promote the acquisition of such virtue, while the life of lazy indulgence that

wealth often engenders is a grave obstacle to good character. Though human freedom makes it possible for even bad persons sometimes to do the right thing, consistently good moral behavior in difficult situations requires well-practiced virtue.

To sum up this discussion, it should again be emphasized that, because a teleological ethics takes its principles not primarily from the will of a legislator but from those goals that are given in human nature, it has to be grounded on an anthropology or analysis of human nature. This analysis of human nature is first of all the eminent subject of natural science. Hence, while ethics does not formally depend on natural science, ethics presupposes natural science as its necessary material (not formal) condition. We cannot decide how humans “ought” to behave unless we first know what their natural needs and their powers to fulfill these needs actually “are.”

In fact, Aristotle realistically notes that we should look for less certainty in ethics than in natural science because of the great complexity of human nature and human relationships.⁵⁸ Hence ethicists need have only a general knowledge of natural science, although they must keep on the alert to any new scientific information that may improve ethical analysis. Thus the principles of ethical science are directly evident from human experience and constitute within it three autonomous but related disciplines since the problems of individual ethics, the ethics of managing a family, and the ethics of managing a larger community have different specific goals and present different problems in attaining those goals.

When, in the ethical sciences, we speak of “human nature,” the term “nature” is only analogous to its use in “natural” science, since the latter refers only to material things, and natural *moral* law is only analogous to natural *physical* law. Once it has been concluded that the supreme and most specifically human goal of human life is true contemplation and that this requires a kind of knowledge that extends to spiritual realities, it becomes evident that the completion of ethics must pertain to Metascience. What Metascience adds to ethics as such is precisely the appreciation of the human person as spiritual, intelligent, and free, and thus ordered to God and to the community of other spirits.

From the foregoing we can also conclude how important it is in interdisciplinary and multicultural dialogue to make use of Metascience and its comparative study of worldviews to relate natural science and especially the fields of anthropology and psychology to the comparative study of ethical systems. The marked contrast between the Secular Humanist worldview and those that understand the human person primarily in spiritual terms must be faced. Furthermore, within spiritual worldviews, there has to be frank recognition of the important differences between the monotheism of Judaism, Christianity, and Islam on the value of the human person, on one side, and the chiefly monistic perspectives of Hinduism and Buddhism with their key concept of reincarnation, on the other side. The relative lack of concern of the Chinese and Japanese cultures about the future life must also be acknowledged. At the same time, the convergence of these various worldviews on many moral norms must also be acknowledged and reinforced by cooperation for peace and social justice.

4. Teleology in Technology and Ecology

The practical goals of the ethical sciences are fixed in human nature and are thus *unconditional*, while the goals of the technologies are freely chosen and thus are *conditional*. I am ethically obliged to try to keep healthy, but while I am obliged to play ping-pong according to the rules of the game, this is so only if I freely choose to play ping-pong. Hence, the technologies are subordinated to the ethical sciences, since unless what they achieve is helpful for a good life they are a waste of time, and if it is harmful (such as the production of atomic weapons or cigarettes) they are immoral and cannot be properly called “practical.” The so-called “technological imperative,” to do whatever we have the technological power to do, is obviously bad ethics.

Much has already been said about technology in previous chapters. Here it is only necessary to relate the metascientific notion of “goodness” to the pressing problem of

environmentalism.⁵⁹ We human beings could not exist without the remarkably balanced ecology of our earth, and hence we must always be concerned that our use of technological control over the environment preserves these features and alters them only in view of a good life for all humanity. Yet current discussion of environmentalism sometimes loses sight of the fact that our obligation to preserve and perfect the environment is primarily to promote good *human* life, not to preserve the inanimate or subhuman species that constitute this environment. No doubt rocks, trees, and whales are ontologically good in themselves; but if the teleological aspect of natural science that has been defended in this book is correct, nonintelligent things find their ultimate perfection in their service of intelligent life. Moreover, subhuman animals do not have spiritual life, as do human persons, but at best only present a preparation for the existence of human life.

To hold, as Peter Singer has argued,⁶⁰ that animals have “rights” because they can feel pain is mistaken for two reasons. First, and most important, the rights of human beings are founded on their personhood, not on their ability to feel pain, since even unconscious persons who feel no pain have rights. Personhood is marked by intelligence and free will, which humans but not animals possess. Second, it is gratuitous to assert that animal pain is identical with human pain. Studies of human pain show that it consists not only in a physical feeling but also in the fear and anxiety of the sufferer, who may see this pain as a sign that happiness as the goal of life is becoming inaccessible, or that it can be met only with a great effort of courage and patience. This major component of pain exists in animals in a different way than in humans, because they lack true self-consciousness and a perception of an ultimate goal of life. Hence animals have “rights” only in an analogous sense, namely, that they deserve to be treated with respect for the remarkable and valuable creatures they are and spared unnecessary injury or suffering. Moreover, cruelty to animals tends to brutalize their human abusers and inclines them to abuse other humans. Unless one accepts the notion of Eastern religions of the transmigration of souls,

however, we do subhuman creatures no injustice to use them for morally good human purposes.

Yet we must also keep in mind that the greatest service that the material universe serves for spiritual beings, including human persons, is not just the provision of material needs. Among spiritual beings, only human persons require that material support; but all spirits, including the pure spirits, need the material universe as the mirror in which they come to a natural knowledge of the Creator. Although pure spirits know by innate ideas rather than by sense contact with the material universe, some of these innate ideas have as their objects concrete material realities. The Creator has carefully adjusted the material universe to the ways his creatures can know that universe in its truth that has the clarity of beauty. By its beauty the orderly universe attracts intelligent creatures to God in love. That is why our universe is also called a “cosmos,” which in Greek signifies “that which is in good order.”

Consequently, environmentalism must use as its criteria for making legitimate changes in the environment not only whether the biodiversity in ecological balance will continue to supply our material needs, but also whether such changes will increase the beauty of our *garden* earth that is both a natural wonder and a work of human art. Without a rich biodiversity, this work of wonder and of art will be greatly diminished, although, of course, we cannot preserve all the species of living things that have existed in the course of evolution. For our respect for the earth and its beauty, we can find much support both in all the great religions of the world and in the traditional religions of marginal peoples, since in all of them there is a sense and mystery of nature, as is evident in their arts.

D. TELEOLOGY IN THE FINE ARTS

In every culture, its value system or ethics and politics finds expression in the fine arts, not precisely as persuading to right

action (since that is the function of rhetoric), but as portraying the world and human life in their striving for perfection. The fine arts are a kind of mean between the practical and the theoretical disciplines. They are practical in that they produce external objects, but they are theoretical in that these objects are not of practical use but are produced to be contemplatively enjoyed. Because their goodness is contemplative, it consists in their expression of some kind of truth, not a truth hard to grasp (since then it would not be enjoyable), but truth precisely as it is fitted to our human mode of cognition; and we have seen that this is truth as it is *beautiful*. Current art criticism often eschews the term “beauty” because to some it connotes a type of idealizing art that lacks strength and tends to sentimentality. As “beauty” has been defined in this chapter, however, it includes strength and sublimity, and in no way implies sentimentality. It may seem to some odd, however, to say that in the arts we contemplate truth in its beauty. Why truth? Is it not rather the sensible qualities of the art object, its color, textures, shape, symmetry, or its melodies and harmonies, or its grace of movement and gesture, or its imagery and play of language, not truth, that is contemplated? Again, do not art objects appeal to our feelings and emotions rather than to our intellects?

The answer to such questions about the fine arts becomes clear if we note that because of the human mode of knowing through the senses, the meaning or truth of things is most easily and precisely known by us, not in abstract thought, but in its beauty when it is given sensible expression. This accessibility of the object is also facilitated by emotional empathy with an object that makes it connatural to our human way of knowing. Our knowledge of truth in the scientific, abstract, and purely intellectual mode is indeed more perfect in precision and certitude; but in this mode truth is difficult for all but the most expert, while the same truth given sensible expression can be easily grasped, at least by those of cultivated taste. That is why, as said earlier, that when, in the development of the Enlightenment worldview, primary reliance for truth was placed on a fact-free, mathematicized science, other aspects of truth, including its enhancement in value by its beauty, led to the

Romantic movement, in which the kind of contemplation provided by the fine arts became a substitute for religious contemplation.

An important result of this divorce of the fine arts from a value-free science has been the remarkable evolution of “modern art.” The Neo-Classicism and Academicism of the late eighteenth and much of the nineteenth centuries looked back to a tradition that had flourished in the Christian Renaissance, a phase of art history not yet marked by the separation of the fine arts from the Church and its liturgy. But with the advance of the Secular Humanism born of the Enlightenment, in the latter part of the nineteenth century a radically new experimentalism began in an effort to find a style of art really expressive of this secularizing ethos.

For this purpose, one approach was that of an objective Realism that resembles the scientific approach to reality, but in the visual arts and music Realism was soon replaced by Impressionism, which emphasized not the object seen but our subjective impressions of the object.⁶¹ At the turn of the twentieth century, this became Expressionism and Abstractionism. Emphasis on the truth of the object was replaced by the exaltation of the *creativity* of the artist, supposedly freed of representing any recognizable object so as to be completely free to create new objects unconnected with reality.

Yet it is now generally recognized that “formalist” art theorists went too far when they claimed that art works mean nothing but themselves as objects viewed simply as pure patterns of sensation. When a painting becomes nothing but a visual pattern, or a piece of music nothing but an arrangement of notes, it is reduced to a mere *decoration* whose beauty is quite superficial and cannot long engage contemplative enjoyment. Wallpaper can be a pleasing background for living, but only the most effete aesthete is likely to contemplate it for long. The same goes for “background” or “mood” music.

We humans are so constituted that purely sensible patterns always have at least something of the character of a *sign* that conveys other meanings to us than mere sensible pattern. Who can deny that music expresses human feelings or emotions, and that in doing so it conveys something that is true to human

experience or is false and meretricious? So too do “abstract” painting, sculpture, dance, poetry, and fiction have some objective reference, however obscure. Human feelings and emotions cannot be simply separated from the truth of the things that arouse such emotions. One cannot love or hate emotion itself but only objects, persons, and events that arouse emotions.

Hence, if I carefully examine my very real enjoyment of modern “abstract” works of art (at least some of them), I discover that they do have meaning for me beyond their purely formal qualities, and hence participate in truth and falsity. The questionable aspect of modernism in art, however, is that too often this “meaning” is little more than the artist’s egoistic assertion of his freedom to display his originality. The result has been that at the end of the twentieth century modern art seems worn out, and what is being produced often resorts to shocking the beholder or propagandizing for some cause rather than producing a work that can be enjoyed for its contemplative beauty. Thus the distinctions between poetry, politics, and pornography vanish.

Metascience would suggest that the way out of this dilemma is to return to a genuine interest in the objects that constitute the world of human life, not indeed to mechanically represent them like a photograph (though, of course, a photograph can be a work of art), nor necessarily to idealize them, but to enter into their essential natures and dynamism. This will be possible only when our scientific understanding of the world also recovers its teleological understanding of final causality in nature. In all cultures, the worldview and value system is expressed in its fine arts and religious rituals. The truths of any culture, even its most profound truths that are difficult to express in verbal language, are expressed in a way accessible even to the untrained viewer or hearer. It has been argued that the primordial art was the dance,⁶² for which music, poetry, costume, and setting were then provided. Fine art had a communal setting before it was consigned to museums. Metascience, therefore, can assist artists today to begin once more to free themselves from the notion of “creativity” that is really narcissistic and once more draw their inspiration from the artistry of their Creator displayed in his

creation.

E. DIALOGUE WITH THE ETHICS OF OTHER CULTURES

Dialogue with Platonic and Hindu and Buddhist ethics can begin with their common agreement that the goal of worldly life is the release (Hindu *moksha*) of the spiritual soul from the cycle of reincarnation and the ignorance and suffering it entails.⁶³ For Hindus this release is the return of the *atman*, or soul, to the Absolute or Brahman, and is to be achieved by the practice of asceticism and meditation. Thus it is traditional in India to divide the lifetime of a Brahmin (a member of the priestly caste) into four periods, that of the learner, then of the householder or married man, then of the forest dweller who lives an ascetic life, and finally that of the solitary mystic who has attained to or is approaching enlightenment.

Most Indians probably live according to the customary rules of their caste, not expecting enlightenment in this cycle of their lives, while only a relatively small number engage in the life of direct striving for release and constant meditation. Hence, in India, four goals of life have been recognized: (1) *moksha*, or release; (2) *dharma*, a life of duty or obedience to accepted norms; (3) *artha*, a life of material prosperity; and (4) *kama*, a life of pleasure. From the seventh century BCE these goals were expressed in writings called *sutras*. Sometime after the second century BCE the *Laws of Manu* codified the mythical origin of the caste system of priests (the brahmins or "twiceborn," that is, those initiated to perform priestly rituals), rulers, farmers and merchants, and sudras (manual workers). It also assigns the responsibilities of each caste.

These ethical rules of Hinduism are very much mixed with complicated ritual practices intended to enforce the caste divisions and their respective norms. Central to the Vedic religion

was the idea of *sacrifice*. This ritual, however, was not, as for Judaism, primarily an act of acknowledgment of the Creator, but rather an invocation of magical power. Thus creation itself was pictured as the sacrifice of the primitive man (Manu), from the various parts of whose body the castes were born. Little attempt, however, was made to systematize these rules on a principled basis.

The Buddha, Gautama Siddhartha, who belonged not to the priestly Brahmin caste but to the warrior caste, though retaining the doctrine of reincarnation and enlightenment, instituted a radical reform of Hinduism based on the Four Noble Truths: (1) life is a torment of pain and pleasure, (2) this torment is caused by human desires, (3) this torment will cease only with the cessation of such desires, and (4) only the “Middle Way” between extreme asceticism and worldly indulgence, exemplified by the Buddha, can bring cessation of desire and result in unending peace. This Middle Way is an eightfold Path of achieving: (1) the right understanding of life, (2) the resolve to travel this way, (3) right action, (4) right speech, (5) a simple way of life, (6) continued effort, (7) right “mindfulness,” and (8) right concentration. The first five of these eight steps refer essentially to morality, the last three to meditation.

As we have already seen, Buddhist meditation, unlike that of Hinduism, does not seek the total emptying of phenomenal consciousness, but rather an acute awareness of phenomena that reveals their transience and impermanence. Thus the extinction of desire cannot be achieved as long as there remains any illusion that anything is permanent in the cyclic flux of the impermanent. Hence one has to become convinced, through constant meditation, of the *emptiness* of all things, even of one’s self as a person. It must be realized that all the things of experience are merely aggregates of interdependent appearances that will dissolve into nothingness with the dissolution of these temporary, codependent bonds. The goal of this mediation and of human life is the attainment of *Nirvana*, or extinction of desire, a condition of peace beyond pain and pleasure.

As related in the last chapter, Buddha claimed to have

attained Nirvana, but then to have decided, out of compassion for others, to continue life for some forty-five more years so that he might instruct others on how to gain this same release. His compassion was thus, by its total detachment even from the desire for Nirvana, the manifestation of his attainment of Nirvana. In contrast to this conception, Christians believe that Jesus's compassion for sinners was for the sake of the sinners who might, through his sacrifice, attain to eternal life. Jesus died not to demonstrate his detachment from desire, but out of love for his fellow humans. As for the persons whom the Buddha saves from desire, neither he nor they are anything but empty and impermanent aggregates of the world of flux that is in fact *identical* with Nirvana, since both are wholly "empty."

When disciples asked the Buddha, "What is *Nirvana*?" he refused to answer, since to do so would have falsified what cannot be expressed in any human terms. He denied that it was annihilation, but refused to say whether it continued after death, since it is obvious that it must transcend the categories of time. Hence, in later Buddhist speculation, it was said that the phenomenal world of flux is identical with Nirvana since that world is entirely empty and thus in no way positively distinguishable from Nirvana.

While the Buddhist conception of a celibate, begging life made sense for "monks" (note that Christian and Buddhist monasticism are actually very different in their purposes) wholly dedicated to seeking Nirvana, it appeared to have little to say to the laity, who could not expect to attain that goal until, in some remote incarnation, they themselves became monks. Hence, building on certain elements already present in early Buddhism called the Theravada or Hinayana, a new form of Buddhism called the Mahayana arose, especially promoted by a great sage Nagarjuna around 100 CE. According to Mahayanists, the historic Buddha was only one of many Buddhas who are in fact, like the Hindu *avatars*, apparitions of a transcendent Buddha identical with the impersonal Absolute. These many Buddhas are all moved by compassion for humanity, and by devotion to them, along with their spiritual help, *anyone*, monk or layman, can come to realize their own "Buddha nature" and perhaps even now to attain

Nirvana.

All these versions of Buddhism, however, have Nirvana as their ultimate goal and propose the same Middle Way of ethical life. One of its notable features is the emphasis (found also in other Indian religions because of the concept of reincarnation) on nonviolence that extends even to animal life. In Tantric Buddhism, which is especially prominent in Nepal, emphasis is placed not only on special meditation techniques, such as the contemplation of *mantras* (symbolic pictures), but also on magic.

In some versions of Tantra, in strong contrast to monastic chastity, an eroticism is practiced. Certain practices in Hinduism also seem to revert to the sexual rituals of the ancient fertility religions. While even in Judaic and Christian mysticism married love is a sacrament of the union of God and his Church, or a metaphor for the union of God and the individual soul, these monotheistic religions have always rejected any confusion of sexual indulgence with spiritual mysticism.

One may well wonder how Hindu ethics, with its emphasis on the ascetic life, has been able to provide a practical ethic for the Indian laity for whom such a life is hoped for only in some distant reincarnation. This need was met in Mahayana Buddhism by the doctrine of faith in the help of some transcendent or actually incarnated Buddha, and in Hinduism by *bhakti* devotion to a god, Vishnu or Shiva, conceived as a manifestation of the Absolute sought by ascetics in meditation. Thus the great ethical classic of Hinduism, especially popular Hinduism, is the *Bhagavad Gita* ("Song of the Glorious One") that forms part of the epic *Mahabharata*.⁶⁴ It was probably added to this epic sometime between 400 and 100 BCE, perhaps to match the asceticism of the Jains and Buddhists who did not accept the Vedas, and also to support the Hindu social system by showing the need for an ethics of social responsibility according to Hindu law.

The theme of the *Mahabharata* goes back to the Aryan dualism founded in the oldest of the Vedas, the *Rig Veda*, according to which the present world order emerges cyclically from titanic struggles between good and evil forces. In the *Gita*, this great eschatological battle between a good and evil tribe is

about to begin. The leader of the good tribe, Arjuna, stands in his chariot ready to enter the fray when, thinking with horror of the terrible slaughter that is to follow, he throws down his bow in despair. But his charioteer urges him on. This charioteer is really Krishna, the supreme and Glorious Lord identical with Vishnu, who has come to begin a new cosmic cycle after the time of quiescence (*pralaya*). Krishna instructs Arjuna by first showing him that he is blinded by ignorance since he still accepts the Vedic dualism of Matter and Spirit as elaborated in the *Samkhya* philosophy.⁶⁵ This Vedic faith in the power of ritual sacrifices is only a half-truth. The real truth is that if Arjuna carries out his duties in life (*dharma*) by engaging in the war he will himself become a sacrifice and thus will be enlightened so as to understand that he and all things are identical in mutual love (*bhakti*) with God, that is, Krishna.

Thus, while retaining the essential doctrines of Hinduism concerning reincarnation and salvation through ascetic meditation, this great poem provides a more positive conception of moral duty for the laity in Hindu society. It does this by a genuine theism that, however, remains monistic. This is true also of the other great Hindu epic, the *Ramayana*, directed more to the Hindu upper classes than is the *Gita*.⁶⁶ Its theme is the struggle of the royal hero Rama against evil and the fidelity to him through many perils of his wife Sita. In this story Rama stands for Vishnu, and the devotion of his wife, and of his wonderful monkey servant (and even in a hidden way of his evil opponents), is supposed to inspire *bhakti* devotion to this god Vishnu, who symbolizes the Absolute.

Chinese culture, even when it received Buddhism, had a very pragmatic orientation that was in marked contrast to the speculative and mystical perspective of Hindu culture. Confucius (the Latinized form of the name K'ung Fu-Tzu) presented an ethic whose goal was entirely this-worldly. He did indeed believe in "Heaven and the Decrees of Heaven," considered as the impersonal order of Nature. But Confucius did not teach much about "Heaven" and actively discouraged interest in spirits as distracting from ethical concerns about practical daily life. He

attentively practiced the rituals of traditional Chinese religion (*li*) as ways of educating his students in a proper respect for tradition, authority, and propriety of manners, but he had little to say about the religious significance of these rituals.

Confucius's chief work is the *Analects* (1938), a gathering of his brief sayings on ethical topics, probably collected by his pupils. These sayings, like Proverbs and other wisdom literature of the Hebrew scriptures, and of the even earlier Egyptian wisdom sayings, express both personal insights and a fund of traditional moral experience. Confucius's chief concern was the development of the "superior person" or "gentleman" (*jun zi*), whose primary characteristic is the virtue of "benevolence" (*jen* or *ren*).

Confucius stressed the importance of developing such virtues by an education not unlike that of the Greek "liberal arts." It is centered on a careful study of the traditional Five Classics of poetry, music, history, and divination, with the *Analects* as the fifth. Such a study aims particularly at restoring the proper "naming" of things, that is, at precision of thought and expression. Contrary to the emphasis of the prevailing Legalist School on the necessity of coercive government to maintain public order, Confucius taught that only through the development of a class of superior persons would it be possible to reform the social and political order and maintain peace. Eventually, this type of Confucian education became official in China under the Han in about 136 BCE, and exams based on it became the test for all government positions.

Undoubtedly Confucius believed that his moral teachings rested on a correct understanding of human nature as established by Heaven, but he left the defense of this position to later disciples. An especially influential disciple, Mencius, maintained that human nature is essentially good, while Hsün Tzu took the opposite view. Confucius's approach was also opposed by Taoists, such as Chuang-Tzu, who were suspicious of the artificiality of Confucian education and advocated more trust in human instincts and a life in harmony with the whole of nature. For a time, the teachings of Mo Tzu prevailed. He opposed Confucius's emphasis on ritual, filial piety, and the fulfillment of

duties to those closest at hand. Instead, the Mohist School emphasized that Heaven is the origin of morality and promoted a universal benevolence toward all persons without distinction.

As a result of such criticisms, Confucianism, during the period from 221 BCE to 960 CE, assimilated many elements of Taoism, Mohism, and Buddhism. After 960 CE until the Marxist revolutions of 1912, Neo-Confucianism prevailed but took two opposite perspectives. On the one hand, the School of Principle or Reason led by Chu Shi held that the universe can be reduced to one Great Ultimate Principle conceived as the origin of positive male forces (*yang*) and negative female forces (*yin*) that constitute all material things. On the other hand, the School of Mind led by Wang Yang Ming (1472–1529) taught that a universal Mind contains all things and is identical with the moral law of the universe. Thus Metascience cannot but raise the question whether Confucian ethics, excellent in its details as it is, has ever achieved a secure foundation in an anthropology that adequately defends the spiritual nature of humanity.

F. FINAL CAUSALITY AND THE COORDINATION OF KNOWLEDGE

How then does the transcendental, analogical concept of the “Good” and its final causality help to overcome the fragmentation of knowledge, contextualize this knowledge in historical worldviews, and open the way to fruitful dialogue among various parties? First of all, we note that in all worldviews there is the central question of the meaning of human life in relation to a trans-human reality. Clearly this is true of the great Eastern world religions that aim at the Good conceived first of all negatively as *release from suffering*. It is true also of the monotheistic religions that aim at salvation not only as liberation from suffering but also as eternal life in communion with a personal God. Are these two different conceptions of religion, or are they somehow

reconcilable? One cannot escape, for example, the question of whether the goal or good of Buddhism is merely negative or somehow positive (and if so, in what sense). Does the renunciation of all desire that Buddha (as well as some Stoics in their doctrine of *apatheia*) seemed to have taught, or the doctrine of “holy indifference” promoted by some Christian mystics, amount to a doctrine that it is even wrong to desire happiness? Kant’s deontological ethics seems to support such a conclusion, as Schopenhauer concluded when he embraced this Eastern principle.

As for the dialogue between the transcendent religions and Secular Humanism, the question arises concerning the relation of the human good to the good of the universe. Some might say that the universe is meaningless and cannot be said to have a good at all—that it just is, without purpose or goal. Yet great Secular Humanists, such as Einstein, Marx, and John Dewey, seem to teach that the goal of human life is to understand the awesome order of the universe and in its light bring some similar order into human life and society. The question becomes acute in the opinions expressed by some in the ecological movement, who ask whether perhaps the universe would be better if there were no humans on the planet at all! Thus, in every worldview, the affirmation or the vehement denial of a goal for human life, or its relation to the good of the universe, or participation in the goodness of God, stands at the center. It is contextualized by the whole perspective of the culture. Hence it must be central to dialogue and intercultural research.

This central issue, therefore, splits into two related questions: the good of human beings and the good of the universe. In a Confucian perspective, as in many others, the good human life is that which conforms to the “Decrees of Heaven.” Hence one must go on to ask whether “Heaven” is a personal God whose wisdom and will guide the universe, or rather a Stoic impersonal natural law or Logos immanent to the material world. Hence, in the ethical disciplines, the moral good or *summum bonum*, whether it is conceived as a supreme good or a harmonious fulfillment of many human needs, as well as whether it is individual or communal, is the first principle on which an ethical science is

constructed. Dialogue will be frustrated unless it is recognized that this is a debatable question to be explored, not one assumed to be answered yes or no, or to have no answer.

The other question, whether there is a goal of the universe as a whole, and if so, what it is, is inescapable in natural science. Many scientists think it absurd even to ask. Yet it is essential not to confuse the ethical and the scientific question, or the ways in which the term “good” is proper to each discipline. Natural science can speak of what is “good” for something only in the limited sense of a teleonomy in things less than animals that have no cognition and hence know no aim, where the “goal” is simply the predetermination of natural efficient causes that explain the regularity of their effects that are expressed by natural laws. Animals, on the other hand, certainly seek the satisfaction of their needs (goods) that by sense perception and evaluation (estimation) they cognize as leading to physical pleasure or the avoidance of physical pain. Yet there is no evidence that subhuman animals perceive such goods in terms of the intellectual abstract notion of “ends and means.” In human beings, however, this becomes evident in the freedom with which they choose means to ends in ways not completely determined by social interaction.

Part 3

**The First Cause or
Absolute Principle of
Being**

The Absolute and / or Nature

A. THE MONISTIC VIEW OF THE SUPREME PRINCIPLE

1. *Monism and Monotheism*

In chapter 4 I argued from the foundations of natural science to the existence of an immaterial First Cause as the necessary condition for a Metascience distinct from natural science, mathematics, the practical sciences, or logic. I also showed that the proper subject of Metascience is contingent being (*ens commune*) as it analogically includes both material and spiritual beings. Hence this chapter will be devoted to asking not whether an immaterial First Cause exists (scientific question 1), but what is its essence (scientific question 2). It was argued in chapter 5 that “Being” as the subject of First Science is an analogical concept and hence can have only a quasi-definition. This is all the more true of the First Cause of that Being.

When one attempts to say what the First Cause is, the major problem, from the viewpoint of comparative religion, is not the issue of polytheism (many gods) versus monotheism (one god only), but that of *monism* versus *monotheism*. Religious thinkers

in polytheistic cultures usually defend the worship of many gods as a concealed monism. They claim that the many gods of popular religion are known by the wise of those cultures to be simply symbols of a single Absolute One. Even in traditional religions, the lesser gods and spirits are usually not thought of as distinct persons, but as various manifestations of a more remote High God.¹

In trying to achieve some understanding of the nature of the First Cause, the first question must be whether the world of human experience is really distinct from a First Cause who has freely created it out of nothing, or whether this world of experience is really identified with its First Cause. As shown in chapter 1, the major worldviews answer this question in very different ways. Strict monotheism was historically the great contribution of the Jews to world culture, adopted from them by Christians and Muslims. In sharp contrast, the great Eastern religions of India and China, and less clearly the mythological religions, have a strong monistic tendency, though within their worldviews monotheistic trends can also be noted.

2. Materialistic or Nature Monism

The obvious connectedness of the parts of the universe has often led in history to a materialistic monism, according to which the universe is a single substance, although it has parts that are somehow differentiated. This is often referred to as “Nature,” and even mythologically as Mother Nature, because out of its all-encompassing womb the things of our experience have emerged and to it they ultimately return. Among the Greeks, Parmenides had anticipated this position, and quite logically was led by it to deny all efficient causality and change.² For him, as we have seen, Being was an eternal, motionless sphere. But the chief proponents of a materialistic monism were the Stoics, who taught that reality is only a vast mass of passive matter made dynamic by a *logos* or world-energy (pictured as the element “fire”). This cosmic fire has produced the universe in perpetual process

according to deterministic laws and will again reduce it cycle after cycle to chaos, a view again proposed by some scientists as an endless cycle of Big Bangs and Big Crunches, although recent observations seem instead to favor a “flat” universe forever expanding.”³

In the nineteenth century, Marx revived this Stoic worldview, but added to it the Hegelian dialectic by which these world processes follow a pattern of *thesis*, in which contradictory forces struggle with each other to a point of crisis or revolution, when an *antithesis* or negation takes over. The struggle of opposing forces then continues until the next crisis, when a *synthesis* or “negation of the negation” emerges, producing a higher level of organization. Thus Marx replaced the cycles of the Stoics with a progress toward some more absolute unity, as Hegel had done.⁴ It has been pointed out that this pattern was a secularization of Christian eschatology ending in a utopia instead of a heaven. Some modern scientists also think of the universe as a single “energy field” described by quantum mechanics.

Albert Einstein was the greatest scientist of the twentieth century. In his many pronouncements about religion, he always expressed the profound awe he felt as a physicist before the marvelous order of the universe. To the question of a rabbi as to whether he believed in God, Einstein replied, “I believe in Spinoza’s God, who reveals himself in the harmony of all being, not in a God who concerns himself with the fate and actions of men.”⁵ He explained that a notion of a personal God who rewards and punishes human beings seemed to him too anthropomorphic to be credible, and that scientific determinism kept him from believing in free will. He made a famous statement in opposition to the principle of indeterminism basic to quantum physics: “God does not play dice!” This expressed his conviction that any scientific view of the universe requires as its goal the demonstration that all cosmic phenomena can be explained by deterministic natural laws without the need to specify initial conditions. He seems to have accepted, therefore, that no other universe than the one that exists is possible. This opinion would, if by God is meant the one *necessary* being, identify the universe

with God and thus would be *pantheism*.

3. *Process Philosophy Monism*

Not a few scientists in the twentieth century have recognized the inadequacy of a strictly materialist worldview to account for psychic phenomena. If the world is only matter and energy, how can scientists—who in that hypothesis are only but matter and energy—know and control this world? Prominent among those who attempted to deal with this issue was Henri Bergson, who, in his *Creative Evolution* (1911), proposed a view of the world derived from the scientific theory of evolution yet incorporating a psychic element that was ultimately open to mystical experience. Among those greatly influenced by Bergson were the French Catholic paleontologist Pierre Teilhard de Chardin (1881–1955) and the British mathematician Alfred North Whitehead.

Teilhard, in his main work, *The Phenomenon of Man* (1959), argued for a universal “law of complexification” by which God causes matter to evolve from a lifeless condition to the “biosphere,” then to the “noösphere” of global self-conscious life, and finally toward an ultimate “Omega Point” in which the universe will be perfected in the likeness of God. This “Omega Point” is the incarnate Christ, who is both human and divine, and the community of believers of whom he is the head. This Christic evolution is possible because the energy that is the co-principle with matter has both an outer and an inner aspect (centrifugal and centripetal energy). The outer aspect explains physical complexification, the inner aspect explains an increasing psychic unification.

This fascinating Teilhardian synthesis of religious spiritualism and scientific materialism had for a time considerable influence and no doubt opened the way for many to think about this question. But its scientific and philosophical vagueness, not to mention the theological problems it raised for Catholic orthodoxy (since it passed over the topics of the angels, original sin, and many other doctrines), rather quickly discredited it. From a scientific point of view, its great weakness is that current science

has not discovered any “law of evolution,” but understands evolutionary data in term of a historical scenario in which chance plays a major role.

Alfred North Whitehead’s synthesis of science and spirituality was worked out in a much more technical way and rests on a more thorough understanding of modern physics than Teilhard’s synthesis.⁶ It still has wide influence among both Protestant and Catholic theologians, but little among scientists. Besides the influence of Bergson, that of Leibnitz is prominent in Whitehead’s concern to develop a “metaphysical hypothesis” that would be consistent with modern science and would answer the problem of evil in the world. Whitehead proposed what he called his “cosmology” as a hypothesis to be tested by its fit to empirical facts in the scientific manner.

For Whitehead, the fundamental principle of all reality is “Creativity.” To exist, however, this Creativity must be embodied in an “actual occasion.” According to what he calls the *ontological principle*, nothing actually exists except as an actual occasion of Creativity, and God is the only permanent and eternal such occasion. God’s nature has two aspects. His *antecedent* or *primordial* nature consists in an infinite number of *eternal objects*, similar to Platonic ideas. These constitute all the possibilities of actual entities that God in his Creativity can produce. From these, he freely selects a series of such objects in temporal and contingent existence, and, by producing them, also actualizes them in his own conscience, thus constituting his *consequent* nature. In this way, everything that comes into actual existence is forever preserved in God’s memory in objective immortality. Yet in selecting and willing the actual existence of these objects in a certain series, God exercises Creativity by initiating the concrescence of several forms into a unique actual occasion. Once initiated, any actual occasion, since it is an instance of Creativity, forms itself as a unique *nexus* or event by its *prehension* of the qualities of certain of the various eternal objects in God’s primordial nature. Thus there is a psychic element, or degree of consciousness, in all actual occasions (*panpsychism*).

As an actual occasion forms itself according to the aim given it

by God when he initiates it, it attains an internal unity. But, since it is a discrete quantum, it instantly ceases to exist, so that the temporal world, just as modern science claims, consists of discrete quanta. Yet each actual occasion as it perishes leaves traces of itself in successive events, thus generating relations of cause and effect in time. In Whitehead's system, God is the only "person" that exists; human beings, like all other complex objects, are constituted simply of streams of events. Though in every event there is a psychic element, only in human beings does this reach the level of self-consciousness, so that human lives are constituted by streams of consciousness. With the dissolution of the events that constitute the body we die yet remain as eternal objects in God's consequent nature. Thus, throughout eternity, God undergoes a *creative advance* as his memory of the past is constantly enriched.

Whitehead developed this hypothesis in remarkable technical detail, based on four notions—actual entity, prehension, nexus, and the ontological principle—and four sets of Categories—the ultimate, eight categories of existence, twenty-seven categories of explanation, and nine categorial obligations. One of Whitehead's chief aims, and the one that has especially interested theologians, is that in this hypothesis, though there is evil in the world, there is no evil in God, since at any point in time he always harmonizes all worldly events as eternal objects in himself in his state of blissful consciousness. Hence he is not responsible for the evil in the world, since it is the result not of his actions but only of the failures of some of the many actual occasions that he initiated but that, as embodiments of some degree of consciousness and Creativity, have the freedom to go their own way. This solution of the problem of evil (a problem I have discussed in chapter 10) is hardly satisfactory because, while relieving God of responsibility for evil, it also restricts his omnipotence and hence his power to save his creatures from evil. His creatures are ultimately destroyed by evil and survive only as objects in God's eternal memory.

Thus Whitehead's system is essentially *pantheistic*, since its fundamental principle is Creativity exemplified in a God who necessarily creates the world and is dependent on it for his own

advance in perfection. Without his creation God would be an empty chaos of disordered and merely potential ideas. Whitehead, however, rejected the term “pantheism,” and preferred *panentheism* (God *in* all), a term invented by the post-Kantian idealist, Karl C. F. Krause (d. 1832). Panentheists do not deny some distinction between God and the world, yet so minimize this distinction that, for them, God is ultimately the only “real reality,” and the creation is, much as Spinoza thought, just a mode of his total being. Since, in classical theism, God not only transcends his creation but also is intimately present to it (or better, it is present in Him),⁷ “panentheism” actually is either identical with theism or is pantheism. Certainly “pantheism” is more accurate to describe Whitehead’s system, since God’s actuality depends on the actuality of the world, rather than conversely.

4. *Spiritual Monism*

a. Monism in the Traditional Religions and Occultism

While process philosophy went beyond materialism, it remained dominated by modern science, and its account of spiritual reality is quite meager. On the other hand, if we go back to most ancient and still surviving mythologies of the traditional religions, we find accounts of nature in which spiritual forces are everywhere present. The number, dispersion, and relative obscurity of global preliterate worldviews (prehistoric, historic, and present-day) make any generalizations about them utterly inadequate. Yet the bulk of the evidence shows that in most such cultures there is belief in a supreme, good High God who is the origin of all the Power in nature. No clear distinction is made between the spiritual and the material, but rather between this Power and whatever is lacking in power. The power of God is distributed among all things so that they are all invested with *spirits* to which their activities are attributed. As the Greek philosopher, Thales, put it, “All things are full of gods.”⁸

E. B. Tylor invented the term “animism” to describe this type of

worldview. Spirits are generally good, but some are malevolent forces. Even good forces may become malevolent when not treated with proper respect. Commonly, however, because the High God is thought of as good, it is not thought necessary to placate him by special rituals. Often the myths recount that, because of the evil in the world, God has withdrawn from it. Hence practical religious life and its rituals tend to focus not on the High God but on the various lesser, but closer, spirits. The help of good spirits is sought against evil ones, or help is sought to win the favor of both, so as to gain personal power over the problems of life, health, fertility, hunting and farming, and for freedom from curses, witchcraft, and so on. The offering of gifts (sacrifice) is an almost universal way of obtaining this favor, and so is the practice of magic, usually based on the concept that a symbolic act has practical effects. Such magic often seems a substitute for technology. Generally the life power of human persons is thought to survive bodily death. Hence the spirits of ancestors are parts of the spirit world, and their favor, like that of other spirits, is to be retained by the same means.

The value systems that are derived from this type of worldview generally stress the survival and harmony of the tribe, both within itself and in relation to the animated world. The human guides to right living in such a world are of the type called the "shaman." He or she is supposed, by reason of traditional knowledge and personal insight (often gained by trances, drugs, meditation, asceticism and other practices, and also by reason of an unusual personality), to have access to the spirit powers. This type of worldview is "primitive" only in the sense that it reflects cultures with relatively simple technologies in which there is too little leisure to provide for a class of persons given to analytic reflection and rational formulation of ideas. Hence, these worldviews and value systems are formulated and transmitted as mythology. Since myths express perceived truths primarily in metaphor, and because metaphors are polyvalent, it is not easy to determine the exact meaning of these worldviews. What can be said is that they seldom exhibit a notion of God as Creator in the strictly monotheistic sense of a Necessary Being who has freely produced a contingent world out of nothing.

In fact, the unqualified monotheism of Judaism that Christianity and Islam also adopted is not even clearly formulated in the earliest traditions of the Hebrew scriptures. It only gradually emerges and reaches explicit formulation in Second Maccabees, dating probably from 124 BCE, which is not included in the present Jewish and Protestant canon but only in the Septuagint translation of Jewish sacred writings adopted by the pre-Reformation Christian Church. In the preliterate religions in which the Supreme God tends to remain in the background, the result is a monism in which all reality is seen as an organism animated by the reduction of the Supreme God to a Great Power of only vaguely personal character or which is simply impersonal, like the “Heaven” of Chinese Confucianism, or the “Great Ultimate” of Neo-Confucianism, or the “Nature” of Taoism or Japanese Shinto.

Creation, therefore, is seen as subsequent to the existence of a primordial substance, often mythically represented as a chaotic Ocean or River, or even a Primeval Egg. Out of this chaos God emerges and then forms the remaining matter as the universe that this God, before withdrawing to some superior place, animates with power. These creative processes are also often mythically expressed by the relationships of male and female forces or gods. Again, they may be pictured as the result of a titanic war between good and evil forces. It is evident that, without demythologizing analysis, metaphors derived from human birth and craftsmanship seem the only ones easily available to explain the existence of a structured and dynamic universe. As for the metaphor of war, this is the best available to describe the evident evils and disorder of the world. While it would be poor hermeneutics, therefore, to take these mythologies literally, yet it is apparent that any worldview that has this type of metaphorical expression can hardly escape a strongly monistic tendency. The High God is often conceived in an impersonal manner and creates only out of some preexistent chaos—from which the God also emerged. Thus, in Native American religions in North America, according to Weston La Barre:

“Medicine power” for these purposes [to control life’s vicissitudes]—Algonkan *manitou*, Iroquoian *orenda*, Siouan

wakan, Jivaro *kakarma*—as a vast supernatural reservoir in nature that the individual might tap or acquire, is misleadingly translated as “Great Spirit,” for Amerindians were not monotheistic and had no proper Creator God. Moreover, medicine power is impersonal, though variously possessable by persons, much like impersonal Melanesian *mana*. Indians sought impersonal *power* but did not “worship” personified *gods*, at least not until the late specialized agricultural religions had been built locally on a Pan-American shamanistic base.⁹

Similar views are reported as basic to many nonliterate societies. Their universe is one filled with superhuman figures that are possessed by some universal Force, Fate, or Destiny not clearly distinct from the universe it vivifies. The ancient literate societies were more explicitly polytheistic. Yet, as is evident from Greek mythology, the High God Zeus is a product of some impersonal Fate and is not strictly a Creator but rather one who brings order out of a preexistent chaos governed by the Titans or more primitive forces. Thus throughout the world these preliterate traditional religions did not very clearly distinguish between the material and immaterial and tended to a kind of neutral pantheism little different from materialistic monism.

Curiously, this type of worldview common to preliterate societies survives to this day in the forms of occultism, theosophy, “New Age,” and certain strands of science fiction, and its literature is prominent in most bookstores. It is eclectically combined with features derived from Hinduism, Buddhism, Greek Hermeticism, and Gnosticism. Our sensible world is energized by invisible powers, often conceived as more physical than spiritual in character. New Agers hope to control these energies by magical rituals. Dialogue with those immersed in this confused worldview must take the form of demonstrating the profundity of the classical forms of “spirituality.” There is a great need to arouse in these seekers a sense of true worship of God, rather than encourage presumptuous attempts to gain power over occult forces for worldly ends.¹⁰

b. Neoplatonism

Many elements of mythological religion survived in Greek philosophical thought, which was essentially an effort to reform and systematize the chaotic truth found in myth. The same Thales who said “All things are full of gods” was rated by Aristotle as the first philosopher. Platonism (and Pythagoreanism before it) tended, as we have seen, toward a spiritual monism in which the sensible world was understood as a mere imitation of the world of Ideas. These Ideas were imitations of the Idea of the One, shining from it like the rays of the sun, because the One is also the Good, since, as Neoplatonism insisted, *bonum est diffusivum sui* (the good necessarily diffuses itself).¹¹

The most systematic and most explicitly monistic form of Platonism was that proposed by the Alexandrian Plotinus in the third century CE, just at the time that Christian monotheism was taking over the pagan Roman Empire. A pupil of Plotinus, Porphyry, tells us that his master had traveled in northwest India where, from the time of its conquest by Alexander the Great, the cultures of Greece and India were in contact. Historians, however, have not been able to find in Plotinus’s writings tangible evidence of Hindu influence, even though the philosophical similarities are profound. Others have tried to go back behind Plato to Pythagoras to posit a contact with India; but the fact of any actual connection remains speculative.¹² Neoplatonism, however, continued to have great influence on monotheistic Christian thought.¹³

According to Plotinus, the supreme reality is the One of which nothing, not even “being,” can be properly said, beyond that the One is also the Good, that is, the goal toward which every being strives.¹⁴ The Indian Vedas had also said that the Absolute is neither existent nor nonexistent. For Plotinus, the first principle of philosophical explanation, *Bonum est diffusivum sui*, “the Good diffuses itself,” carries with it the implication that this diffusion or emanation is *necessary*. Since the One and Good is absolutely simple, one cannot say that it is a knowing subject, because for Plotinus knowledge always implies the duality of knowing subject and object known.

Hence the first necessary diffusion or emanation from the One is the Nous (Greek for “Intelligence”). Because of its inner duality, the Nous turns back in loving desire and contemplation to the One from which it came so as to be united to the One and thus overcome its own duality. By this return to the One, the Nous is unified and so perfected in goodness, and therefore (again by the principle *Bonum diffusivum sui*) necessarily emanates the World Soul, in which duality becomes the plurality of lesser spirits contained within the World Soul. Then the World Soul and all its included spirits are called to turn back in loving desire and contemplation to the Nous, and through the Nous to the One. Thus all things are again One. Yet to say “again” is not correct, since in fact this process of emanation and return (*exitus et reditus*) is really timeless and eternal.

It is the World Soul that gives order to the material universe. For Plato and Plotinus, “matter” is understood not as real potency in the Aristotelian sense, but simply as empty space on which the mathematical forms are imposed to shape the atoms out of which all material bodies are constituted. The multitude of human spirits that are contained in the World Soul (as the multitude of ideas are contained in the Nous) exist timelessly within it but, by reason of their relative lowness in the spiritual hierarchy, are liable cyclically to a fall by reincarnation into material bodies. If, however, in a lifetime they attain again to philosophical contemplation, they ascend once more to the level of the World Soul with its mathematical forms and through it to the Nous or Platonic world of Ideas. Finally, souls may be rapt in an ecstatic trance in which subject and object are identified and reabsorbed in the One. This cyclical process of emanation of the Many from the One and their return to the One continues cyclically forever. Hence, Neoplatonists hope for a complete ecstatic ascension to the One beyond the discursive duality of the intellection of the Nous. The claim that in this ecstasy the duality of knower and known is lost in the One demonstrates the essential monism of Neoplatonism. This is its most notable similarity to the monism of Hindu *Advaita Vedanta*, in which the individual self in intense meditation discovers its identity with the Absolute.

Thus, for Plotinus, the universe is a hierarchical system of

forms that are distinguished by the degree to which they participate *formally* in the One. Time and change (and hence material and efficient causality) and even plurality become so entirely secondary that, as in *Vedanta*, they might well be said to be illusory. Although final causality is retained (since all things seek to return to the One in loving ecstasy), yet this is no more than a “return” to an original state that really always exists. This tendency to think of the relation of the phenomenal world to the One as a series of more or less perfect *imitations* of the One, rather than in terms of the One as *efficient* cause of the world as *creation* from nothing, is characteristic of Plato’s own thought. As I will show more fully in chapter 13, Aquinas, in his fourth way of proving the existence of God, adopts this approach through formal causality, though for him it presupposes as more evident the three first ways through efficient causality. Thus, in a monotheistic rather than a monistic perspective, the world comes about not by a necessary diffusion of the One or Good, but by an entirely free act of the Creator.

This spiritual monism rejects both the materialist monisms discussed previously and the *substantial* pluralism of pure spirits in favor of the claim that the phenomenal plurality of the universe is ultimately reduced to some kind of spiritual, all-embracing Absolute. Note that such spiritual pantheisms need not deny *all* distinction between the Absolute One and the phenomenal Many, but the only distinctions that they permit are to be ultimately transcended in the unity of the Absolute One.

We have already seen, besides the purely materialistic monisms defended by some on scientific grounds, thinkers like Spinoza, Teilhard, and Whitehead developed systems in which a psychic element is present in all matter and ultimately emerges from it and dominates it. Thus, even a leader in modern physics like Einstein could cite Spinoza who, following the method of Descartes, claimed that we have a clear and distinct idea of substance that includes existence and which therefore necessarily exists. Since such a necessary existent is what is ordinarily meant by “God,” then the whole phenomenal world, whether spiritual or material, becomes a mode of God.

Spinoza sought to overcome Descartes’ dualism of mind and

matter, but his thought also had roots in kabalistic Jewish mysticism that was itself influenced by Neoplatonism.¹⁵ Spinoza in turn greatly influenced the post-Kantian German Idealists Schelling, Fichte, Hegel, and the many philosophers who followed them. These idealists in various ways maintained that all reality is a manifestation or product of Absolute Spirit, in which plurality is ultimately reduced to perfect unity. Historically, all such systems of spiritual monism in Western thought owe much to Neoplatonism. As Cornelio Fabro has shown in his *God in Exile*,¹⁶ modern philosophy has abandoned monotheism not so much because of Neoplatonic influences as because of the more direct influence of the Cartesian *Cogito ergo sum*, which grounds knowledge not on extramental reality but on subjective self-awareness. While Fabro is certainly correct about this, yet the Cartesian “turn to the subject” itself had antecedents in the Neoplatonic notion that truth is to be found through the recollection of innate ideas.

c. Indian, Chinese, and Japanese Monism

If we widen our survey to world cultures, we note how similar to Neoplatonism is the type of monism that prevails in the eastern religions. In India, the Vedic commentaries or Upanishads, the earliest of which date from c. 1000 BCE, already express a monistic interpretation of the highly developed polytheism that the Aryan invaders of India shared with the Greek and Roman traditions. Many Indian thinkers have believed that human intellection is the act of our spiritual *atman* (soul), and that this individual *atman* is ultimately identical with the *Brahman* who is the Supreme Being.¹⁷

After the older Upanishads were written, Siddhartha Gautama, the Buddha, rejected the elaborate ritualism of Vedic religion, but adopted its technique of *Yoga* meditation, which is aimed at acquiring true wisdom not by revelation or philosophical analysis but by mystical experience. In this way, he attained to an enlightenment that he called Nirvana. The Buddha, however, as we saw, refused to answer questions about what exactly is the

nature of this Nirvana, or “blowing out of the flame” of desire. He would only indicate what it was not. It was not nothing (annihilation, nihilism), nor was it union with a personal God, yet neither was it enlightenment about the identity of the individual soul with an Absolute (as Hindu teachers had claimed). Instead, the Buddha taught that the individual spiritual self is just as unreal as the human body, as the material world of change, and as the spirits and gods of mythology. Thus Buddhism, like Hinduism, is essentially monistic, since even the individuality of the human self is denied permanent reality, although its version of monism posits an Absolute that can only be described negatively.

Buddhism, unlike Hinduism before the nineteenth century, was from the beginning a missionary religion, because Buddhist compassion made it obligatory that true believers be free, as the Buddha had been free, even from any desire to enter Nirvana. Thus they ought to achieve perfect freedom from attachment to Nirvana by guiding others to that freedom.¹⁸ Yet, because Buddhism did not accept the Vedas as the source of enlightenment, nor the mythology and caste system of Hindu society, it died out in India. It has continued to flourish in Sri Lanka, China, Korea, Japan, and much of Southeast Asia. As previously mentioned, from the nineteenth century on, it has influenced certain western philosophers, among whom one of the first was Schopenhauer, and, through him, the composer Richard Wagner and other artists.¹⁹

Buddhist thought left powerful effects on Hinduism, especially in the form of nondualistic (*Advaita*) *Vedanta* that received its most systematic defense by Shankara Acharya (traditionally c. 788–822 CE, others say c. 700–750), called by some the “St. Thomas Aquinas of Indian thought.”²⁰ Shankara defended nondualism on the basis of the sacred Vedas and Upanishads. But he also used subtle philosophical analysis in a dialectical manner to show—somewhat like Kant’s destruction of metaphysical antinomies—that all rational thought based on sense experience ends in contradiction.²¹ Hence wisdom must rest on the mystical experiences of sages preserved in these sacred books.

Shankara taught that “liberation” cannot be achieved except

by the direct perception of the identity of the individual (*atman*) with the universal self (*Atman, Brahman*).²² He evidently believed that he too had experienced the same mystical union with the Absolute that was the source of Vedas and their Upanishad commentaries. This mystical enlightenment reveals the illusory character of all reality, material and spiritual, and even of the Creator God, Ishvara. Nothing truly exists except the self-identical Absolute, of whom it is best to say that it “neither exists nor does not exist.” Hence the “created” world differs from the Absolute only for those who are still unenlightened. Thus, when questioned as to the relation of *maya* to the Absolute, Shankara replied that any such relation pertains to *maya* and hence need not be explained. Nevertheless, *Advaita Vedanta* does not deny the reality of the enlightened human self, as Buddhism emphatically does, but asserts the identity of this self with the Absolute.

This theoretical unqualified non-dualism is for some Hindus difficult to reconcile with their traditional practice of *bhakti*, or loving devotion to a personal deity, which approaches monotheism. Shankara himself was a devotee of Shiva. Hence Ramanuja (1017–1137 CE), generally considered the second greatest philosopher of Hinduism, proposed a qualified non-dualism according to which the human self endures in its own individuality even when it has attained mystical union with the Absolute. Yet Ramanuja remains essentially a monist (non-dualist), in that he compared the union of the Absolute and the human self with that of the soul and the body as forming a single reality in which the Creation qualifies Brahman just as Brahman qualifies Creation.²³

More frankly dualist is the *Dvaita Vedanta* of Mahdva (1238–1317 CE) who declared the Absolute’s independence of the creature and the creature’s need of grace. At the same time, Madhva denied that the existence of the Absolute can be proved from creation. It can be known only from the record of the Vedas and by personal mystical experience. Nor did Mahdva ever clearly enunciate the doctrine of a free creation *ex nihilo*. Thus, what is especially significant is that even in these *bhakti* devotional systems the doctrine of the eternal preexistence and cyclical

reincarnation of individual souls is accepted. Hence even these systems are silent about an absolute distinction between God and his creatures.

The influence of Buddhism throughout the Far East, even after it had waned in India, reinforced monist tendencies already present there. In China, Taoism, in its doctrine of "The Way," taught that all things exist in a balanced harmony of opposites (the Yin and the Yang) within the all-embracing unity of Mother Nature; and this easily blended with Buddhist elements. While the teachings of Confucius are not evidently monist, in the Neo-Confucianism of Chu Shi, under the influence of Buddhism, an explicit monism emerged. This Neo-Confucianism has even been called atheistic, since it reduced the principles or essences of all things to a single "Great Ultimate" inseparable from matter, a view very much like that of the Greek Stoics.

In Japan, the indigenous religion of Shintoism has more in common with the preliterate mythological worldviews, but was soon overlaid by Buddhism, especially in its Ch'an (Japanese "Zen") version. Zen Buddhism, a Japanese version of this worldview that has become especially popular in the West, dispenses with the scholarly study of the enormous Buddhist literature but still uses meditation techniques to attain to Nirvana. Zen, however, understands Nirvana to be simply the realization that the ordinary world of our experience is "empty" so that it loses its power to cause the enlightened to suffer.

Thus, in spite of the great complexity of eastern cultures, it would be a fair generalization to say that, within the East, though thinkers considered other possibilities, they came to be dominated by monistic worldviews, for which Shankara's *Advaita Vedanta* perhaps constitutes the most philosophically precise apologetic. Some thinkers in this tradition, however, would reject the label of "monist," since they do not say that the Absolute is "one" but only that it is "not dual"—that is, that it transcends even our human notions of unity and existence.

B. CRITIQUE OF MONISM

Some Christian theologians, such as Raimon Panikkar and Michael von Brück,²⁴ seek to show the similarity of *Vedanta* non-dualism to the Christian experience of “participation in the divine nature.”²⁵ Nevertheless, the question remains why Indian thought seems to deny, or at least lack, the monotheistic doctrine that creation is the free act of a personal God who bestows on human persons genuine individual existence totally distinct from his own, yet freely calls them to be united to him in knowledge and love. While the views of Ramanuja and Madhva tended in this monotheistic direction, they did not clearly embrace it. Buddhism, which has been especially influential in the West, seems utterly to reject both monotheism and the reality of human personhood.

When to Jewish and Islamic monotheism is added the Christian doctrine of the Triune nature of God—manifested by the incarnation of the Second Divine Person, and through him the sending on the Church of the Third Person—the gap between Christianity and the Eastern religions is further widened. While the manifestation of the Absolute in *avatars* such as Krishna is an important feature of Hindu thought, these human figures generally have no historical context and are considered to be merely phenomenal rather than incarnational. Thus they resemble what, for Christians, would be a heretical *docetic* conception of Christ, in which his humanity is a mere apparition.²⁶

To Eastern monists, however, monotheism and creation *ex nihilo* seem “dualistic” and naïve failures to recognize that true wisdom lies in the realization that All is One and the One is All. Hence a notable feature of Indian culture is the dichotomy between popular religion (which is often fantastically polytheistic) and the religion of the more spiritually advanced. The enlightened tolerate popular polytheism as an inevitable stage in the cycle of reincarnations, over the course of which souls only gradually begin to see that the many gods to which they are devoted are merely symbols of the one transpersonal Brahma. Mahayana Buddhist thinkers also are content to tolerate the elaborate pantheons of Buddhas and gods of popular religion, and the dependence of the simple on their gracious assistance toward ultimate enlightenment in Nirvana.

Panikkar and von Brück argue that Hindu religion is not really monistic by distinguishing between “monism” and “non-dualism.” For these writers, Hindu “nondualism” means that the relation between the Absolute and the Creation is *both* one of identity *and* difference. Hence they argue that Eastern “monism” resembles the Christian view that God and creatures are *analogically* similar. Yet, in reply to this, it must be recalled that to say that God and Creation are “analogically similar” means that the two orders of being thus compared are actually *more different* than they are the same, even though they have some genuine similarity. Therefore, while the question of analogy may be a good point of departure for interreligious dialogue, if this dialogue is to be fruitful, serious metascientific questions remain to be faced. It is not sufficient for ecumenically minded Christians to cite the Christian tradition of mysticism and negative theology, as if these differed little from Eastern monism.

For *Vedanta* non-dualism, the enlightened sages discover in meditation that what they thought to be their own spiritual selves are in fact identical with the Absolute and hence have no personal existence but only an eternal existence in the Absolute. Thus Christian mysticism has aspects in common with the qualified non-dualism of Ramanuja, yet differs fundamentally even from that view, since for Ramanuja the Absolute *Atman* and the individual human *atman* are related as soul to body—that is, have only one existence. In the monotheistic view of Judaism, Christianity, and Islam, God gives the human person its own existence in creation, and hence these two existents—God and Creation—while they may be united in knowledge and love, always remain two (though the existence of the creature depends totally on the Creator). It would render theological dialogue fruitless if this metascientific difference were covered over, and the dialogue would miss the unique contribution that the Jews made to Metascience, namely, the concept of a monotheistic creation.

How then can Metascience promote dialogue between these two apparently utterly opposed views of monism and monotheism so evident among the great world religions? First, it must be recognized that Western Platonism, which has much in common

with Eastern monism, has profoundly influenced the historic development of the monotheistic religions. Thus, this confrontation of monism and monotheism is not new. For many centuries, Christianity in particular but also Judaism and Islam have sought to assimilate whatever is true in Platonism.

Second, it must be recognized that comparison of theism with Eastern and Neoplatonic spiritual monism is difficult to make in an objective way because of the different grounds on which these two views are held. While theism generally argues from reason only for the existence of a Creator, it ultimately confirms this conviction by faith in a divine revelation. Spiritual monists, on the other hand, generally rest their convictions on personal experience attained by meditation techniques. Although all orthodox Hindu sects accept the Vedic sacred scriptures as “revelation” from Brahma, their concept of “revelation,” as we have seen previously, is quite different from that of Jews, Christians, and Muslims. For the monotheistic religions, revealed truths utterly transcend the human capacity to recognize them as *intrinsically* true. Instead, they must be accepted by *faith* in God’s word given through prophets like Moses, Jesus, or Mohammad, who are uniquely sent by God as his witnesses. Thus, monotheistic faith attains ultimate truth only *extrinsically* in this life, through faith in revelation and the love inspired by that faith, and must await the intrinsic “beatific vision” in eternal life.

On the contrary, the Hindu and Buddhist sacred writings are understood as based on the authentic experiences of past sages. These experiences are also accessible to anyone who will follow the way of meditation exemplified by these sages. Thus, while beginners must *extrinsically* trust their gurus and the sacred writings that they expound, they hope eventually to share in this life in the same *intrinsic* experiences and thus to know its truth for themselves *apart from faith* either in their teachers or in the sacred writings. Thus, monotheistic mysticism essentially is not an *experiential* but a *faith* mysticism,²⁷ while the reverse is true for Eastern mysticisms. This difference is somewhat lessened, of course, by the fact that, in actuality, most monists do not expect to attain this experience in this life but in some future

reincarnation, as well as by the fact that Western believers too sometimes have mystical experiences.

The question of whether the monistic mystical experience can be understood without denying its authenticity has already been discussed in chapter 8, section A.2.c. Here I am concerned only to point out the fundamental problem that spiritual monism presents, namely, how to understand the ontological status of the plurality of substances and of human selves experienced in this life. If this world is only one of appearances, what kind of existence do these experiences have, and how have they come to exist? If they are absolutely unreal, then, since there are neither souls nor bodies that really exist, is reincarnation itself illusory? If the souls never existed, how can it even be said meaningfully that they were ever in a state of illusion or ignorance? And if no sacred scriptures or enlightened sages ever existed, how can disciples seeking enlightenment under the guidance of these sages ever come to enlightenment, since neither teacher nor disciple really exist? Obviously, if such paradoxes are to be avoided, some kind of reality must be given to this world with its pluralism.

Therefore, in any monistic worldview, the assertions of the absolute unreality of the material world and individual human persons must be understood in some qualified way. The common qualification is to say that *maya* or *samsara*, the world of phenomena, is not “nothing” but has a purely *secondary* kind of existence. Often the metaphors of *dreaming* or *play* are used to describe the phenomenal world, and the subject or ultimate ground of this dream or play is said to be the Absolute—which, however, itself remains unchanging and nonactive. Perhaps the best way to understand this ancient and profound spirituality is to consider that Eastern thought was not so directly faced with the type of logical analysis that the Greek origination of natural science has imposed on the monotheistic religions of the Western Ecumene.

Thus, Neoplatonism, while agreeing essentially with monistic thought, achieved an expression of its essential position that is rationally explicit and literally expressed. Christianity found ways to reconcile Neoplatonism with theism, although with some

fundamental qualifications, especially as regards recasting it in terms of a doctrine of creation *ex nihilo* and eliminating reincarnation.²⁸ Thus, it may be that spiritual monism should be taken, not as a denial of all pluralism, but simply as a rhetorically emphatic way of asserting the primacy of the Absolute One over the secondary reality and contingency of the Many. Theism attempts to state the same truth in a less paradoxical manner. Thus, the monism of mythological cultures can perhaps also be explained by the fact that these cultures generally lack systematic philosophies to explicate their myths and interpret their metaphors more unambiguously. In many of these cultures, also, attention is focused on ancestral and nature spirits because the High God is thought to have withdrawn to a remote heaven. An adequate semantic and metascientific analysis of these worldviews might reveal that their monism ought not be taken literally but admits of some genuine pluralism.

As for the materialist monism of Stoicism, Neo-Confucianism, Marxism, and modern science, to which I have often referred, it could be argued that these are motivated by a laudable desire to save the empiricist and realist foundation of knowledge against Idealism. The Aristotelian and Thomistic epistemology more effectively refutes Idealism, and yet still shows that even when knowledge is empirically grounded it leads to the demonstration of the existence of an immaterial First Cause. Moreover, as I have tried to show, this Aristotelian and Aquinian view is compatible with modern science without yielding to the exaggerated claim that all reality is material, a claim that reduces scientific thinking itself to electrical currents in the brain.

Nor does such a plurality of material substances in any way contradict the findings of quantum physics. Although quantum physics certainly does emphasize the interconnectedness of the universe as a system, it cannot deny the reality of stable and observationally distinct substances at the macro-level, such as atoms, molecules, and organisms. Surely it is not necessary for a quantum physicist to conclude that he is not a living organism distinct from his inanimate apparatus, or that he is identical with his dog, just because they form an intricately interconnected system. In fact, a critique of the various monisms reveals that

they can be overcome by observing the categorial distinctions made by Aristotle on the basis of fundamental human experience between substance, agent, recipient, and relation, and that, in fact, such distinctions can be found in some Hindu and Chinese thinkers. One can logically claim that the material universe is made of many *relatively* independent substances (and relative independence is all that is claimed for a distinct substance), yet consistently maintain that none of these can exist except in a network of relations of cause and effect.²⁹ Thus, the facts of interconnectedness on which materialist monism rests can be explained without denying that the universe is constituted of many relatively independent substances.

Even if it is also admitted that the material “universe” is actually only a part of a more extensive universe that includes human spirits and pure spirits, it remains true that this vast plurality of substances exists not necessarily but contingently. Certainly no permanence can be found in material substances. As for spiritual substances, the fact that their freedom makes *sin* possible and thus, by its contradiction to the goodness of their existence and of a necessarily good Creator, seems to require some kind of purification, also raises the question of their permanent existence. Hence monistic worldviews often explain the existence of contingent beings, even contingent pure spirits, as the result of some kind of a primordial “fall.”

In the non-dualist *Vedanta* of Shankara, penetrating dialectical arguments are given to show that phenomenal existence is self-contradictory and hence cannot be real. Yet, as shown in chapter 3, the principle of contradiction is itself derived in natural science from our phenomenal sense experience. Hence, if that sense experience is illusory, Shankara’s argumentation begs the question. Moreover, as argued in chapters 3 and 8, sense knowledge does give us certitude that the contingent world exists, even if contingent existence is puzzling to understand and define. It can be asked whether the withdrawal from the senses practiced in *Yoga* meditation may account for doubts about the reality of the phenomenal world in Hinduism!

Does this mean that monotheists must simply reject all

monistic views about the Absolute? To do so, I believe, closes off dialogue prematurely. On the one hand, spiritual monism speaks a language that does not absolutely exclude a monotheistic interpretation since its principal concern seems to be to maintain the ultimate reality of the Absolute relative to the phenomenal world. Monotheists can totally agree with this concern. Moreover, it is evident that in the great monistic systems of Neoplatonism, Hinduism, Buddhism, and the Chinese religions, as well as in the High Gods of traditional religions, there are strong monotheistic tendencies, as exemplified by Hindu *bahkti* worship.

As for materialistic monism, monotheists must admit that Secular Humanism as a worldview based on a materialistic interpretation of the foundation of natural science arose within the lands where monotheism has most flourished. Yet, for that very reason, monotheists must be ready to answer the understandable charge of monists that monotheistic insistence on the reality of the creation does in fact undermine the supremacy of spiritual reality that it claims to support.

In this book I have attempted to propose and defend a reasoned way out of this dilemma. I would contend with Alfred North Whitehead that the advance of natural science became possible only because of the monotheistic insistence on the reality of an orderly, material, sensible world produced by a wise and good Creator.³⁰ It only is from the mechanistic and idealistic distortions of the foundations of natural science introduced by the Enlightenment and Secular Humanism that materialistic monism has come to dominate the West and is now colonizing the globe. Obviously today the great monistic religions, even more than the monotheistic religions that have struggled with this issue now for some centuries, are being forced by the cultural global dominance of modern science and its technology to show how the primacy of the spiritual can be maintained. If the monotheistic religions can accept modern science in the revised form proposed in this book that leads to a Metascience capable of defending the primacy of spiritual reality while maintaining the genuine reality of nature and human personhood, then they may find common ground with the other great religions. These seemingly monistic religions may then find that their prime concern to defend the

supreme reality of the Absolute can be given a monotheistic interpretation that meets that concern and makes possible their survival in the modern scientific world through an alliance with Judaism, Christianity, and Islam. Aristotle many times³¹ refers to metascience as “a discipline that we are seeking.” Perhaps to postmodernity will fall the full finding of that toward which Aristotle was the first to grope.

The One Creating First Cause

A. MONOTHEISM

1. *The Existence of a Creator*

Monotheism—belief in the One First Cause who is Existence itself and who is Creator or First (efficient) Cause of all things—is present in various more or less obscure ways in most, if not all, human cultures. Yet only the Jews, the Christians, and the Muslims, all three derived from the same Abrahamic tradition, teach this doctrine explicitly and without ambiguity.¹ The proof of the existence of a spiritual First Cause on the empirical grounds provided by natural science in light of its foundations, as given in Aristotle’s *Physics*, has already been expounded. But in Greek culture itself the full implications of this demonstration were never fully grasped.

Scholars today generally consider mistaken Aquinas’s conviction that Aristotle, and perhaps even Plato, arrived at a Creator.² They doubt that the proof of an immaterial Prime Mover in *Physics* VIII gets any further than a world soul that moves the outer sphere of the universe, as Avicenna read Aristotle. They also point out that when this proof is repeated in the *Metaphysics*,

this Prime Mover appears to be the final but not the efficient cause of the action of the celestial intelligences who move the spheres. Finally, they ask whether, for Aristotle, a Prime Mover is the cause of the *existence* of the universe rather than simply the cause of its motion.

I have already touched on these difficulties in chapter 4, section A.2. There I pointed out that even if Aristotle failed to draw the conclusion from the premises he uses to prove that the First Cause creates the world *ex nihilo*, as Aquinas thought he did, yet Aquinas is correct in maintaining that in fact this conclusion logically follows—that is, that the conclusion in question is entailed as a logical consequence of what the text actually does say. Furthermore, I noted that, in the *Physics*, what is answered is the question of the *existence* of a nonmaterial First Cause. This proof lays the foundation for a Metascience whose proper task is to answer questions about the *essence* of this First Cause, insofar as human reason can understand it by analogies from effect to cause. Hence, the above difficulties cannot be answered at the level of natural science, but only at the level of Metascience. That is why Aristotle, after summarizing the proof for the existence of an immaterial First *Efficient* Cause, then goes on to ask what can be said about the nature of this First Cause.

John Knasas has argued³ that Aquinas's use of Aristotle's argument for the Prime Mover in *Summa contra Gentiles*, although it follows in exact detail Aristotle's argument to the same effect in *Physics* VIII,⁴ cannot be proper to natural science because Aquinas also refers to its exposition in *Metaphysics* XII. This objection neglects the fact that, throughout the *Metaphysics*, Aristotle summarizes materials taken from the special sciences. This is entirely appropriate to Metascience in its task of coordinating the results of the other sciences. Aquinas gives no indication in his commentary on the *Metaphysics* that he sees this form of the proof as different in any essential way from that in *Physics* VIII. Hence there is no reason to doubt that it is properly valid at the level of natural science, but is taken up and used in Metascience to consider not the existence of the First Cause but what can be known of its essence. It is also reasonable to

consider the Thomistic “Five Ways,” or *Quinque Viae*, by which the existence of a “First Cause” is demonstrated in the *Summa theologiae*,⁵ simply as a summary for theologians of arguments derived from natural science and confirmed by Metascience, arguments without which the theologian could have no confidence that his discipline bore on reality.⁶

Again, the fact that Aristotle in *Metaphysics* XII treats of the First Cause as the final cause of the universe has been taken by many commentators, ancient and modern, to mean that he does not consider the First Cause as also an efficient cause. This is a very odd supposition, both because it is precisely as an efficient cause that the existence of a First Cause has been established in the *Physics* and resumed in the *Metaphysics* itself, and because it was Aristotle himself who pointed out, in first identifying final causality, its correlativity with efficient causality (outside of chance efficiency) in being and intelligibility. The final cause is “the causes of causes,” and thus it is a “cause” only in a way analogous to the more obvious way in which an efficient cause is a cause. Hence it is proper to Metascience to show the implications of the realization that the First Cause’s special mode of causality involves no element of potentiality whatsoever in that First Cause. It is utterly contrary to Aristotle’s whole thought to suppose that there could be a final cause that does not require a proportionate efficient cause.⁷ Final causality, as explained in chapter 10, is the predetermination of an efficient cause and could not exist without such a proportionate efficient cause. Since the total series of moved movers cannot move itself, how could the First Cause be the final cause of the motion of all things unless, by implication at least, it was the first *efficient cause* of their motion?

Does Metascience add anything to the natural science proof of the existence of the First Efficient Cause, a proof that, as I have argued, metascience presupposes? Certainly, as we have seen, if that proof were not valid, Metascience itself would not be valid. Nevertheless, Duns Scotus, though he did not deny some validity to natural science proofs of the existence of a First Immaterial Cause, nevertheless, in keeping with his view of metaphysics, a

view so different from that of Aquinas, much preferred what he deemed would be a strictly metaphysical proof.⁸ He pointed out that, as even a Thomist must admit, the certitude of natural science is hypothetical in that it rests on facts that are only contingent; yet it is still necessary *given* those facts, rightly interpreted. Thus, in other possible worlds, these facts might not be true; for example, the proof from motion, as I have expounded it, would be futile in a universe in which there were no moving bodies.

To answer this question, one must keep in mind that the epistemological order of the sciences leaves to Metascience the task of coordinating all the findings of the special sciences. Metascience does this in two ways. One way is, as Jacques Maritain said, “to distinguish in order to unite.”⁹ Metascience first distinguishes the different senses of “being” (existence) in the different sciences; then it unites these different senses of being, not as Scotus did by reducing them to a univocal concept, but by coordinating them analogically. Metascience does this by defending the principles of all the sciences and, ultimately, their participation in the supreme principle that is the First Cause. This is why, as we have seen, Aquinas insists that this First Cause is not part of the proper subject of Metascience but its *principle* and its object or goal. He writes, in the Proemium of his *Metaphysics* commentary:

This threefold consideration [of natural, mathematical, and immaterial substances] ought to be attributed to one science. For the aforesaid separated substances are the universal and first causes of being. It pertains, however, to the same science to consider the proper causes of some genus and the genus itself; just as natural science considers the principles of natural bodies. Whence it must pertain to the same science to consider separated substances and *ens commune*, which is the genus of which the aforesaid substances are the common and universal causes. Hence it is evident that although this science considers the aforesaid three [topics] nevertheless it does not consider them all, but only *ens commune*, as its

subject.

Thus, since only the first question about immaterial being, namely, whether it exists, is proper to natural science, the other three scientific questions concerning immaterial beings are for Metascience to answer. For that reason, I believe, the last four of Aquinas's *Quinque Viae* can best be left to Metascience, although they could be demonstrated by natural science with the kind of certitude proper to it. Therefore it makes sense that Aristotle prefers to leave to Metascience (First Philosophy) all the possible ways to demonstrate the First Cause's existence except the proof by motion, since only that more evident way is necessary to establish the existence of the subject of Metascience. Metascience, however, considers the *Quinque Viae* principally to prepare to answer the three last scientific questions concerning the essence and properties of immaterial substances (questions 2 and 3) and why these properties result from the essence of such spiritual substances (question 4).

The third way, from possibility and necessity (which Scotus preferred), enables the metaphysician to show that, although the proof from motion to establish the existence of immaterial substances arrives only at hypothetical necessity (if the world of bodies in motion be real, then . . .), it can also be understood in such a way as to lead to the absolutely necessary existence of the First Cause. The subject of Metascience is not, like the subject of natural science, restricted to material *ens mobile* but extends to the totality of being. Hence, only Metascience can show that the First Cause has absolutely necessary existence such that to deny its existence is to deny the extended metascientific form of the principle of non-contradiction.

If there were no immaterial First Cause, Metascience shows, no universe of any sort would be possible. But even if no universe existed, the First Cause would exist. It follows also that in the First Cause essence and existence are identical, that the First Cause is Pure Act without potency. From this demonstrated conclusion Aquinas in the *Summa theologiae* and the *Summa contra Gentiles* systematically demonstrates the attributes of the First

Cause, that is, its “properties” as they have their causes in this “definition” of the immaterial First Cause as Pure Act.¹⁰

Therefore, while in *Metaphysics* XII, chapter 8, the proof of the existence of the Prime Mover is resumed, what remains for its consideration is only this First Cause as final and exemplary formal cause of all things, and especially as final cause, since “the final cause is the cause of causes.”¹¹ Thus it is under this aspect (of the ultimate goal of all things) that the essence of the First Cause is to be most perfectly understood. Since the efficient and final causes are proportionate to each other, and any efficient cause is specified by its ultimate effect or teleonomy, to understand the First Cause as the Ultimate Goal of all being is the most metascientific way, and it will be followed in the next section.

2. The Divine Essence

The chief issue between monotheism and monism, therefore, is not the existence of a Supreme Being but its nature or essence. If Metascience is to contribute to a reconciling dialogue among the world religions, it must not only affirm the existence of a spiritual First Cause, but must give a positive, although (since Pure Act is infinitely beyond our comprehension) necessarily inadequate, account of this First Cause. That Aquinas did not reject such interreligious dialogue is evident from the great use he made of the monistic Neoplatonic tradition, which, as we have seen, bears such a similarity to the traditions of the monistic Eastern religions.

In St. Thomas’s *a posteriori* proofs of the existence of the First Cause, an initially nominal definition of the First Cause is used that must be deepened by Metascience. His most extensive expositions of the real “definition” or essence of the First Cause, insofar as it is accessible to human reason, and the consequent demonstration of the First Cause’s “properties” or attributes, are to be found not simply in his commentaries on the relevant Aristotelian passages in the *Physics* and the *Metaphysics*, but in much more detail in the first book of the *Summa contra Gentiles*

and in the *Summa theologiae* I, qq. 3–25. The former exposition probably dates from 1264–65, the latter from 1266–68. Since the former is apologetic and uses only arguments from reason, while the latter is theological, it might seem that the former, though earlier, best represents Aquinas’s philosophical approach to these questions. Yet this should not be assumed without further examination; and indeed further examination does show that the two are virtually equivalent from the standpoint of philosophy.

In the *Summa contra Gentiles*, from chapter 13 to the end of book 1 (omitting some intervening issues not relevant here¹²), the order of exposition is as follows. First, the existence of the First Cause is proved, then its attributes. The First Cause is (1) eternal, (2) without passive potency, (3) without composition, (4) immaterial, (5) having an identity of essence and existence, and (6) without accidents. It is (7) not in a genus, that is, not in the category of substance, nor is it (8) the “Being” that is the subject of Metascience. But it is (9) good, (10) one, (11) infinite, (12) omniscient, and (13) truth itself. And it is endowed with (14) will and freedom, (15) love and virtue, (16) life, and (17) eternal beatitude.

How does the order in the *Summa theologiae* differ from this? First, the eternity of the First Cause precedes the other attributes in the *Summa contra Gentiles*, because Aquinas there especially emphasizes the proof of the existence of the First Cause through motion. Hence, since the First Cause is the Unmoved Mover, it is also timeless. In the *Summa theologiae*, however, the question of The First Cause’s eternity is postponed until after its omnipresence (I, q. 8, not so explicit in the *Summa contra Gentiles*) is shown to follow on its infinity (I, q. 7), and then its eternity (I, q. 10), or “omnipresence” in time, also follows.

Second, attributes (2)–(8) in the *Summa contra Gentiles* are all covered in I, q. 3 of the *Summa theologiae* under the heading of the First Cause’s simplicity. Question 4, on the First Cause’s total perfection, completes this by showing that its simplicity is that of a *plenitude* of Being. Nevertheless, the exposition on points (7) and (8) of the *Summa contra Gentiles* that are not contained so explicitly in the *Summa theologiae* have special

importance for this present book, since they again make clear that the First Cause is not contained in the proper subject of Metascience, but is its aim or object.

Third, in the *Summa theologiae* the infinity, omnipresence, immutability, eternity, and unity of the First Cause are all placed after the treatment of the First Cause's perfection and goodness in I, qq. 4–6. "Goodness" here obviously means *ontological* goodness since the First Cause's moral goodness or holiness is treated later, in qq. 19–21. This order is logical because these attributes follow directly in that order from the identity in the First Cause of essence and existence. In the *Summa contra Gentiles*, however, after goodness and infinity, the omnipotence, immutability, and eternity of the First Cause are omitted because they have been previously covered.

Fourth, the remaining items of the *Summa contra Gentiles* deal first with the First Cause's knowledge and then with its will, and the same is true of the *Summa theologiae*. The latter, however, adds more detailed treatments of the First Cause's justice and mercy, its providence over its creatures, their predestination, and the First Cause's omnipotence, topics especially pertinent to Christian theology. Both treatments end with the First Cause's beatitude. Somewhat odd, however, is the fact that, while the *Summa theologiae* places the First Cause's life (I, q. 18) before its will and love, the *Summa contra Gentiles* (cc. 97–99) deals with the life of the First Cause just before its discussion of its beatitude. Did Aquinas do this to emphasize his insistence on the primacy of intelligence over the will in opposition to the voluntarism of the Franciscan school that was to come to a climax in Scotus and Ockham?

The conclusion of this comparison seems to show that, while the *Summa theologiae* expands on certain items of special theological concern, the two expositions do not differ significantly in their argumentation from the viewpoint of reason and Metascience. Consequently, I will follow the order of the *Summa theologiae* as somewhat more mature and concise. We have seen that the generic subject of Metascience, namely, "Being" as it has only analogical unity (*ens commune*), includes all

contingent beings. Therefore *ens commune* cannot *strictly* be said to have properties so much as “modes” as it is considered in relation to the plurality of beings or in its relation to the intellect and will as their respective objects. The First Cause, in its infinity, is utterly beyond human comprehension and definition, and is best described as in the Bible: “I Am”—that is, the one in whom essence and existence are *identical*, the one who exists *necessarily*. This at least distinguishes the First Cause absolutely from its creatures that exist only contingently, that is, as having existence that is really distinct from what they are, from their “essence.” Properly understood, this fully answers Heidegger’s complaint that classical philosophy had only an “onto-theological” conception of God, that is, conceived the First Cause as simply the highest degree of the sort of “being” possessed by humans in the world. This of course would be true if the First Cause were included in the *ens commune* that is the subject of Metascience; but for Aquinas it is not so included but is the goal of that science, which, however, the science can never claim to comprehend.¹³

This exposition of Aquinas absolutely distinguishes the nature of the First Cause from any of the monistic conceptions previously described, which do not make explicit that all phenomenal reality, although it has been given a genuine existence by the First Cause, depends utterly on the freedom of that First Cause. The distinguished Analytical Thomist Norman Kretzman, in his fine commentary on the *Summa contra Gentiles*, felt compelled to disagree with Aquinas’s view that First Cause creates freely.¹⁴ Kretzman argued that, according to the Neoplatonic dictum that “the good diffuses itself,” although the First Cause is free as regards *what* it creates, it must necessarily create something. I will show later why this argument is false and why, were it to be accepted by Thomists, it would make them (as well as being at loggerheads with Aquinas himself) again open to Heidegger’s charge of onto-theologism.

The absolute unity and simplicity of the First Cause makes impossible that it have any properties that could be demonstrated of it. Yet, since we know the First Cause analogously in terms of its distinct effects in creation, it is not contradictory to speak of its

“properties” or “attributes” as long as we keep in mind that, in the First Cause itself, these attributes are really identical with its absolutely simple existential essence. For example, we can speak of the First Cause as having intelligence and free will because it is the cause of these powers as they are really distinct in humans and pure spirits, although they are identical in the First Cause’s absolute unity. The long list of such divine attributes presented in Aquinas’s two *Summas* can (with preference given to the order in the *Summa theologiae*) be conveniently divided into two main topics: why and how the First Cause is one, and why and how the First Cause is personal.

B. THE DIVINE ATTRIBUTES

1. *The Plenitude of the First Cause*

The mode of Being that is the transcendental concept of Unity has the First Cause as its principle. Hence the First Cause in its perfect and exemplary unity is the cause of whatever kind of unity that is found in the created, contingent world. Created unities are only imitations of and participations in the absolute Oneness of the First Cause. Aquinas demonstrates this in the *Summa theologiae* (I, q. 3) by showing that, since the First Cause is Pure Act, it cannot be potential in any respect. It cannot be a body composed of matter and form, since matter is potentiality. Nor can it be substance having accidents, as do both bodies and pure contingent spirits, since a substance is potential with regard to its properties and accidents.

The First Cause cannot be composed of essence and existence, as are both bodies and pure contingent spirits, because in creatures essence and existence are related as potency and act, but the First Cause is Pure Act, free of all potentiality, and its essence is identical with its existence. Nor can the First Cause be defined by being classified in a genus

(category) of things as a species contrasted to other species, since in things that can be so classified there is a real distinction between what is generic in them and what specifies them; for example, when a human is defined as a “rational animal,” rationality is really distinct from animality, otherwise brute animals would not be animals. Scotus did not satisfactorily avoid this difficulty when he insisted that the First Cause was included in the univocal “Being” that for him was the subject of Metascience. This univocity then forced Scotus to distinguish God from his creatures only by claiming that God has an infinite “mode” of the *same* being that his creatures possess finitely.

It is against this Scotistic position that Heidegger’s accusation of onto-theology is really valid.¹⁵ Scotus perhaps took this position in order to avoid the type of agnosticism exemplified in the work of the great Jewish philosopher and theologian Maimonides (Moses Ben Maimon, 1135–1204) of Cordoba, Spain. For Maimonides, the First Cause is inaccessible even to metaphysical wisdom, and its essence can be known only by faith. For Aquinas, however, the incomprehensibility of the First Cause does not prevent some positive knowledge of both its existence and essence through its effects. Yet this knowledge remains strictly analogical, so that “Being” as applied to the First Cause and to its creatures in no way implies something univocally common to them mind-independently.

The unity and simplicity of the First Cause raises a problem not felt in Judaism and Islam; for the Christian doctrine of the Trinity appears to contradict the First Cause’s unity and simplicity. Aquinas faced this problem squarely in the *Summa theologiae* (I, q. 30, a. 1, ad 3),¹⁶ but this is directly a theological problem and only indirectly a philosophical one.¹⁷ To say philosophically that the First Cause is absolutely *simple* is merely negative and liable to be misunderstood, since the lowest kinds of beings, such as atoms or quarks, are also the most simple in that sense. Therefore, positively, we must say that the simplicity of the First Cause is the *plenitude* of actuality and of internal unity, which *includes and infinitely exceeds* every perfection possessed by the things that are its effects. This plenitude also includes even *all*

possible perfections, since “perfection” means actuality and the First Cause is Pure Act.

From this it follows also that the First Cause is the principle of the transcendental Good, that is, of the *ontological good* in all its many senses, not simply of the moral good. As such the First Cause is the goal or final cause and the *extrinsic exemplary* formal cause¹⁸ of all things, even of the material universe—as is evident from the fourth and fifth of the *Quinque Viae* by which the First Cause’s existence is demonstrated. It also follows that, since finitude or limitation of act is produced by a correlative potency, the First Cause as Pure Act is absolutely infinite, while all contingent things are finite in one way or another. If the First Cause freely chooses to create, it must also be *omnipresent* in its effects. It must exist within every created being more intimately to that creature than the creature is present to itself, yet remain absolutely “other” than its creatures.

The First Cause is not “out there” or “up there,” but always *here and now*. Thus the First Cause—which, as Pure Act, has as its very essence to exist—is utterly *transcendent* with respect to creation, yet it is also and equally *immanent* in that creation since creatures exist virtually only in their First Cause. It is precisely by this interiority to creatures that the First Cause is a hidden First Cause (*Deus absconditus*), because it appears to creaturely knowledge only in and through its created effects. Yet in them it does manifest and reveal itself to its intellectual creatures, since that is what the First Cause created them for. To speak of the “Unknown First Cause” can only mean that it is known in its creatures but not, as far as creaturely powers of knowing are concerned, in itself.¹⁹

This last point has been badly misunderstood by process philosophers, who think that they have the advantage over Christian thinkers who believe in a First Cause that is “aloof” and “distant” from the world, while process philosophy presents a First Cause who is immanent in the world or “involved” and “related” to the world, just as the world reciprocally is related to it.²⁰ Yet since to cause something an agent must be in contact with its patient by actual *presence* (as was shown in chapter 4), the First Cause

must be present to its effects by its *power*, since all things act only as empowered by the First Cause.²¹ Moreover, since the First Cause created persons to know it as Creator, this relation in the end becomes one of person-to-person.

Such a view of the First Cause differs from monism in that, for Aquinas, all things exist in the First Cause who is absolutely immanent in them, yet they cannot be said to *be* the First Cause, or a *part* of the First Cause, since the First Cause's existence is identical with its essence and is thus necessary, while its creatures have only an existence caused by it and hence are contingent. In this contingency they are "other than" and "exterior to" the First Cause, yet, at the same time, they are "in" the First Cause by its immanence and their absolute dependence on it. Thus the First Cause's united transcendence and immanence are not contradictory. In fact, it is precisely *because* the First Cause *absolutely* transcends its creation that it is able to be so intimate to it. (A simple analogy to this is the expert counselor who is able to understand clients better than clients understand themselves, precisely because most clients are subjectively confused while the counselor remains present to them yet transcends their confusion by the counselor's cool but empathetic objectivity.) If the First Cause were in any way dependent on its creatures, then it could not *always* be able to help them.

From this omnipresence of the First Cause also follow its *immutability* and *eternity*. As the first uncaused cause of all change, the First Cause absolutely transcends change. Since time is defined, as was shown in the discussion of the categories in chapter 3, as "the measuring of one motion by a more regular motion," the First Cause's unchanging existence is absolutely timeless and eternal. Thus, from this first group of the attributes of the Absolute Being that is Pure Act, we are brought to a deeper understanding of what it means to say that the First Cause is absolutely One as the principle of the transcendental Unity found in created things in their various kinds of unity. On the one hand, this unity is *interior* to the First Cause because all forms of composition or division within its essence are excluded. On the other hand, it is an *exterior* or numerical unity in that there can be

only one First Cause, the defining doctrine of monotheism. Aquinas, in the *Summa theologiae* (I, q. 11, a. 3), demonstrates this numerical unity of the First Cause by three arguments: first, because the essence and existence of the First Cause are necessarily identical, no other being can possess this necessary essence; second, because the First Cause is infinite in its perfection, it cannot be limited by another perfect being; and third, because the First Cause is the cause of all other kinds of unity, including the unity of the universe, it can itself only be one. An objection can be made to this last argument on the grounds that perhaps there are many universes. Indeed, there is talk in science today of other, maybe even an infinity of, “possible worlds.” Yet even were this the case, the collection of universes would still have something in common if they are to be meaningfully called “universes” or “worlds.” At least they would have in common the fact that they are systems having existence. This collective unity, then, would require a single First Cause to account for the unity, however minimal.

2. The First Cause Is Personal

The reader may wonder why, if I am discussing monotheism in this chapter, I have so cautiously used not the term “God” but mostly the expression “the First Cause”; and I have referred to this as “it” and not “he” or “she.” I have done this to face squarely the objection often made that the First Cause whose existence Aquinas proves is simply the Unmoved Mover, and not the *personal* God of Abraham, Isaac, and Jacob. This First Cause, the objection runs, may be the “That Which Is” of philosophy, but it is not the “I Am” of biblical revelation. Note should be taken that Aquinas, in his *Quinque Viae* in the *Summa theologiae* (I, q. 2, a. 1, c) claims no more than that he has proved the First Cause which, he says, “everyone understands to be God.” Thus he is careful, as I have tried to be, to keep the issue of the existence of the First Cause distinct from the further issue of what or who this cause really is. Yet the fact that the First Cause is the creator of all contingent things, including human beings whom we know

possess intelligence and free will, can only mean that it is also intelligent and free. Hence it *is* that Personal Being, the “I Am,” identical with the God of Abraham, Isaac, and Jacob worshipped by Jews, Christians, Muslims, and other monotheists.

The term “person” (*persona*) means, in the first place, a living substance endowed with intelligence and free will (such was the earliest definition of person formulated by Boethius), whether it is one of the human persons of our experience or a pure created spirit. The First Cause can be said to be a “person” only in the analogous sense that, just as a cause has some similarity with its effects, so the Creator can be known through his creatures yet infinitely transcends them. Thus, since it is the First Cause of the perfections of intelligence and free will that are the highest perfections of creatures, it must in some analogous way *be* personal. This term “personal” must be applied to the First Cause in a real though eminent way, as pertaining to an *infinitely* different order of being—a Cause-Without-a-Cause, known to us only through contingent effects necessarily referred to Pure Actuality. I have used the term “personal” here as in the common expression “a personal First Cause,” in order to avoid the Trinitarian problem in Christian theology that speaks of “Three Persons in One First Cause.” This would of course be a contradiction if the term “person” were univocal with the notion of “person” as it applies to human or angelic persons. Aquinas defends the Christian doctrine of a trinity of persons in the One First Cause, but maintains that, since this truth is a mystery of faith, reason cannot prove it to be true but can only refute arguments (often made by Jews and Muslims) that it is contradictory.²² Assuming the theological doctrine to be true, however, certain “images” or “vestiges” of this interior life of the Creator can be found in his creatures (notably in the spiritual trinity of the being, intelligence, and will of human beings and pure spirits). Such considerations, however, transcend the scope of a Metascience limited to observation and reason.²³

Today feminists object to speaking of God as “He,” since they claim that this is an androcentric, patriarchal way of supporting male superiority. I have written at length elsewhere on the

equality of women and men, and I strongly support feminists' efforts to obtain social support for authentic women's rights and full recognition as persons of intelligence and free will.²⁴ I also grant that in the literature of the world's religions androcentrism is evident. Nevertheless, I do not think that the perennial power struggle between the sexes is the only, or even the most basic, reason that the monotheistic religions use masculine names, pronouns, and metaphors for the One God, while in monistic religions feminine equivalents are more frequent.

Since we know God through his effects, we must choose those names for God that best express the relation between Creator and creature. Metaphors or analogies for naming the creator are most appropriately taken from the relations of parents to children, since this is the basic human experience of the observable causes of human existence to their effects. If the First Cause is named "Mother," the metaphor conveys the notion of *similarity* between cause and effect, since the child most obviously comes from the mother's body, is nourished at her breasts, and begins life close to her. Some feminists have for this very reason preferred pantheism or panentheism to monotheism. In monotheistic religion, however, the emphasis is not on the intimacy of relation between the Creator and creature, but on the *difference* or transcendence of the Creator, since, as shown above, it is this "otherness" or transcendence of the Creator that is the source of the Creator's *immanence*. Hence Judaism, Christianity, and Islam use masculine names, pronouns, and metaphors for the One God, in my opinion, not primarily to promote male dominance but as the metaphor most expressive in universally intelligible, analogical language of the concept of monotheism. Hence I follow this practice in this book, without intending any implication of the inferiority of human feminine persons.

Aquinas, before discussing God's intelligence, asks in the *Summa theologiae* (I, qq. 12 and 13) how we know and name the First Cause, but we have dealt with this topic of analogical naming in previous chapters. The actual discussion of the First Cause's knowledge is quite lengthy and begins only with question

14, continuing through 15. Here, it is sufficient to say that God, as Creator of a universe, the major part of which consists in the created intelligences of angels and men, is the exemplar of all intelligence. Since intelligent makers know what they are making prior to making it, so the First Cause could not freely create and empower for activity what he did not know. Hence God must be *omniscient*.

By analogy with the artists of our experience, we can speak of God's "ideas" of the world he creates. Yet his simplicity or inner unity demands that these ideas not be considered as really distinct from his intelligence. Nor is God's intelligence a property in the sense of a quality distinct from his essence, as are created intelligences. Aristotle was correct to say that the First Cause is "Thought Thinking Itself" (*noesis noeseos*),²⁵ since the primary object of his intelligence is his own existential essence with which his intelligence is identical. Thus, in saying that the First Cause is Pure Act, we mean that he is the perfect act of self-knowledge. God is totally transparent to himself.

Jacques Maritain accused Descartes of "angelism" because, in the *Cogito ergo sum*, the father of modern philosophy assumed that the direct object of our awareness is the act of thinking itself, not (as Aristotle and Aquinas insisted) some sensible object. I would go further and accuse Descartes and modern philosophy under his influence of being infected by pantheism, since it is God, not man, who is "Thought Thinking Itself," and hence whose object of thought is identical with his thinking.

Some commentators, both ancient and modern (as we discussed earlier in this chapter), have concluded from the fact that Aristotle, in *Metaphysics* XII, treats of the First Cause chiefly as a final cause of the universe that he did not think it was its efficient cause. Others have concluded from the fact that Aristotle speaks of the First Cause as "Thought Thinking Itself" that his First Cause does not know the universe whose motion it causes and hence has no providence over it. It is true that Aristotle does not discuss the First Cause's knowledge of the world. Yet Aquinas is surely correct in interpreting Aristotle as holding that the analogy by which the First Cause is proved to be intelligent (from the fact that it is the First Cause of all contingent

intelligences) requires that it also know what it causes, although it knows this in knowing itself (somewhat as an artist knows his work first in his own mind).²⁶ Thus, in knowing himself, the First Cause knows his ideas that are identical with his own self and in them knows what he makes. Nor is the dignity of an artist or of God lessened but enhanced by their knowledge of things inferior to themselves, because they know these inferiors in knowing themselves in the superior power of their creativity. Moreover, this divine knowledge of creation, unlike that of human artists who often fail to make exactly what they have conceived, is perfect and unailing.

Since God's knowledge of himself and his creation is perfect and complete, it can only be true and without any falsity, and is thus the principle and supreme exemplar of all truth. As mentioned before, Aquinas (in contrast to the order of exposition in the *Summa contra Gentiles*) in the *Summa theologiae* (I, q. 18) places *life* as an attribute of God immediately after the discussion of his intelligence and thought, since no life activity is greater than true thought. Thus the life of God as First Cause is primarily a life of contemplation and only secondarily one of creation. Plotinus refused to attribute intelligence to the First Cause or One, but only to the second god, the Nous, on the grounds that, in thought, the subject and object must be in some manner distinct, a condition incompatible with the One's perfect unity. For Aquinas, Plotinus has over-literalized the analogy between human and divine thought. In a *human*, thinking mind and object of thought must be distinct, but this does not mean that there is a contradiction in saying that thought and object are identical in the One.²⁷ Thus we notice that, in the monistic worldviews, when they do not assign gender to God, there is a tendency to depersonalize the First Cause and call him by terms like "the Absolute." *Advaita* Vedantists like the great Shankara did not dare to speak of a personal First Cause, although Shankara worshipped Shiva as a manifestation of the Absolute.

As is well known, Aristotle in the *De Anima* and in the *Metaphysics*, and even in the *Nicomachean Ethics* (where he assumes human responsibility for moral decisions), does not give

special attention to the human will and its freedom. For Aquinas, however, the philosophical understanding of free choice (as distinct from merely voluntary acts, which are common to man and beast) becomes a major topic. Because God is supremely intelligent, he also has a *will*, a will that with regard to all finite things is perfectly free. Voluntarists like Scotus and Ockham sought to make will the supreme attribute of God, in view of the consideration that Christian theology holds love to be more important than knowledge for human salvation.²⁸ Aquinas agreed that love of the good is key to salvation, but still insisted that no one can love *anything* without knowing at least *something* of what that object is, even though, granted that minimum knowledge, one's love can far exceed one's knowledge during one's earthly life. Aquinas also maintained, contrary to the Franciscan school, that for ultimate beatitude the intellectual vision of God is primary, because this knowledge by vision completes the work of love by providing the *actual union* with God in glory.²⁹

A second, and perhaps more significant, reason for the voluntarist position was to oppose the Neoplatonist view incorporated into Aristotelianism by Averroes and by some of his disciples in the Paris arts faculty who denied freedom to God. Hence, in order to defend God's freedom and sovereignty, Scotus and Ockham claimed that God's will has primacy in his actions of creation and governance of the world. Aquinas would have regarded this argument as superfluous since in free acts of the will, though the intellect proposes the alternatives and makes the final act of practical judgment (called *imperium* or command), it is the will that moves the intellect to this final act.³⁰

The act of God's will is perfect, and hence is love of what is good, principally of his own good (just as the principal object of his intelligence is his own self), but consequently is also love of all that he has freely chosen to create. As shown in chapter 9, by "good" is meant the attainment by each creature of its natural goal or fulfillment. For persons, human or pure spirits, this means their happiness, ultimately in union with their God in the community of happy persons. For Aquinas love is not simply benevolence, the welfare of the person loved, but is also a desire

for friendship or union between lover and beloved.³¹ Thus God is the principle of all love and is its exemplar, Love Itself. Unfortunately, often today the term “love” is thought to refer primarily to sexual love. Since sexual love implies *need* of a partner, God cannot love in this way,³² since he needs nothing. His love is wholly one of generosity, of self-giving to any other that he freely, for its own sake not for his, chooses to create.

Yet there is a profound analogy between sexual love and divine love in that, since perfect love is not only benevolence but union, God wants us to be united with him— not that he may be complete, but that *we* may be completed as he intends us to be when he creates us. Reviewing what was said above about process philosophy, it is clear that what such a philosophy says of God’s love means something quite different than did Aquinas. For Alfred North Whitehead, God loves the world only in the sense that God needs his creation to complete his own “consequent nature” and thus advance his own happiness. His creatures, after a momentary existence, survive only in God’s consequent nature as his happy memory of them after they themselves have perished!³³

Today, love is sometimes defined in the language of psychotherapy as “unconditional acceptance,” a dangerously ambiguous phrase. God loves only what is good, either as an actuality or as a real possibility grounded in some actuality. Thus, he can be said to love a sinner but not his sin, because that sin is hurtful to the sinner himself and often to other innocent persons as well. God, therefore, cannot accept the sinner except as one for whom repentance is a real possibility. The sinner who dies finally unrepentant, or a pure spirit whose evil decisions are irrevocable, cannot be properly said as such to be an object of God’s love since by the abuse of their own freedom they have refused God’s help to achieve happiness and thus are forever powerless to achieve it. They have excluded themselves from the society of God and God’s friends for the sake of that imagined and willed absolute autonomy of a finite self. That everlasting, self-chosen isolation is what is meant by “hell.”

Not to consider this tragic consequence of the refusal of God’s

love as a real possibility is mere sentimentality. What psychotherapist does not recognize that if a client refuses to be helped, to talk about accepting that client unconditionally is fruitless? The only escape from this hard conclusion is to suppose that creatures do not really have free will and are thus compelled by their natures to repent. This derogates the dignity of created persons since they then would not really participate in their Creator's freedom.

Here arises still another topic of dialogue with those monistic worldviews that seem ambiguous on the question of human freedom. For example, while Neoplatonism, Hindu *Vedanta*, and Buddhism hold for moral responsibility (called by the latter two religions *karma*), they "solve" the problem of evil by supposing that inevitably in some future reincarnation all souls will return to identity with the Absolute. Thus souls are free only as regards how many reincarnations they will need to escape the cycle of suffering, but they are not free as regards their ultimate destiny. Some of the Greek Fathers of the Church also speculated as to the eventual salvation of all human beings, and this has been given at least some support recently by the Catholic theologian Hans Urs von Balthasar and others.³⁴ From the viewpoint of Metascience, such views diminish both the freedom of creatures and of the Creator, since they suggest that God is obliged in justice to save all his creatures no matter what they choose for themselves. Thus the creatures would not ultimately be able freely to reject him as their goal in life. How then could they freely and ultimately choose him as that goal? It is contradictory to speak of free will and then to depict it as intrinsically determined to some final condition in the very matter of choices.

The attributes that Aquinas next discusses in the *Summa theologiae* (I, qq. 21–24) have to do with God's *care* for his creation. Because God is Love, and love seeks first the common good of all creatures, and then, within that common good, the good of every individual creature, he has the attributes of both *justice* and *mercy*. By his justice he maintains the order of the universe and especially that of the community of persons through which each person may reach happiness. By reason of their

freedom, both human persons and pure spirits can sin, but only humans can repent. This is because human intelligence and will, unlike that of pure spirits, depend in their operations on a changeable body and hence are also changeable. Therefore God in his love can show mercy to human sin, a mercy that does not contradict his justice, but a divine mercy that, by recognizing the human condition, perfects it.³⁵ Aquinas, however, as we saw in earlier chapters, argues that sins of pure spirits, due to the clarity of intelligence by which they are committed, are by their nature irrevocable and unforgivable.³⁶ This seems also to imply that, for highly intelligent human sinners, repentance is less likely and more difficult than for most of us!

The debates in Metascience about this obscure problem of freedom had notable consequences for the history of Christian theology in the hard fought controversies over “predestination.” The Protestant reformers, reacting against the late medieval nominalist emphasis on divine freedom yet influenced also by nominalist voluntarism and its emphasis on God’s absolute sovereignty, tended to minimize human freedom. Luther asserted, in his *The Bondage of the Will*, that we are either “slaves of sin” or “slaves of grace.”³⁷ Calvin—or at least his followers interpreted him in this sense—thought that the absolute sovereignty of God requires that he “predestine” his creatures either to salvation or damnation. To refute Calvinism and to save human freedom and responsibility, the Jesuit Luis de Molina (1565–1600) proposed the famous theory of the “middle science” (*scientia media*) of God, according to which he foreknows all the circumstances in which human beings will act throughout history and consequently what they will do in these circumstances, yet without God’s foreknowledge being in any way the cause of the creature’s free decisions in those circumstances.

The Thomists strongly opposed Molina’s theory of the *scientia media* as contradictory and in fact deterministic, since, for Aquinas, God’s knowledge of the world derives from his own free creative choice, and hence must in some way be the first cause of all created reality, even of the freedom of free human acts. The Molinists, however, considered the view of Aquinas to be

contradictory, since, if God causes our free acts, we do not determine them and hence they are not free. Thomists reply that to say that God is the “cause” of all created things including free human acts must be understood analogically. Although in the material efficient causes of our experience one agent causes another to act only by a *coercive* or deterministic action, this is less and less true as one ascends the spiritual order of human activity from which we draw our analogical understanding of divine causality. For example, with little coercive effect, a teacher or counselor influences the action of a pupil or client simply by persuasive words and personal trust. Indeed, such spiritual influence can actually enhance freedom of thought or action by removing impediments, as when a teacher helps a student see a problem more clearly, or a counselor encourages a client to make a free decision. By this analogy, it becomes reasonable to think that God causes the actions of creatures not merely to act in a deterministic mode (as do natural physical causes), or in a chance mode (as in the conflict of natural causes), but also in a free mode (as in intelligent human choices). Thus Aquinas says that the First Cause’s causality extends to all created causation whether it is natural, chance, or free.³⁸

This famous controversy was greatly confused, I would say, by the use of the terms “foreknowledge,” “predestination,” and “pre-motion,” all of which seem to imply that God knows the free human act in time *prior* to its performance. But an effect does not follow its proper cause in time. A causal act and its proper effect are not successive but simultaneous because the effect, strictly speaking, depends for its actual existence on its cause. For Thomism, all history is present to God in his eternity, in which there is no before and after. It makes no sense to speak as if God in his unique contemplative awareness knows what is going to happen *before* it happens: the priority in his awareness is not one of time but of cause to effect; and in this case the manner in which the First Cause causes the free act and the manner in which a human person causes its free act are of an entirely different and only analogical kind of causality, of “dependency in being.” While the Molinists were forced by their position to say

that the First Cause and the free human agent both are *partial* causes of one and the same act, the Thomists said that both the First Cause and the human agent are causes of the same identical act in its *totality*, but in different orders of causality. I have cited these theological controversies here³⁹ because it seems to me they are a prime example of how Metascience, although it is based on reason only, can promote better dialogue in theological debates based on faith.

God's guidance of creatures to happiness, or their free choice to exclude themselves from happiness by their evil actions, is part of the First Cause's more general attribute of *providence*, by which it guides all of history to its final completion. In the discussion of the discipline of history in chapter 9, section E, it was shown that, from the viewpoint of reason, there can be no science of history, because history as history has no universal laws, no fully fixed patterns. This is so both because history depends largely on free human decisions and because it deals with events that are shaped by large doses of chance guaranteeing their uniqueness. I also noted that in monistic worldviews, especially those of India, history is conceived as a repeating cycle, an "Eternal Return." This concept makes history deterministic, but also of little significance, since its story is only one of an infinity of identical stories. In monotheistic worldviews, however, history has a definite goal. For the Jews, this goal is the Messianic Age of justice and peace. For both Christians and Islam, it is the Final Judgment. But for Christians the central event of history is the Incarnation; for Muslims the central event is the revelation of the Qur'an to Mohammed.

Metascience cannot discover any such pattern to history,⁴⁰ and is not even able to say whether the universe has a beginning or an end. All that Metascience can say is that, while history is not intrinsically deterministic and is thus unpredictable, it is nevertheless subordinated to the wisdom and will of God and constitutes the working out of his love for his creatures. God will permit no evil, physical or moral, that does not ultimately contribute to the good of the universe that will as a whole far exceed the sum of particular evils. I have already touched on this

problem in chapter 10, and will add here that Aquinas devoted an extensive “disputed question,” *De Malo* (c. 1272, one of the very last of his writings to find its way into English translation), to discussion of the problem (see also *Summa theologiae*, I, q. 49).

Aquinas also wrote a disputed question *De Potentia* (1265–66) on the divine attribute of *power* (taken up in *Summa theologiae* I, q. 25), in which he demonstrates that God has infinite power since “a thing acts as it is in essence and existence.” Since God is perfect in wisdom and love, he is the Almighty. In human life, by contrast, power is ambiguous. Not far wrong is the saying of Lord Acton: “Power tends to corrupt. Absolute power corrupts absolutely.” God’s power is the exception to this rule— absolute but absolutely incorruptible. For God never uses his power for his own benefit, there being no way he could do so, since he needs nothing; he exercises his power only out of generous love for his creation. God cannot, of course, do evil, nor can he do what is contradictory, for example, create a “square circle.”

The final divine attribute that Aquinas treats in the *Summa theologiae* (I, q. 26) is God’s *beatitudo* or happiness. Obviously, if God is “all powerful” (although there are limits on the ways in which the Divine Goodness can be extrinsically imitated and participated⁴¹), and if the primary object of his love is his own being through which he loves all his creatures and seeks their good in union with him, he himself enjoys perfect beatitudo in his eternal self-contemplation. Yet he also freely wills to bring all created persons to share that contemplation. Metascience can do no more than to establish that this contemplation is possible to human beings by their achievement of wisdom through human experience and to pure spirits through the innate ideas given them in their creation. Therefore, this natural happiness of intelligent creatures compared to that of God is imperfect absolutely speaking, even as it is perfectly proportionate relative to human or angelic nature. Whether an all-loving God may have freely chosen to raise us to some share in his contemplation that utterly exceeds our human powers remains a mystery for human reason. Metascience can show that such an elevation would not

entail contradiction, perhaps; but that such a “deifying” elevation of the creature is really possible, or that it will actually occur, can be answered only by a revelation from God. That is why the monotheistic religions have looked beyond human reason to faith in revelation as the ultimate reply to the questions that Metascience can formulate but cannot itself answer.

C. GOD AND CREATION

1. The Triple Causality of God as First Cause

Earlier in this chapter, I pointed out that Aristotle, after proving in natural science the existence of a First Cause of motion and its immateriality, and hence the need for and validity of a Metascience broader in scope than natural science itself, left a deeper consideration of this problem to Metascience. Aquinas completed Aristotle’s discussion with his famous *Quinque Viae* of proving God’s existence. Of these five ways the first is rated by Aquinas as “the first and more evident (*manifestior*) because it is taken from motion,” the type of change most evident to our senses and proper to natural science.⁴² This implies that the other four ways somehow presuppose the first epistemologically, not as if they are its corollaries but because it precedes them in the order of the intuitive evidence of the middle terms involved in their premises.

Thus the student in *Physics* first intuits the existence of motion from sensible observation and then by analysis of this real motion arrives at the notion of the four causes. The second and third way, presupposing the proof from motion, derive their middle terms from *efficient* causality: the second from the series of efficient causes that produce motion, the third from the possibility or necessity of the effects of efficient causality. The fourth way, however, no longer argues from efficient causality but from *formal*

causality (degrees of perfection); and the fifth way from *final* causality. Final causality, however, is nothing but the predetermination of the efficient cause to produce the perfect actualization of the formal cause.

No argument from *material* causality is possible since God is the Unmoved Mover, which is Pure Act, while a material cause must be in potency. Yet, in all five proofs, the notion of being as not only actual but as changing (and thus also potential) enters into the demonstration, and this concept of potential being is derived from material causality. Aquinas, in a rare tone of contempt, berates a certain David of Dinant for thinking that God is “prime matter.”⁴³ Yet this absurdity is found rather frequently in monistic thinkers who, in their struggle to explain the phenomenal world in relation to the Absolute, speak of it “emerging” or “flowing” or “diffusing” from the Absolute and then “returning” to it, as if on the analogy of prime matter receiving various forms which it eventually loses.

Our knowledge of God excludes any possibility that he could be an *intrinsic* material cause of his effects since he is utterly free of potentiality. Nor, since he is Pure and Necessary Act, can he be the *intrinsic* formal cause or act of anything that is contingent and thus somehow potential. Thus, the language sometimes used in monistic worldviews that speaks of the Absolute as the “ground of all beings,” as if the Absolute were the matter out of which phenomenal things are made, or as the “soul of the universe,” as if the Absolute were a form in matter, can only be understood as metaphors and not as proper analogies. Yet the Stoics and other more spiritual monists have called God the *Logos*,⁴⁴ Energy, Force, or Soul that animates the material cosmos. For Plotinus, too, the World Soul was the Third God. But an intrinsic formal cause is correlative to the matter that it informs, and if God were such he would depend for his existence on matter and would not be its free Creator.

2. The Extrinsic Formal Causality that Is Exemplarity

Yet God is the *extrinsic* formal cause of creation, because in acting as Creator to produce the universe God gives it essential and existential actuality, and that actuality is an imitation, copy, “mirroring of,” or participation in the pure actuality of the Creator.⁴⁵ Thus Platonism and Neoplatonism considered all things to be imitations of the Ideas, and the Ideas to be imitations of the One. Aquinas, in his Fourth Way, argues to the existence of God from the degrees of perfection found in creatures. In this way he assimilates into his Aristotelian Metascience much from the Platonic tradition that had before him been so influential throughout the history of Christian thought. Indeed, Aquinas has often been accused of being more Platonist than Aristotelian, yet the arguments for this assertion generally reduce to the fact that Aquinas made extensive use of Platonic sources, notably, the Pseudo-Dionysius and St. Augustine. But Aristotle also made extensive use of Plato’s thought. In doing so, both he and Aquinas transform what is of value in the Platonic tradition by restating it in conformity with a critical epistemology that is anti-Platonic.

A more serious way of making this claim that Aquinas is a Platonist is exemplified by the important work of Cornelio Fabro.⁴⁶ He argues that Aquinas’s whole Metascience rests on a notion of participation that was not used by Aristotle but was central to Plato’s thought. Participation is a concept that provides explanation through that extrinsic *formal* causality called exemplarity. For Plato, as already noted, all material things are imitations or reflections of superior things, and ultimately of the Idea of the One Good. Aristotle does not object to this thesis of Plato, since formal causality, both intrinsic and extrinsic, is essential to his own way of understanding reality. He criticized Plato for failing to explain *how* this imitation comes about—that is, Plato neglected the *efficient causality* by which God produces effects that imitate their Cause.

Because Plato so exaggerates the importance of mathematics, where formal causality is uppermost and efficient causality not present at all, he presents a universe that has an eternal, timeless pattern. Such a static universe is quite different

from Aristotle's dynamic temporal universe in process. Thus, when Aquinas exploits Platonic sources that dwell on how in their diversity all created things imitate God in a hierarchical order, he still remains true to Aristotle, because his doctrine also explains that this *participation* in God's plenitude of Being would not exist if God had not efficiently created things. Although this formal likeness relates first to essences, it follows also that it is true of the correlative existence of these essences. "God as God" efficiently causes to exist the various things that reflect his own perfection in a variety of ways and with existences proper to the essences of each. Thus the existence of even inanimate things is a participation in God's existence, though the existence of living things, especially of intelligent ones, is a far more perfect participation in that same divine existential act.

In keeping with Aristotle's anti-Platonic epistemology, Aquinas verifies the Greek's doctrine of the four causes and their correlation *first* in natural science based on sensible experience. Since in natural science it is shown that every effect participates in its proximate proper cause univocally, and in its more remote proper causes at least analogically, the same can be asserted of the effects of spiritual causes. This is why Aquinas, after saying that the proof of the existence of God by efficient causality is the most evident of the proofs, then goes on to add the fourth proof "through grades of perfection" as a proof by formal causality complementary to that through efficient causality. He argues that since we observe many grades of certain perfections in natural things (e.g., degrees of heat in bodies), there must exist a most perfect thing that is the cause of these less perfect things.

Thus, in a room in which objects have different temperatures, we know there must be an object that is hotter than any of the things in the room that it has heated to various lesser temperatures. Some have laughed at this argument, since it seems to prove that God is the central heater of the universe! Of course Aquinas did not stop there. Science today traces all the energy in the universe back to gravity, electromagnetism, and the weak and strong nuclear forces, but according to the Big Bang theory these forces were not differentiated in the first epoch of cosmic history. Hence science today is seeking for the unified

force that produced the Big Bang and then differentiated into several lesser forces. Finally, it is apparent that if the Big Bang was a purely material force, it was embodied in matter and, since matter is infinitely potential, was not its own source. Thus we arrive at the First Cause “who all understand to be God” as an analogical cause, including all the perfections of the universe that imitate his plenitude of perfection in various degrees.

A contemporary of Aquinas, but working in the Platonic tradition of St. Augustine, the great medieval Franciscan Doctor of the Church, St. Bonaventure, built a theology primarily on the formal causality of *exemplarity*,⁴⁷ in marked contrast to Aquinas’s theology developed on an Aristotelian basis of all four causes, with a certain primacy given to efficient causality as the cause most directly related to existence. These two theological systems, constructed not only on different philosophies but also on different emphases of causality, complement each other. We can hope, therefore, that the long traditions of Neoplatonism and Idealism in the West, and of Spiritual Monism in the East, alike emphasizing the Spiritual Absolute known in meditation and self-awareness, can be assimilated to Western empirical Realism that has produced modern natural science and scientific technology. The truth of material things, precisely because it is independent of our finite human minds, leads to the discovery of spiritual realities that are likewise mind-independent. These realities transcend us and are seen to consist in a community of persons to which our own spirituality calls us. As beautiful forms of nature inspire us, our thought and love ascend toward the God whom these forms truly though distantly copy. We humans, too, as embodied spirits—even we—are “made in the image and likeness of God.”⁴⁸

God as the First Cause also possesses all the perfections found in material substances that make them of service to the life of spiritual beings. Even matter has an analogical similarity to God, in that by its very potentiality it has an infinite capacity to receive perfections given through created agencies, and thus (like a mirror) reflects God’s own perfections. As the Bible puts it, “The heavens declare the glory of God” (Ps 19:2). Thus God is Unity itself, and all the other forms of unity we have described in

creatures are participations in his Unity.

Can plurality also be somehow attributed to God, since he is the Cause of the plurality of contingent substances whose diversity he has chosen to create for the sake of the perfection and unity of the total Creation? This cannot be, of course, inasmuch as the division and lack involved in plurality implies negativity and contingency. Yet in the sense that plurality makes possible the existence of more types of perfection, by analogy we can think of God as the infinite treasury of all perfections in which this divided plurality is unified in one simple totality of Being. Thus Aquinas, perhaps having in mind the Gnostic Manichean view that the visible universe is a product of an Evil God, asks "Whether the multitude and distinction of creatures is from God?" and answers:

[God] produces things to be in order to share his goodness with them and to be represented by them. And since he cannot be adequately represented by one creature, he produces many and diverse creatures so that what is lacking to one in representing the divine goodness will be supplied by another creature; for the goodness which is in God simply and uniformly is multiplied and diversified in creatures.⁴⁹

Thus Metascience also affirms that God, as the ultimate source and goal of all the contingent creation that he has freely willed to make from nothing according to his wisdom, must be not only the efficient cause of our universe (as argued in *Physics* VIII) but also its ultimate extrinsic final cause. I previously mentioned that some commentators hold that, since in *Metaphysics* XII it is only this final causality of God that is discussed, Aristotle did not think God was the efficient cause of the existence of all contingent things, but only of their motion or their forms. This objection overlooks the fact, so often pointed to in these pages, that the *Metaphysics* presupposes the *Physics*. Moreover, as I have also pointed out, it is essential to Aristotle's theory of the causes that any final cause be always correlative to an efficient cause that is predetermined to produce it as that efficient

causes's proper and specific effect. In Aristotelian Metascience, God could not by efficient causality produce the universe otherwise than as a participation or imitation (formal causality) in his own infinite perfection, and by an act of spiritual wisdom and free will that aimed to do so (final causality in a conscious being).

This teleological type of causality is the way that an object of desire moves the will of an intelligent being without itself being moved. Hence it is the form of causality that is more appropriate to explain the subordination of the finite intelligences to God than is the efficient causality by which God moves subhuman creatures. Yet it must not be forgotten that even in the line of efficient causality God is the *Unmoved Mover*. Finally, the fact that God is the ultimate final cause of all things establishes that he is the Supreme Good. Therefore God, while not related to the world by a relation of dependency, is related to the world by his free choice to create it. The creation and governance of the cosmos proceed from free acts of his sovereign will.

The idea of a God who is free to choose to create seems to some anthropomorphic. It is, however, required by the natural science proof of his existence, since the First Uncaused Cause cannot be in any way dependent for its existence on any existent outside itself. Thus Spinoza, as pointed out in an earlier chapter, spoke poorly in speaking of God as *Causa Sui*,⁵⁰ Cause of Himself since (as Aristotle insisted) the very notion of "cause" implies that "Nothing can cause itself." God as the necessary being, whose very essence is to exist, is uncaused. This is the basis of the divine Unity and Uniqueness. Nor, again, is it anthropomorphic to attribute intelligence and therefore freedom to God, since he is the source of our created intelligence and freedom, and a cause must contain what it gives to its effects. To escape anthropomorphic thinking about God we need not reject such analogies but rather free them from all negative elements. Our freedom is restricted, while God's is infinite. We can misuse our freedom to do evil; God cannot do evil, not because of any restriction on his freedom, but because of the total truth of his intelligence identical with the total goodness of his will.

But if the First Cause, contrary to Plotinus and Whitehead, has absolutely no need to create and gains nothing by doing so, why

does it create? Hence the metaphor used in Hindu thought and also in the Old Testament⁵¹ to describe God's creative activity as a kind of "play"—because play is not, like work, necessary, but free—is a helpful metaphor but, like most metaphors, inadequate to the reality. While play is free, yet it is done for the pleasure of the player, and God in his eternal joy needs no entertainment. Therefore the better analogy from human experience for God's freedom is not that of a player, but of a generous person who gives to another not for his own satisfaction or aggrandizement but solely for the good of the other. Of course, in actuality, human givers never show such perfect generosity. They are not even obliged to such altruism since they necessarily always gain something for themselves by their good deeds, be it only an improvement in their own character. Since, however, God is perfect, needs nothing, and cannot be improved, he is free to share goods with creatures that otherwise would not even exist.

This raises the famous question of whether, as Leibnitz argued, this is necessarily "the best of all possible worlds." Scientists like Einstein and Weinberg have in effect adopted this opinion of Leibnitz in their search for a Final Theory of Everything, as if the plan of the universe has mathematical necessity. Aquinas, long before Voltaire, pointed out that this notion of the best possible world is self-contradictory: such a world, because it would necessarily exist, would be God.⁵² It is also self-contradictory to suppose that the world might be both contingent and still be the best possible world. The world's contingency entails its finitude. Hence God, whose power to create is infinite, could always make any possible, yet necessarily finite (because created) world, still better in some particular. Again resorting to analogy, we note in our experience that the freedom of a human artist, though restricted, does not require that the artist make only one work that is for him the best possible; the artist is free to make various works of art, each of excellent quality, but none can be certainly said to be the best he can do, since some day he may outdo himself. Analogously, God has chosen to create this world and no other, not because it is the best he can do (since there is no limit to his powers) but simply for its own sake.

Christians agree with Jews and Muslims that there is only one God, but claim that Jesus revealed that *within the one God* there is a community of three Persons possessing that one identical Divine Being. The positive truth of this claim utterly transcends human reason, although, negatively, it can be shown metascientifically not to be contradictory to monotheism.⁵³ Since Jesus also claimed to be the Second Person of this Divine Trinity, who has become incarnate in our human nature, some Christians have argued that our universe is the only one possible. Aquinas would not have agreed. He found no contradiction in the possibility of several incarnations of the Son.⁵⁴ Others have claimed that since our universe is the site of at least one such Incarnation, no more perfect world is possible than one in which God is incarnate. Yet, although it must be granted that such an incarnational presence of the Divine in the world exceeds any other created perfection, this does not prove that the universe might not have been more perfect in other respects.

Can we, however, conclude that God has created only one universe, as Aristotle maintained?⁵⁵ If there were more than one universe, each would have to exist in entire independence from the other; and thus we, in our universe, would have no way of knowing anything about them except by divine revelation, whence this is an unanswerable question for Metascience. Metascience, also, has no way of answering the question whether there is intelligent life elsewhere in the universe than our earth, although perhaps natural science will someday give us that answer.

If God creates freely, then he creates *ex nihilo*, “from nothing.” This is a difficult notion, as can be seen from what we have already said about the inadequacy of the concept of “creation” in monistic worldviews. In such worldviews, God or the gods emerge out of some kind of preexistent chaos or primordial egg and then proceed to create other things out of that same material. Sometimes a wife for God emerges out of the same matter, or even is divided from the body of God, like Eve from Adam’s rib. Then the male and female gods beget others like themselves or form lesser creatures. Thus, in a strictly monistic worldview, if God creates, it would seem that he must create out of his own

substance. Hence Neoplatonism spoke of the universe “emanating” (flowing out like water from a spring) from God, rather than as created by him. Obviously, what leads to such notions—that, if taken literally, are self-contradictory—is the universal experience that all human making, even making by sexual generation, requires a preexistent *material* cause.

Creation in the strict sense, however, is said to be “out of nothing.” This must be understood by analogy to human making out of preexistent matter. But “nothing” is not literally a real material cause but a merely mind-dependent relation of negation, a way of saying “creates without any preexistent material.” We cannot imagine such an act of God except by picturing a primeval empty space or chaotic material. Yet *intellectually* we can understand *ex nihilo* as signifying that God has the infinite power to produce something totally other than himself and give it a genuine, although contingent, existence.

This brings us back again to the principle that, while God’s essence is to exist necessarily, in his creatures their essences require to be given existence by the Creator if they are to exist in their own reality. This is the meaning of the classical statement, “After creation there are more beings but no more Being,” since any quantitative addition of finite beings to an infinite Being is meaningless. Thus one can agree with Hindu thinkers who say the Absolute “neither exists nor does not exist,” and that it is not so much One as “Non-dual,” if the terms “existence” and “unity” are too literally understood. God’s existence and unity transcend all our experiences and remain mysterious. This is why Christian theologians, without contradicting themselves, can say that God is both One and yet a Trinity.

3. *The Hierarchy of Creatures*

The monotheistic view of God as a personal being who, from nothing, created the world not so as to add anything to his own absolute plenitude of being but that it might participate in that plenitude, leads us back to the consideration of created Being (*ens commune*) that is the proper subject of Metascience. As

shown in chapter 6, the first “property” of that analogically unified subject is the transcendental concept of Unity. This unity is perfectly realized only in the One God, while his creation, in order to better imitate his infinite plenitude, consists in many things that are different but possess a unity of order.

Hence the universe consists of a cosmic hierarchy of many bodily and spiritual substances, with the human species in an intermediate position. This plurality of substances, whether material or immaterial, forms a dynamically interconnected, evolving, and unified system that, in its contingency, exists in total dependence on God. Each of these substances is interiorly unified by a differentiation of its quantitative or functional parts (in the case of spirits only the latter). It is also exteriorly unified to form the universe by various kinds of efficient causes. In this hierarchy, the lower a substance is in rank the more subject it is to sequential operations (“time”) and to chance and disorder. The higher it is, the more it attains to psychic activity, freedom of choice, and interpersonal communion.

The Thomistic view of the multitude and diversity of creatures explained in chapters 6 and 7 results in a conception of their hierarchical order very different from that of Neoplatonism, and in particular of the Christian theologian Pseudo-Dionysius who introduced the term “hierarchy” into theology. Neoplatonism conceived the hierarchy of beings as perfectly linear, so that whatever perfections were contained in an inferior member of the series were contained completely and in a better way in the immediate superior from which it received that perfection.⁵⁶ This model of hierarchy resembled the series of the natural numbers, in which the units of any given number are contained in any greater number. Aquinas accepts the analogy to the number series, but with a very important distinction. This analogy is more perfectly realized in the hierarchy of pure spirits and less perfectly realized in the hierarchy of material things, but is *always* qualified since it is true only *generically*, not specifically. For example, the human being is higher in the hierarchy of creatures than minerals, plants, and animals, and contains their perfections; yet we cannot sparkle like a diamond, nor flower like a rose, nor swim like a fish. Instead, with the generic hierarchy of creatures, each species of

creatures has some *unique* perfection possessed by no higher creature, not even the highest, outside of God.

What is true of species is also true in the case of individuals within species of material things, so that—in a Thomistic Metascience—no substance in the universe is a mere “clone” of another.⁵⁷ The higher a creature is in the hierarchy, the more distinct it is from other creatures. Two grains of sand are not identical in their perfections, but their differences are very small. The differences among human beings are very great, however, and Aquinas can even speak of the soul of each human person as unique. In the case of pure spirits, this uniqueness is formal, so that every spirit is a species unto itself. This also implies that each creature, in addition to the relation to God that it shares with other members of its genus, also has its own unique relation to God. The human spiritual soul with its intelligence and free will that make it an image of God is not finally produced by God through biological processes since matter cannot generate what is purely spiritual; it must be immediately created by God whenever a human body appropriate to a soul is biologically produced.

Moreover, since each human body is uniquely individual (even identical twins differ somewhat), and each human soul is created in a complementary relation to a unique body, Aquinas, as we saw, says that each human soul even when separated from its body at death still retains this intrinsic relation to the individual body it formerly possessed, a condition which forever distinguishes it from the condition of the angels.⁵⁸ Thus each of us humans is a microcosmos mediating between the material and the spiritual parts of the universe. Furthermore, by attaining to a certain wisdom in the contemplation of the universe as the mirror of God, we each stand in a unique I-Thou relation to God. By that very fact we also share in God's *community*, which includes all who search for truth, in every form of learning and in every culture, old and new.

Thus it appears that Aquinas's understanding of the relation of the universe and the human spirit to God is in full agreement with Eastern thought in holding that the ultimate reality or Absolute is

infinitely beyond human conceptualization and, as Aquinas emphatically says, “Theology does not so much say what God is as what he is not.”⁵⁹ Thus *compared to God* the creation is, as it were, “nothing.” Even the human person, therefore, as a creature is compared to God as “nothing”—or, to put it in a different way, we, both in our spiritual and material reality, *have nothing* that we have not received from God as the Absolute Spirit on whom our very existence and actions at every moment utterly depend.

On the other hand, Aquinas is able to avoid the seeming negativism which the Non-dualist thought of the great Shankara tends to foster by speaking of the creation as “self-contradictory,” merely “phenomenal,” “illusory,” or “mere play.” Aquinas shows rather how the affirmation of the genuine, though relative, *reality* of our world and our own persons manifests, however imperfectly, the infinite existence and perfection of God and his personal love for us. Does this not give a more satisfying motive for the *bahkti* devotion that Shankara himself ardently practiced than his own language provides? Modern Hindus, like Swami Vivekananda (1863–1902), Sri Aurobindo Ghose (1872–1950), and Sarvepalli Radhakrishnan (1889–1975), as well as modern Buddhists, have therefore interpreted the Indian tradition (to which they remain faithful) in a more positive sense and hence have emphasized concerns for the advance of science and the pursuit of social justice in this world. Yet monotheists can still profit from the Eastern centering on the Absolute Spirit, shared by Aquinas, as a corrective of their own perhaps too “creation-centered” views.

Part 4

**Wisdom, Human and
Divine**

The Way toward Wisdom

A. UNIFIED AND OPEN EDUCATION

1. Education in the Family

In this book I have argued that the fragmentation of knowledge in our universities in the first decade of the twenty-first century can only be overcome by a search for a human wisdom, a Metascience that promotes genuine interdisciplinarity and multicultural dialogue. Only in this way can we achieve a global culture that is peaceful and communicative without reducing the earth's rich variety of cultures and of intellectual disciplines to a mediocre uniformity. What would such an education be like? To reflect on this problem is to summarize the previous conclusions of this book.¹

The first and most essential of all schools is the family. Although in different cultures surprisingly different patterns of family life, some odd indeed, have been developed, in all cultures the nuclear family of mother, father, and children predominates and has proved itself necessary for human survival.² When it functions normally, the family provides the child with the variety of both cognitive and emotional experiences needed as the basis of

all future learning. Only with great difficulty can later, more formal education remedy the effects of family dysfunction. It is in the family that the child first has an experience of itself in the world formed by external and internal sense impressions that lays the groundwork for the future worldview that may someday become implicitly its Metascience. Piaget and other researchers on child psychology have shown that a baby only gradually comes to distinguish real objects from images of objects, to recognize that objects endure through change, and that they are related as cause and effect.³ Indeed I believe that from Piaget's account of childhood learning, one could develop the whole Aristotelian epistemology and Aristotle's theory of the categories! It is also in the family that the child begins to evolve a value system. Although, unlike animals, the human child has only a few, very generalized instincts, it quickly begins to learn that pleasures and pains are associated with certain sense experiences. Earlier I mentioned Aquinas's views on the internal sense that he calls the *vis aestimativa* or "animal intelligence." He shows that in humans this sense becomes the *vis cogitativa*, distinguished from the brute animal *vis aestimativa* because, by virtue of its connection now with the higher power of the human intellect, the sense in question enables humans to evaluate how sense impressions predict the possibility of pleasure or pain in relation to sense objects as they are understood ontologically by the human intelligence.⁴ From this internal sense the child learns to seek pleasure and pain not only from its actual experiences of these sensations, for example, but also from the remembered parental approval or disapproval of its behavior.

Such a learned value system at the sense level is what Freud noted clinically and called, not very appropriately, the "superego." It is only later that children begin to recognize the difference between this imposed value system at the level of images and the realistic and reasoned appreciation of the harmfulness or helpfulness of their actions, that is, to develop a genuine conscience of right and wrong. This probably occurs sporadically at about the age of seven, and only gradually becomes a continuous factor of the waking state as a child begins to use not

just its senses but also its intelligence.

Preliminary even to such truly human thought, however, the child, with amazing facility, has begun to learn the language of its parents. Modern research has shown how connatural to the human child is this wonderful ability to speak a human language.⁵ Human language is very different from the signals animals make since it requires the ability to form universal concepts and to relate words grammatically. This would not be possible if the ability for abstract, intellectual thought were not already developing in the child. Language expresses syntactic or logical relations that, as was shown in chapter 9, cannot be formed in the organic in the senses, but only in the intelligence. Thus, at least the first streaks of the dawn of intelligence begin when the child can construct the first grammatical sentence that is not just a repetition of what it hears from its parents! Hence we should encourage the recent trend toward emphasizing the importance, even for healthy neurological development, of a stimulating environment for children. How fortunate the child who comes to school with a lively imagination, empathy for the feelings of others, and the first steps of a realistic conscience free of neurotic distortion!

2. Liberal Arts Education

In preliterate cultures the worldview of any historic community is transmitted through shamans and their disciples. Commonly such worldviews include an awareness of the ancestral spirits who are thought to protect and guide this cultural transmission. Oral cultures are surprisingly effective in transmitting their traditions. For example, the sacred scriptures of the Hindus, the Vedas, were passed on orally for over a thousand years. Yet the invention of writing greatly stabilizes cultural traditions, while at the very same time encouraging innovation. With literacy, the Hindu Brahmanic and Buddhist monastic schools studied the grammar and logic necessary for understanding their sacred texts, the repositories of the mystical experiences of ancient sages. Confucian schools that trained an elite were based on the

study of the Five Classics embodying the wisdom of a previous golden age. Greek *paideia* centered on the “liberal arts” that marked the difference between free and slave and made possible the understanding of the Homeric epics and other sources of mythology.⁶

These classical modes of tradition and their parallels in other cultures show how essential it is for at least the leaders of a community to be steeped in tradition and skilled in organized thought, interpretation, expression, and communication, so that they might transmit the community tradition effectively. While Plato idealistically looked for a philosopher king,⁷ Aristotle realistically supposed that political and intellectual leadership would seldom if ever be combined in the same individual.⁸ Yet he, like Confucius in China before him, saw how necessary it was to produce a class of teachers to prepare future political leaders with the liberal education that they too needed to govern a free society.

In modern democratic society it has been taken as axiomatic that the whole citizenry ought to become literate and enter into civil discourse that would prepare them to vote intelligently.⁹ Moreover, the rise of scientific technology seems to require some type of liberal education for most kinds of employment. Yet, in the United States, the self-styled icon of modern democracy, a considerable part of the citizenry remains “functionally illiterate” and fails to participate in civil life by voting. It is not necessary here to elaborate on the widespread criticism of the public schools because of their failure to provide an effective liberal education.¹⁰

What then is a “liberal” education? First of all, it must make it possible for the citizenry to obtain the information they need to participate effectively in public discourse. Second, it must enable them to understand and make a critical evaluation of arguments put forth by the parties to this discourse. “Critical evaluation” here does not mean an expert judgment of all arguments on their own merits, since no one has such universal expertise. But if I am to trust another as an expert, I must be able somehow to recognize the signs of that supposed expert’s competence and

trustworthiness or incompetence and fraudulence. With such skills one is “liberated” from mere prejudice or credulity, and prepared to seek the truth effectively.¹¹

The Western Ecumene developed a well-worked-out theory of the liberal arts in the form of the trivium (three ways)—namely, grammar logic, and rhetoric—and the mathematical quadrivium (four ways)—geometry, arithmetic, music, and astronomy.¹²(The Confucian training in the *Five Classics*,¹³ though less oriented to the honing of a scientifically critical intelligence, provides an interesting parallel that also proved effective for over a thousand years.) Plato, though himself a literary genius, criticized the study of literature as deceptive. But Aristotle, in his classification of the sciences, gave room for *belles lettres* in education, and actually provided a richer and more refined view of the nonmathematical arts than tradition before him had developed.

Thus, as shown in chapter 9, Aristotle distinguished “grammar” (linguistics) from logic, but related them to an analysis of all forms of thought and their communicative expression. In his *Poetics*, he studied the use of imaginative thought and expression for the purpose of contemplative recreation with the consideration of metaphorical language and dramatic narrative. In his *Rhetoric*, he showed how many of these imaginative resources could also be put to use in the art of persuasion to action by rational arguments aimed to invoke appropriate rational audience response. In relating these two arts, he took pains to show that they have different and even opposed aims, since the poetic art leaves the audience rested while the rhetorical art spurs them to decision and action. In both arts, however, rational thought is supported by imagery that also has an affective resonance.

Sometimes it is not realized that literary works, because of their rational element, also require logical analysis. Even the most emotional love poem has an appropriate logical structure, which, if it is not understood, fails in its full contemplative effect. Today we hear much in theology about the importance of “narrative” as a way of conveying truth. That all the religions of the world use myths and parables is evidence of this, and Aristotle showed the way to study such thought forms. He even said that poetry is

more philosophical than history since it deals with what is more universal.¹⁴ In Indian and Chinese culture also, the interpretation of sacred texts and profound debates about certain points in the cultural worldview led to the development of sophisticated arts of poetics and rhetoric.¹⁵

An adequate understanding of narrative history and of cultural geography requires that they too be subject to a literary analysis. These disciplines provide narratives of human life that can more effectively persuade the young to the imitation of heroes and the contemplation of the human drama than abstract ethical discourse ever can. Thus, history ought not to be studied as a dry chronicle. Nor should it be narrow indoctrination in the values of the culture. The study of history should open young minds to a much wider understanding of human life than can be provided by their own immediate milieu. History can be dramatized also in theater, film, and television. Consequently, along with fictional literature, history and geography should be included in liberal arts training and used for exercise in the interpretive skills.

The history of China's isolationist pride in being the "Middle Kingdom," as well as the long closure of the Western Ecumene from the cultures of India, China, sub-Saharan Africa, and the Americas, reminds us all of the dangers of ethnocentrism. Hence students should be made aware of how historical data is liable to very different interpretations, yet they should also be shown that in some matters of historical fact a reasonable and objective certitude is possible.

Besides these liberal arts of grammar, poetics, and rhetoric, Aristotle developed in his *Organon* two main types of stricter logic that deliberately abstract from imagery and feeling in order to bring into relief the intellectually objective aspects of thought and communication. For Aristotle, dialectic is not, as for Plato, the specific method of philosophy or science. It is the logic of debate, of dialogue, and of research in which problems are raised and both or all sides of a question are expounded and tentative solutions examined. Thus, dialectic is a necessary instrument of philosophy or science in the search for understanding.

As shown in chapter 7, Aristotle, in many of his scientific

works, begins with a dialectic of alternative hypotheses and opinions.¹⁶ In such discussions, the principles on which the discourse is based are not evident truths proper to the subject of the science but general truths open to differing interpretations and applications, yet ones that enable us to tackle a problem and clear away the rubbish. This often includes the use of *sophistics* to detect arguments that are logically fallacious. Finally, the summit of these liberal arts is *logic* in the most integral sense, that is to say, the sense in which the importance of logic is most readily evident, namely, as the art of showing that an argument is both *consistent* within itself, which Aristotle covered in his *Prior Analytics*, and *warranted* by the type of evidence proper to the particular context or science in which the argument is used, as laid out in the *Posterior Analytics*. For Aristotle, then, logic is not merely a game in which symbols are combined according to an arbitrary set of rules (in the manner of much of modern symbolic or mathematical logic). Instead, Aristotelian logic is grounded in empirical fact, because its rules are justified by the non-contradictory realities of our sensible world.

Modern Analytic Philosophy has made much use of logical analyses to clear the discourse of natural science and ethics from semantic confusion, and for this it is to be commended and its techniques utilized.¹⁷ Too often, however, Analytic Philosophy has also introduced or supported other confusions by an illegitimate reductionism in which all language is treated as if it had meaning only if reduced to currently popular usage (“ordinary language analysis”), at one extreme, or, at the other extreme, that of modern science. But, as I have argued throughout this book, “ordinary language” is both an evolutionary product and a locus of evolutionary process within culture, while modern science in fact exhibits its own confusions. Its detailed development has been so rapid that it has given inadequate attention to its own foundational concepts and principles, such as time, place, causality, and so forth. Deconstructionism has added to the babel of tongues by raising doubts about whether even science itself can be objective.

In the Christian era, St. Augustine, in his *De Doctrina Christiana*,¹⁸ recommended that all readers of the Bible first study

the liberal arts since without them it would be difficult to distinguish the many different thought forms in which the sacred scriptures are written. This art of *hermeneutics* or interpretation has been subject to much recent study. It is all the more necessary for interdisciplinary and transcultural dialogue. Without the basic skills of the liberal arts, the Bible, like other venerable texts, can only be read in a fundamentalist manner that misleadingly projects on its writers the mentality of our own time and place. Biblical literalism oddly resembles modernism, in that the modernist heresy was to make the Bible say what modern culture would find agreeable, instead of trying to read it in the terms of the biblical authors writing for their own contemporaries. The hermeneutic problem has become especially serious in our culture because of the technically enhanced means of communication that subject us to constant propaganda and advertising. Students, of course, must learn to use computers, video, and so on, but at the same they must learn to criticize this chaos of information effectively.¹⁹

The study of mathematics in lower education is essential if the student is to be prepared for higher studies. The ancient and medieval quadrivium provided both elementary knowledge of pure mathematics and some experience in its application to matters of natural science. We expect secondary education also to provide the student with basic mathematical skills for economic competence and other technological applications. Above all, however, secondary education needs to provide practice in acquiring skill in strictly logical thinking, without which the study of natural science and all its derivatives becomes impossible.

What of the debate between traditional methods in teaching mathematics and the so-called “new math” that, after enjoying a brief popularity, seems to be under attack by educators? The aim of “new math” was to teach critical thinking rather than the older, allegedly rote, learning of calculation. To be truly a liberal art, mathematics must be focused on the teaching of critical thinking; yet why need this neglect the training of the memory? The attacks on “rote memory” learning of some modern educators overlook the fact that to reason critically we must have at hand the necessary material about which to reason. Hence the training of

the memory to retain and recall a fund of basic information is the *necessary condition* of critical thinking. Students of the liberal arts, therefore, must acquire such a fund of memorized “facts,” and then evaluate, order, and use these facts in critically reasoned argument.²⁰

Of course, in advocating education in the liberal arts for lower education, one must seriously ask whether this is compatible with preserving cultures that are essentially preliterate. Yet, if we think of Native Americans who have become literate, there seems no reason to doubt that, with proper efforts, many of the contributions of the preliterate cultures can be preserved within a literate culture. Indeed, the hermeneutical skills of truly literate education may be the very ones that can make this preservation of a rich tradition possible.

Granted this kind of lower education devoted to the arts of critical thinking, learning, and communication, students will be ready for a much broader, less compartmentalized higher education. They will not be so likely to fall prey to the temptation of settling for a merely occupationally oriented higher education. For the reason we have seen, the basis of a liberal higher education for *all* students must be the natural sciences. Only then will the present need of all of us to live in a modern, scientifically oriented culture be adequately met. The division between the “Two Cultures” of the sciences and the humanities can be overcome only by rooting the humanities in the objective truth of the “hard” sciences.²¹ This does not mean that the special interest of the humanities in human subjectivity need be lost, so long as students have first been trained in the liberal arts to appreciate the role of imagination, feelings, and personal experience in creative thought. A student skilled in poetics, rhetoric, and dialectic will not easily succumb to scientific reductionism, but will be ready also to acquire the skills of rigorous scientific and philosophical reasoning in broad historical perspective.

If we accept the Aristotelian view of the unity of the human spiritual soul and the body that better fits the biblical conception of the human than does Platonic dualism, then the Greek notion of *mens sana in corpore sano* must also be a concern throughout

education and must also include attention to psychological health. Since all purely human knowledge originates in the senses and is colored by emotions, poor health and neuroses hinder good thinking, while healthy bodily experiences contribute to good intellectual insight. It can be doubted, however, whether the current exaggerated emphasis on competitive sports in American education really serves this purpose for more than a few students.²²

Defenders of American education against critics of its mediocre standards in the liberal arts often claim that this is compensated for by its emphasis on “acquiring social skills.”²³ Yet that it has succeeded in achieving this aim is far from evident. Our society seems increasingly individualistic. It must be admitted, however, that, since one of the principal aims of the liberal arts education is skill in effective communication, training in the liberal arts cannot be divorced from learning to cooperate with others—and in particular to cooperate with others in the search for truth and in the contemplative enjoyment of sharing the truths discovered. Liberal arts education aims not merely at book learning but at the formation of the free human community.

3. Higher General Education

In a society where the political principle of subsidiarity was realized, no citizen’s education would end with a merely primary education. No doubt the majority of citizens would not go on to college or university, but would go to work to support themselves and their families. Yet society would supply them with means to a continuing, lifelong education through publications, libraries, and the media of social communication, and now the Internet, including opportunities for lectures, debate, and dialogue. It would also be a major concern of the community that this information and analysis should not be distorted by demagoguery or commercial appeal to vicious appetites.

Nevertheless, formal higher education will always be necessary for those having leadership roles or special research

and technological skills. It should be obvious that too often modern college and university education channels the student into some form of specialized training before they have adequately completed their general education. This general education should continue the study of the liberal arts using more complex materials in literature and mathematics, along with information on the historical and cultural contexts especially of classic works—such as Plato’s dialogues, the Hindu *Bhagavad Gita*, the Confucian *Analects*—as well as an empathetic acquaintance with nonliterate cultures and the cultures of oppressed minorities. The same applies also to a more advanced study of the fine arts.²⁴

Yet, for the reasons we have seen, if general education is to advance to truly critical thought, it must be serious about the study of natural science as the basis of the other sciences.²⁵ This requires what is undoubtedly the most radical change in present university education and in our culture, namely, a *rethinking of the foundations of natural science*. I have argued in this book that the Aristotelian tradition and its careful analysis of what we know about the categories of the changeable and changing reality needs to be revisited.²⁶ The material world that is epistemologically primary in our knowledge must be known prior to and independent of its Pythagorean mathematization, and freed of the philosophical distortions that its ideoscopic development suffered under the influence of modern idealism in philosophy.²⁷ Only then will this study of nature that is basic to all other higher disciplines reopen the way to the wisdom needed to solve the problem of interdisciplinarity and contextuality. Furthermore, the issue of environmentalism that grows ever more important in our culture demands a sound basis in a correct understanding of humanity’s relation to nature. That is why, in my view, the development of Metascience needs to be at the top of the postmodern agenda.

Once that rethinking of science has taken place, our universities will, as this book has tried to show, no longer be closed to the prescientific cultures of the world. These cultures were and are based on a conviction of the objective truth of a

spiritual realm transcending the material order with which natural science is directly concerned. A rethought natural science will open the way again to this spiritual reality. Moreover, this rethinking of natural science will provide a foundation in objective truth, not only for a Metascience but also for all the other special disciplines.

The prevailing materialistic reductionism of human psychology and the moral relativism of the ethical and social disciplines with its destructive exploitation of the technologies and fine arts, for example, will be overcome by a better understanding of the nature of the human person and of human community. Within natural science itself, the unification of the proliferating special fields will be accomplished by grounding them all in a rethought physics whose foundations have been clarified. As for the many technologies themselves, including economics and truly productive “business schooling” necessary for the occupational education of persons in our society, these will acquire a sound ethical and ecological foundation.

Once the student has developed this kind of understanding of the foundations of natural science, further study of that discipline should emphasize the scientific understanding of the body and psyche of the human person. The details of physics and chemistry need be surveyed in liberal higher education only to the degree necessary for this study of the human person in its ecological context. With this understanding of what it is to be a human person, the way is open to the ethical sciences: individual, familial, and political. In their liberal arts education, students will already be familiar (through literature and history) with “models” of human behavior. Hence they will have at least an imaginative understanding of what is ethically good and bad. But for maturity, students also require a systematic and critical study of individual, family, and political ethics.

Such study is not directed first to observation and explanation, as is the study of natural science. Instead the purpose of studying the ethical sciences is to help students begin to develop a mature prudence, that is, the virtue of careful and realistic decision making about their own responsibilities and actions in the unique situations of life. Though such decisions can be assisted by

general norms, and though the choice of certain means may be excluded as always detrimental (“intrinsically evil”), yet the decisions needed cannot be well made without an analysis of their unique circumstances. Students at this level ought to be developing the great virtue of individual prudence.²⁸

The development of family prudence is helped if the example of parents has been good, for such prudence involves problems of spousal and parental relationships that, to be perfect, require actual experience of married life. This is even truer of political prudence. Getting people to obey the laws without excessive coercion and to cooperate in decision making according to the principle of subsidiarity is an immensely complex task that requires much experience. Yet a theoretical study of individual, family, and political ethics that analyzes the general problems involved in such decision making is a first step in developing these virtues and should form an important element in higher education.

The study of the ethical sciences should comprise the achievements of the modern social sciences, including economics.²⁹ Aristotle would have recognized these empirical social sciences as the same as what he aimed at in his *Politics*. Metascience points out that we have here one of the major confusions arising from the lack of interdisciplinarity. Modern social science tried to become a kind of natural science of general laws and strove to be “value free” like physics is supposed to be. This was a serious mistake, since human social behavior essentially involves free choices and is not simply determined by general laws. Hence human behavior in society cannot be understood except in terms that include human free choice of means to ends, which (for Aquinas and Aristotle) is the proper subject of ethical science.³⁰ Simply to describe social phenomena is history, not science; and, like history, phenomena of human social organization and interaction cannot be explained causally except in the limited way that we have allowed is possible for historical explanations.³¹ Moreover, of what real value are such imperfect explanations *except* as assisting in practical decisions about what is good or bad for society? Therefore, the

social science disciplines need to be incorporated into an ethical study of society and in this way become an essential element of general education. The study of technologies pertains to specialized education, yet it is also essential that general education provide understanding of the ways technology can be used for constructive purposes and how ecologically and morally dangerous technology can be when abused.

What then about the fostering of Metascience in the modern university, since, as I have argued, metaphysics since Descartes also requires a radical revision if it is really to guide and unify the other disciplines without undermining their proper autonomy? In most cultures there has not been a sharp distinction between “philosophy” and “religion.” Thus, to exclude the study of religion (theology) from our universities makes it automatically impossible for them to be multiculturally open. These universities must come to recognize the contextual limits that their own Western, post-Enlightenment thought has imposed on what they teach and the ways they teach it. Metascience—in a broad sense that does not exclude openness to forms of knowledge other than those of western scientism—must be developed in our universities and given the task of enabling them to achieve genuine interdisciplinarity and multiculturalism.

Departments of “religious studies” that scrupulously avoid questions of truth cannot perform this function adequately.³² What we need are not departments in the university that are simply “philosophy” or “religious studies.” We need a major department of “Research in Worldviews” that will inform students about the bases both of their own culture and of the others they will encounter. Then students will be prepared for serious dialogue about what, in these various cultures, can provide common ground for an emerging global culture, for an increasing *unum in pluribus*. Metascience independent of particular faith commitments, as it has been described in this book, has precisely that aim.

Christian universities represent a great international culture that is inevitably a major player in any multicultural dialogue at the sapiential level. Christian culture has played a leading role in the historical development of the university, yet because its

theologians and philosophers in the post-Galilean epoch withdrew from active dialogue with developing natural science, it remains isolated. Christians must now accept the laborious and even painful tasks of rethinking the foundations of natural science and of achieving a Metascience grounded in such a revised natural science. It will then be effective in a mediating, ecumenical role between Secular Humanism (which threatens to reduce all cultures to its own ideological perspective) and the cultures of the world that recognize spiritual reality.

In this task, a Christian university must not only promote dialogue with its monotheist partners—the Jews and the Muslims—but it must also learn to dialogue with the naturalist and spiritualist monism of most other cultures. No doubt it will find in these cultures implicit tendencies to monotheism that will become a common ground for dialogue. Such dialogue is possible, however, only if monotheists are open to the emphasis of monists on a deep spirituality and respect for the natural material world and the human body. It must be admitted, however, that universities with a religious orientation, such as the many Catholic institutions in the United States, are under great cultural and economic pressure for secularization. Most of the Protestant universities have already succumbed.³³

4. Professional Education

In the medieval university, “arts education” included the liberal arts and something of the other disciplines. Students who had completed this general education could then choose one of the “learned professions” of the clergy, the physicians, or the lawyers, to which we can add the teachers, since those getting these degrees were committed to teaching for a period. It was commonly considered that, since such services were necessary for the life of the community, these members of the learned professions should not engage in them merely for profit. They were not to expect pay for their services as such, yet deserved a moderate “stipend” that would permit them a decent human life and opportunity for further study and research. For this reason,

“business” was not regarded as a profession, and even bore a certain stigma because it so often provided temptations to greed and fraud.³⁴

The various technologies or “crafts” also required training, but this training was ordinarily supplied not through schooling but by apprenticeship. Today “vocational training”³⁵ schools have been developed, but a considerable amount of apprenticeship survives. Should not all education be “vocational?” Unhappily, not a small part of the workforce is still untrained as if its members had no creative vocation in life, though advancing technology more and more renders such persons unemployable burdens on the economy.

Medieval Christian society overcame, at least in principle, the Greek notion that manual labor is the work of slaves who are not full members of the human community, that is, citizens of a free society. Christian thinkers, however, were able to explain why, as Marx put it, “All men were born free but everywhere they are in chains,” by the doctrine of the original fall of humanity into sin. Plato had earlier explained this paradox by a myth of the cave, and similarly the Hindus justify their caste system by a myth of human origins. American slaveholders tried to justify their holdings by erroneously claiming that the blacks lay under the biblical “curse of Ham.”³⁶ Yet Christian theology always pointed out that manual labor is not contrary to human dignity. In fact, its productivity helps to overcome the effects of “original sin.” Pope John Paul II, in his 1981 encyclical, *On Work (Laborem Exercens)*, argued that work is an essential aspect of human dignity to which we are *all* called, after the model of Jesus, the truly wise Carpenter.

Thus the power of technology must always be viewed in terms of stewardship of God’s gifts in the service of the essential equality of all human persons in the global human community for the present and the future. Technology, understood as an exercise of human intelligence in the perfecting of the natural environment in the service of ethical life, constitutes a spectrum of skills. This entire spectrum, from the most complex engineering to simple manual labor, requires appropriate training to be humanly

worthy. It is unjust for society not to enable every one of its members to find work suitable to their talents, and to help them improve these talents to their full potential. Their work cannot be reduced to something merely mechanical and mindless. To be worthy of human dignity, work must always involve elements of human thinking and choice. Thus, all members of a society have a right to some form of specialized occupational education as well as the degree of liberal education that enables them to participate in the society as free members. There will be, of course, some individuals who are physically or mentally incapable of this participation, and for them this right simply becomes dignified and humane care.

What then of “business,” which today constitutes the work of a large part of our society, including immensely powerful elites? Is or is not business now a “learned profession”? The argument that it is not is that its aim is the efficient production of the *material* goods needed by the society in which it works, while the learned societies are directed to the direct *personal* good of those it serves. The doctor saves bodily life and health. The lawyer protects the human rights of the client. The teacher educates the student. The clergyman serves the spiritual welfare of the believer. It might seem better, therefore, not to group business with the learned professions.³⁷

Yet the modern conception of business is not simply profit making for the businessman, though it often degenerates into that (as do the learned professions!). The social value of business is that it manages those engaged in the technologies so as to obtain the maximum efficiency in production of the material goods needed by the society, especially if there is to be the leisure required for higher, spiritual activities, including education. Today such an economy requires both an architectonic (as Aristotle would call it) technological competence and a degree of *political* prudence, since the management of an economic corporation is a social function subordinate to the state. Perhaps, therefore, we should add to the threefold division of individual, family, and political prudence a special “economic prudence,” just as Aristotle and Aquinas added a military prudence. Thus, as argued in chapter 11, section C.3, both military and economic prudence

(often called “political economy”) can be considered to be distinct forms of prudence—subordinate, however, to the political prudence that has responsibility for the common good of the whole society.

What must be kept in mind is that, although a truly free and just society needs a level of economic productivity that in the past was impossible and even today is lacking in the Third World, yet human material needs are by no means infinite. The best human living is content with a simple lifestyle in order to leave time and energy for more important spiritual pursuits. Thus, the activity of business and the economy in society must be measured by higher values. Material production and exchange must not dictate to institutions of education and virtue, nor be allowed to corrupt them. Hence business education is a legitimate part of modern higher specialized education, but it must include ethical and political education to set its goals.

This is true also of the traditional learned professions, each of which presents special ethical problems. The clergy have always reflected on their moral responsibilities. Recently, bioethics has developed remarkably. And business, legal, and teaching ethics are beginning to be systematized. All these ethical studies, however, cannot escape the accusation of subjectivism, cultural relativism, and mere propaganda if they are not firmly rooted in a scientific understanding of human nature and its needs. Once again it must be said that this requires a natural science that has been rethought, so as to be open to the reality of human spirituality. This understanding of the human person in terms of its spiritual dignity, freedom, responsibility, ultimate contemplative orientation, and communal life requires that there be a postmodern Metascience, with an understanding of reality as both the material and spiritual creation of the supremely spiritual First Cause, the very science described by Aristotle as “the one we are seeking.”³⁸

5. Continuing Education

While formal education must be terminated at various points so

that citizens can enter into their respective occupations when ready, growth in truth and virtue ought to continue to the end of life. Modern society is beginning to provide more and more institutions of adult education required by advancing technology. For most people, part of the day is spent in reading, watching television, or browsing the Internet. While much of this is done as recreation, as they recreate people are also learning, whether under social guidance or coercive pressures.

The main point to be made about all this is that no one reasonably expects to arrive at wisdom when still young. Aristotle said that metaphysics (Metascience) can be learned only after the age of fifty. Aquinas explains this by saying that, since Metascience reflects on the experiences and knowledge gained through the special sciences, it presupposes a great deal of learning. When the young study metaphysics, therefore, they will normally acquire mainly a stock of empty words and a habit of using them.³⁹ Hence “continuing education” has two goals: to provide further knowledge of special disciplines and to integrate these disciplines by Metascience.

If patient readers of this book are young, they may very well feel cheated to have labored through a long book on metaphysics only to be told that they cannot understand it until they are fifty! But few who *are* fifty do either. By its nature, wisdom is something gradually acquired and never completed, and those who have the opportunities amidst the troubles of life to strive for it consistently are exceptionally blessed. Yet an *introductory* study of Metascience, of metaphysics, is an entirely proper part of higher education, since by that time the student knows something of the liberal arts and the principal disciplines and has begun perforce to face the problem of “getting it all together.” What must be understood, however, is that if this process of critical synthesis is begun but then discontinued, not much has been accomplished.

What of persons whose formal education terminated at the liberal arts level, and who hence never formally studied Metascience? They should have already acquired something of the art of critical thinking, reading, and discussion. Hence the world of what has been traditionally called “philosophy” and even more that of theology and “spirituality” is accessible to them. The

reader of the Bible or the Qur'an or the Vedas is entering into the most profound questions anyone faces.

B. SUMMARY: DIALOGUE IN THE SEARCH FOR WISDOM

I would sum up this summary as follows. We live today in a multicultural world, and we have come to recognize that, for any society, its history and its own lifestyle and limited mentality contextualize the worldview and value system of the culture and of each member of the culture. Each person within her or his culture must seek to understand its foundations and achievements, its own fund of wisdom. Because of the dominance of a Secular Humanist culture based on a certain conception of natural science and the technological power it has provided, all other cultures must recognize its present-day strengths; and of these the major strength, the “strength of strengths,” is the modern university.

Such universities are rooted in a long history from Greek times with a special tradition of articulate and critical thought that made possible modern science. Furthermore, these universities are concerned to enter into multicultural dialogue. They are, however, hampered both by their own worldview, which tends to restrict the possibility of objective truth to a reductionist type of science, and by their failure to recognize as part of that worldview the existence of a spiritual world accessible to us through mystical experience or revelation. Furthermore, they have become fragmented in their accumulation of information that lacks any discipline that can coordinate their data without damage to the autonomy of the special sciences.

I have tried to show, therefore, that, in the Western Ecumene that gave rise to the university, there is a conception of a Metascience—best exemplified by Aristotle and Thomas Aquinas in their so-called “metaphysical thought”—that helps us to provide

an articulated, rational instrument for transcultural dialogue. The deconstructionist argument that all systems of thought circularly breakdown into other disparate systems of thought does not exempt us from thinking. Therefore we cannot escape the responsibility of choosing one of the better points of departure—and some are certainly more promising than others—even if this is to lead us beyond that promising takeoff.

The greatest gap between cultures today is that between Secular Humanism and the other major worldviews supported chiefly by the so-called world religions.⁴⁰ Secular Humanism relies on an interpretation of natural science that denies or ignores a superhuman spiritual realm of reality, or reduces it to a purely subjective psychological and aesthetic construction. Most other major worldviews, on the contrary, hold that the phenomena studied by natural science somehow manifest the dependence of material reality on a greater spiritual reality in which human beings participate and on which their salvation depends. Often today those who hold these worldviews are driven in self-defense to a rigid fundamentalism that does not do justice to these open perspectives on reality.

Those worldviews that include a spiritual realm, whether they claim to know its reality by reason, by mystical experience, by revelation, or in all these ways, today confront a dominant Secular Humanism that threatens them all. This major dichotomy between Secular Humanism and all spiritual worldviews stands in the way of dialogue among all worldviews for several reasons. First, Secular Humanism has achieved its dominance by its economic and political superiority and its control of higher scientific education. Second, the hegemony of Secular Humanism tends to privatize spiritual religion and close off public forums to its adequate expression in the public media. Third, Secular Humanism tends, as does any dominant power, to retain that power by a policy of divide and conquer. Thus it tends to pit one spiritual worldview against another in order to refute them in the interest of its own intellectual empire.

This is where Metascience can seek common ground between Secular Humanism and the spiritual worldviews. The first step is to review the assumptions of post-Galilean science, which,

abandoned by philosophy, caused this gap to develop. These assumptions must be probed to see whether, although historically they may have stimulated the advance of science, they are in principle really necessary for the continued ideoscopic progress of science, or whether some of these assumptions may in fact hinder that progress.

This probing of modern assumptions may result in five possible outcomes. First, of course, some involved in the dialogue may conclude that a materialistic natural science exhausts the powers of human thought to arrive at objective truth. In honest dialogue, the possibility that one side will refute the other, or conclude that it has, always exists. Second, it may turn out that some will conclude that natural science is only one mode of objective truth and is limited to its own field, while other modes of objective truth can be pursued by different routes, so that there need be neither conflict nor harmonization between their findings. Third, it may turn out that others will conclude that, in fact, natural science is by no means intrinsically materialistic nor even agnostic as regards spiritual reality but simply preparatory to a higher mode of objectively true knowledge to which it points the way but which is *wholly* independent of it. This is roughly the view of the Platonic tradition, with which also we may group those world religions of which spiritual monism is an important feature. It is even the worldview of the monotheistic religions, in so far as they recognize that ultimate wisdom rests on supernatural revelation; yet these religions generally reject the notion that revelation and reason can be in contradiction with each other. Fourth, the Aristotelian tradition in its Christianized form (exemplified by Aquinas) may prevail in its contention that natural science, when built on critically sound foundations, remains limited to the study of material things and their processes, yet objectively establishes the validity of other disciplines and eminently of a distinct Metascience. By the comparison of the results of the special sciences, this Metascience gives a sufficient rational account of the existence and nature of spiritual reality to permit a dialogue between natural science and all the sciences with spiritual worldviews, even those that claim access to mystical knowledge or revelation. Finally, of course, a few will conclude

that current natural science may be shown to be fundamentally false. While some spiritual worldviews may find the Secular Humanist version so threatening that they may seek to discredit it altogether, or at least reduce its truth value to nothing more than its pragmatic and technological utility, this outcome seems unlikely to become the dominant view. Of these five prospective outcomes, this book has argued the merits of the fourth possibility.

When we then turn to the spiritual worldviews, we see that the deepest chasm is between what I have elsewhere called the worldviews of Emanation and of Creation.⁴¹ Emanation worldviews understand the phenomenal world as emanating from a supreme spiritual Absolute of which, however, all phenomena in some sense remain formally a part. These basically monistic religions include Hinduism, Buddhism, Taoism, Confucianism in its more speculative version, and, in various degrees, all the preliterate worldviews, as well as the ancient polytheisms. Even Secular Humanism tends to side with Emanationism in that, while it denies spiritual reality, it holds that intelligence has emerged from matter and will return to it. Thus Secular Humanism too opts for monism, and when it considers the possibility of spiritual being it prefers to think of this monistically. Hence the popularity in our secularist culture of New Age and occultist “spiritualities.”

The monotheistic religions, chiefly Judaism, Christianity, and Islam, and various religious systems such as Sikhism that accepted monotheism, or the *bahkti* versions of Hinduism that tend to monotheism, proclaim that God has freely created the world from nothing. This free Creator remains distinct from creation as the necessary Being in contrast to all contingent beings.

What are the possible metascientific grounds of dialogue between these two types of religion? First, it is important that the monotheistic religions acknowledge that, because they defend the distinct reality of the phenomenal world even in its materiality, they have often been tempted to become worldly—acknowledging spiritual reality but, in practice, relegating it to second place in life and thought. It is apparent today that Secular Humanists, disillusioned with their own materialistic worldview, do

not find in the monotheistic religions the access to spiritual reality for which they hunger.

The attraction of Hinduism and Buddhism for many secularists is today very evident. Thus the monotheistic religions must be grateful for dialogue with monistic religions as a means to awaken a deeper spirituality. Even some Christians have discovered John of the Cross and Teresa of Avila only because they first had contact with Eastern mysticism. In Judaism the mystical tradition and in Islam the Sufi tradition (both related to Neoplatonism and perhaps to eastern sources as well) are again stimulating a profounder monotheistic spirituality.

Furthermore, the religious toleration for which Hinduism and some forms of Buddhism are noted demands the respect of the Creation religions if it is understood not as religious indifferentism or relativism but rather as an acknowledgment of the *mystery* of ultimate reality. The religious classics of the East use a paradoxical and metaphorical language that reflects this mystery by indicating it cannot be adequately formulated in any rational system. Hence it is possible to tolerate or even accept a great variety of formulations of mystery with the understanding that no one formulation is to be taken as adequate and with an instinctive rejection of dogmatic claims. Thus monotheists read in the *Rig Veda*, "In the beginning there was neither existence nor non-existence." When they compare this statement with that of Genesis, "In the beginning God created heaven and earth," they are likely to say that, while the latter is straightforward and meaningful, the former is a meaningless oxymoron. Yet one may also read the *Rig Veda* statement as a way of using paradox to indicate awe before the mysterious Source of the phenomenal world, a Source whose necessary "existence" is only analogous to the contingent existence that it gives to creatures and hence is more different from than like their existence.

A great division also exists between the Western Ecumene and other great cultures due to the monotheistic view, which has centered in the West, of the dignity of the human person as a unity of body and soul whose ultimate destiny is resurrected life with God. This view seems to stand in sharp contrast with the Eastern and the Pythagorean-Platonic tradition of the wheel of

reincarnation of an eternal human soul, as also with the Buddhist dissolution of the person in Nirvana. Nevertheless, since in these latter worldviews individual souls and the cycle of reincarnations belong only to the phenomenal world (*maya*) and for the enlightened disappear (or, if they remain, are entirely “empty”), it is not clear in what sense all this can contradict the theistic worldview.

In fact, if understood in a symbolic manner, these monistic teachings may simply be ways of saying that the phenomenal existence of the person is burdened with the *karma* of the past from which it must be freed. This has some resemblance to the Christian doctrine of original sin, according to which human persons come into existence suffering from the evil of the world that has fallen from the integral good intended by its Creator. Hence, in both traditions, it is possible for persons (at least by divine aid, as both Christianity and Mahayana Buddhism teach) to escape this suffering at death.

Perhaps, therefore, those in Emanation religions might come to see their tradition of reincarnation (which is not just Eastern, since Plato held it) as mythological rather than literal, yet containing the profound truths of ethical responsibility and spiritual emancipation. Thus interpreted, reincarnation has its place in the global evolution of human thought as it has moved from mythological to scientific and metascientific expression, yet without rendering earlier modes of thought valueless. Perhaps Secular Humanists will at last recognize that the modern science and technology on which they based their hopes has its roots in the work of Christian thinkers. Then Secularists may begin to see that the achievements of science can best be preserved from irrational postmodern despair by dialogue with religion. Only then can the “war between science and religion” reach an armistice leading to a fruitful peace.

These remarks are intended to illustrate how Metascience can be of service in the inevitable and necessary postmodern dialogue between different worldviews that, to late modern eyes, seemed totally incompatible. How Metascience can especially help is to call attention to the fact that effective dialogue between worldviews cannot remain at the surface but must penetrate to

ontological questions. Dialogue partners must question how, in a given worldview, the various meanings of “Being,” of Reality and Unreality, are understood.

Metascientific analysis must uncover the analogical character of such basic ontological terms and the common sense analogates (“metaphors,” as that term is so often used today) in human experience from which they are derived. Account must be taken of the epistemological sources of the kind of understanding involved: Is it at level of the senses or at the level of intelligence? Is it rational or intuitive, or does it involve both? And if intuitive, what role have special techniques of meditation played? For postmodern culture this metascientific analysis must be kept closely related to natural science, but to a natural science open to the other disciplines and forms of knowledge which in fact depend on it for critical grounding.

Dialogue about ethical and political matters must always recognize their roots in a conception of the human person that is valid both as regards its bodily aspects, studied in natural science, and its spirituality, which is properly the concern of Metascience as well as of psychology (both individual and social) and religion. Finally, this dialogue must be rooted both in a human kindness (the Confucian *jen*) that wants to share the truth for the common good of all, and in an honest search for truth that seeks the Supreme Truth. As myself a Christian in the Roman Catholic Church, I believe that such dialogue is a Christian responsibility. This responsibility can be met only with the humble recognition that whatever truth one possesses is a gift to be shared with others. And this sharing must be wholly respectful of what others know and wish to share with me.

That is why Aquinas, even in establishing the legitimacy of the confessional uses of reason he called “theology,” took such care to point out at the same time the validity of Metascience as independent of particular faith commitments. Without such a recognition, there can be no common framework within which either ecumenism or multicultural dialogue would actually be possible among the diverse human societies. What he envisioned I think the postmodern era must strive to realize.

Appendix 1

Outline of Aristotle's Metaphysics

Part I: WHAT IS FIRST PHILOSOPHY

Book I (Alpha Major): The Need and Nature of a First Philosophy

- 1) Wisdom
 - a) Does Wisdom exist?
 - b) What is Wisdom or First Philosophy?
 - c) What are its properties?
- 2) How many are the kinds of causes? (A dialectic)

Book II (Alpha Minor): Is First Philosophy Worth the Effort?

- 1) For mortals it is very difficult and cannot attain much.
- 2) But this little is worthwhile, the goal of human life.

Book III (Beta): The Problems to Be Solved.

- 1) Problems of method
- 2) Problems about the goal of First Philosophy

Part II: ONTOLOGY

Book IV (Gamma): What Is the Subject of First Philosophy?

- 1) The subject is Being as Being
- 2) Principles of knowing: non-contradiction, etc.

Book V (Delta): Philosophical Dictionary

- 1) Terms that signify cause
- 2) Terms that signify substance or its parts

Book VI (Epsilon): What Science Is First Philosophy?

- 1) It must be a theoretical science and is not history or mathematics, nor, since it also deals with immaterial reality as well as the material, is it natural science.
- 2) It primarily deals with real substance and hence is not logic.

Book VII (Zeta): Opinions about Sensible Substances

Books VIII and IX (Eta and Theta): Truth about Sensible Substances

VIII (Eta): Matter-Form Composition of Sensible Substances

IX (Theta): Act and Potency Composition of Sensible Substances

Book X (Iota): The Properties of Being: The Transcendentals

- 1) Unity
- 2) Comparison to Plurality

Part III: THEOLOGY

Book XI (Kappa): Prerequisites to Investigation of Immaterial Substances

- (1) Problems of First Philosophy (from **Beta**)
- (2) Problems of subject matter of First Philosophy (from **Gamma**).
- (3) Issues about material being determined in *Physics* and **Beta**.

Book XII (Lambda)

- 1) First Philosophy is about Being as substance and its kinds.
- 2) Sensible substances
- 3) Immaterial substances? The Unmoved Mover and other immaterial movers

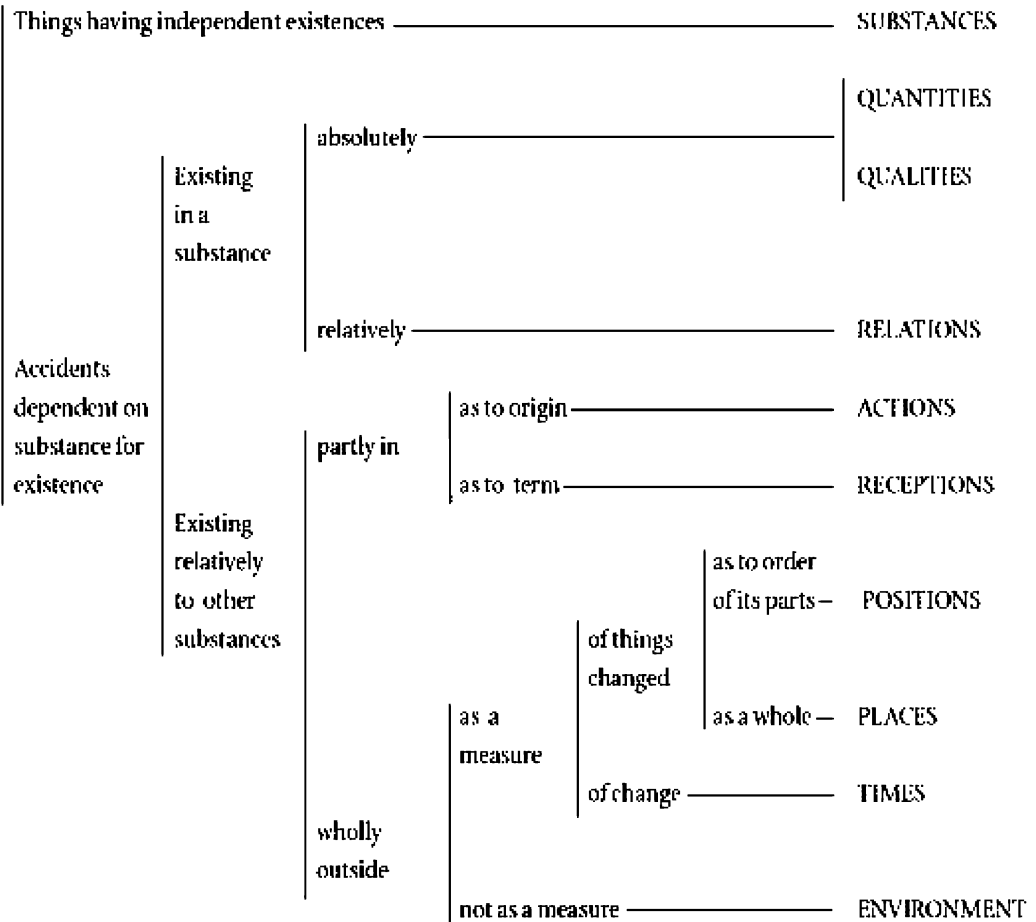
Books XIII and XIV (Mu and Nu): Refutation of Pseudo-Immaterial Substances:

Mathematicals and Ideas as Principles

Appendix 2

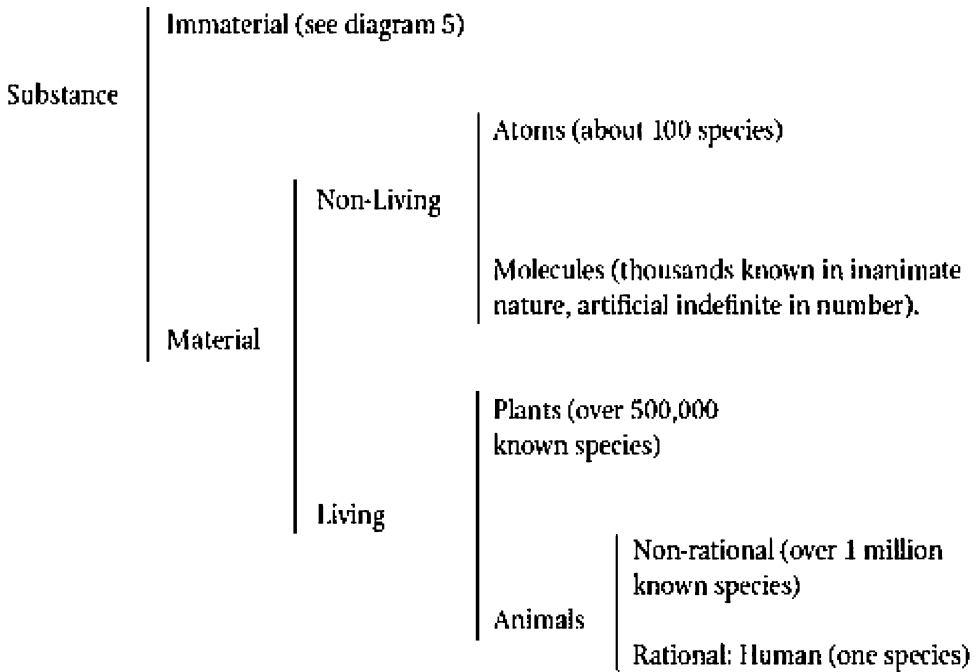
Natural Substances and Their Properties

The Ten Categories of Mind-Independent Being (“Reality”)



Category of Substances

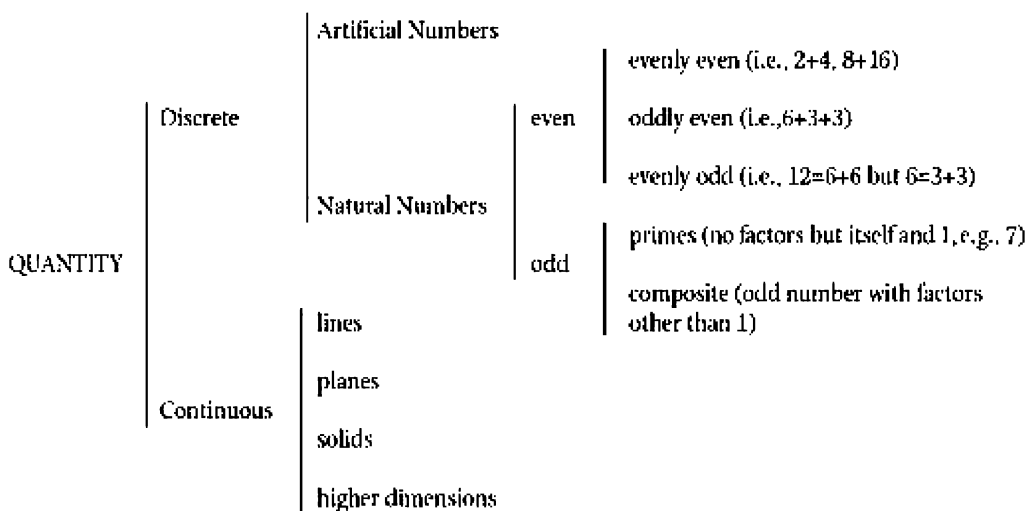
(Defined as contingent things that have independent existence)



Note: Taxonomists guess that there are between 3 and 30 million species of living things, most still not classified.

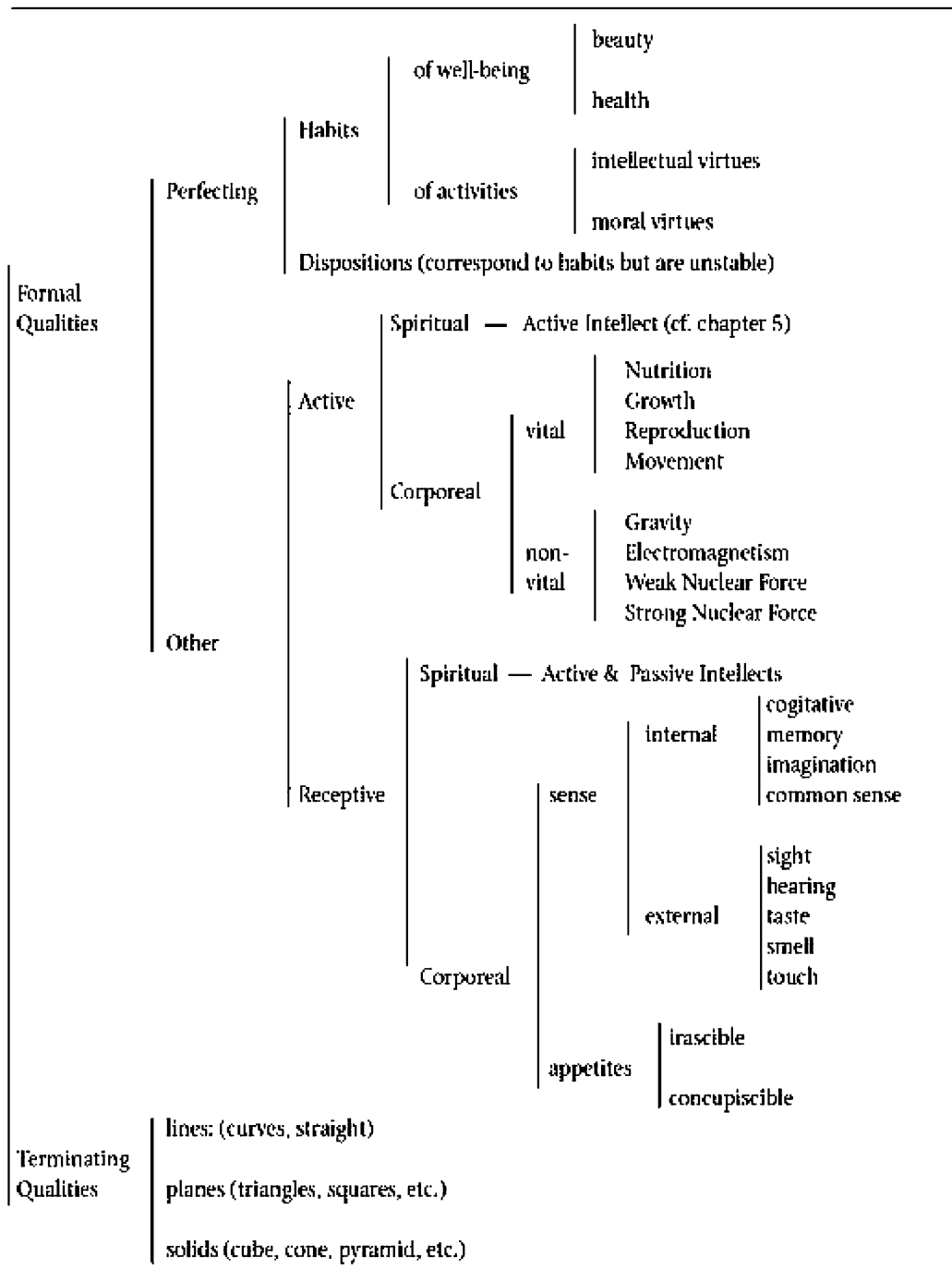
Category of Quantity

(Defined as the property of a material substance by which that substance has parts, each of which, if separated, would be another material substance)

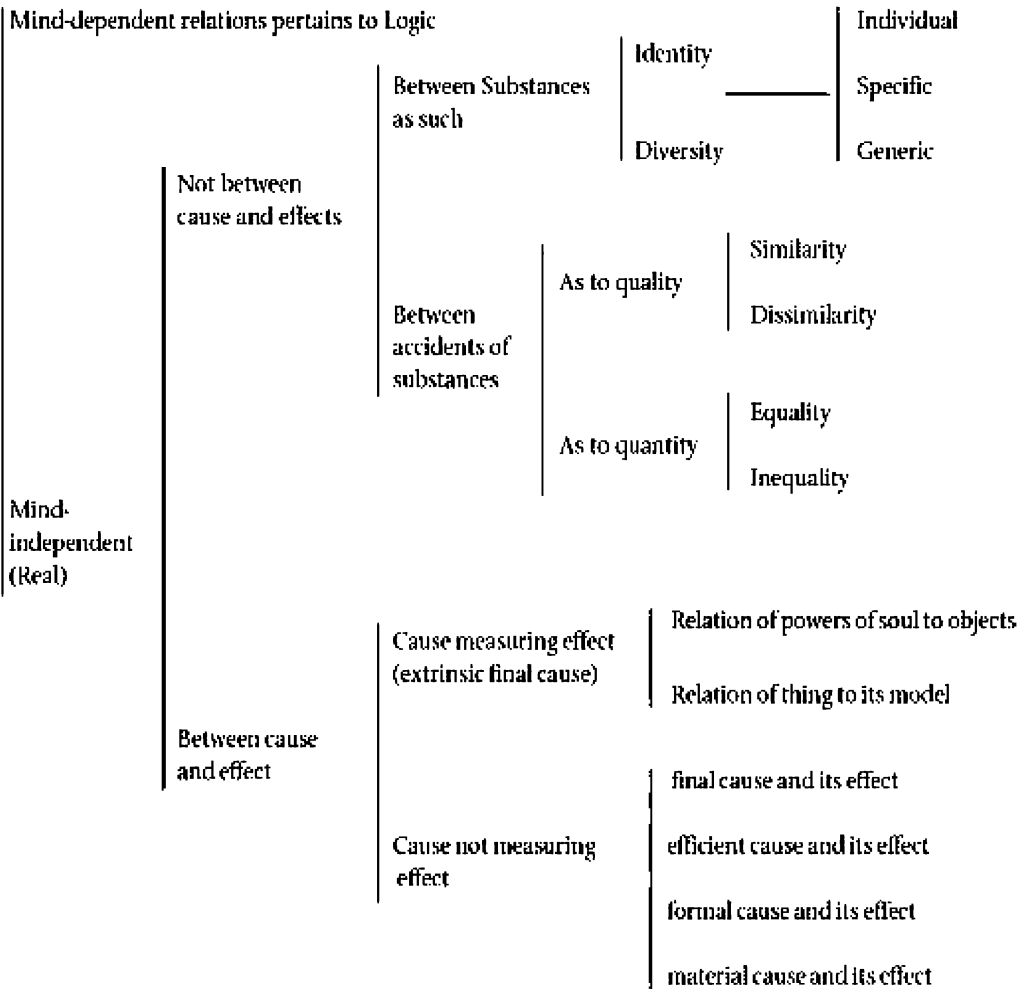


Category of Qualities

(Defined as the property of substances that formally determines it and distinguishes it from other substances)



Category of Relations



Categories of Actions and Receptions

Immanent:
remaining in the substance

Transient:
one substance changes another

Natural

Artificial

Substantial

Accidental

alteration
of qualities

growth in quantity

change of place

Other Four Categories

A classification of positions, places, and environments would be a map showing the juxtaposition and orientation of every body in the universe. Classification of times would be a chronology of events of the past to the present and predicted events of the future. According to Einstein's Special Relativity, there can be no communication between bodies faster than the speed of light. Since bodies are in motion with respect to each other, and any human observer is located on a moving body, this means that our observations of time and place are always relative, but it does not establish, as is often supposed, that there is in reality no absolute present time or place in the universe, since the past and present do not exist and motion presupposes what is not in motion.

Notes

Preface

1. The term “metascience” has been used in a sense quite different from what I will propose by Gerard Radnitzky, *Contemporary Schools of Metascience* (1970), who says that Hakan Törnebaum founded the Department of Metascience at the University of Göteborg, Sweden, in 1963. Radnitzky speaks of the attempts of Logical Positivism and of Phenomenology to consider the assumptions of science but does not include any discussion of immaterial being.

2. See below, chapter 3, section D.1, and the extended discussion in John Deely’s *The Impact on Philosophy of Semiotics* (2003).

Chapter 1 The Problem of the Unification of Knowledge

1. J. Ian H. McDonald, *The Crucible of Christian Morality* (1998), pp. 7–9. He also says of the New Testament writings: “They are addressed to an interpretative community, structured to convey a coherent system of meanings, or to map a coherent picture of the world.”

2. Aristotle, *Politics* I, chap. 2, 1253a.

3. Julie Thompson Klein and William H. Newell, “Advancing Interdisciplinary Studies” (1998), p. 3. This contains ample discussion of the history and different senses of such studies. It also uses the term “Integrative Studies.” See also Julie Thompson Klein, *Interdisciplinarity* (1990).

4. McDonald, *The Crucible of Christian Morality* (1998), p. 12.

5. The term “contextualize” was introduced into theology by Shoki Coe and Aharon Sapsezian, “Ministry and Context” (1972). See also Bruce J. Nicholls, *Contextualization* (1979), p. 21.

6. See Miguel de Beistegui, *Heidegger and the Political Dystopias* (1998), pp. 35–42, who quotes from Heidegger’s *Wegmarken* (1967): “The scientific fields are quite diverse. The ways they treat their objects of inquiry differ fundamentally. Today only the technical organization of universities and faculties consolidates this burgeoning multiplicity of disciplines; the practical establishment of goals by each

discipline provides the only meaningful source of unity. Nonetheless, the rootedness of the sciences in their essential ground has atrophied.”

7. See the essays in G.H. Turnbull, *The Educational Theory of J. G. Fichte* (1926); and Johann G. Fichte, *The Purpose of Higher Education* (1794).

8. F. W. J. von Schelling, *On University Studies* (1966).

9. I paraphrase from the *Iliad* (c. 750 BCE), book III.

10. Plato, *Apology* (c. 399/90 BCE), 38a. For references to Plato in translation, see Edith Hamilton and Huntington Cairns, *The Collected Dialogues of Plato* (1961); but this saying I give in its common paraphrase.

11. DNA studies reported in “Science Times” of the *New York Times*, May 2, 2000, Section D, p. 1.

12. See

<http://www.culture.gouv.fr/culture/arcnat/chauvet/en/index.html> (last accessed May 2005). The paintings in the Lascaux caves are usually dated about 17,000 years ago.

13. See M. L. West, *Early Greek Philosophy and the Orient* (1971), pp. 239, 450–80.

14. William H. McNeill, *The Rise of the West* (1963), pp. 167–70, 316–17, 558–59.

15. *Ibid.*, pp. 217–23.

16. For a sampling of these views, see David Adams Leming, *The World of Myth* (1990).

17. To visualize chronologically the parallel developments of philosophy and religion in the earliest historical epochs, it is very helpful to keep at hand the “Timetable of Figures” arranged by dates of birth and death at the end of John Deely’s *Four Ages of Understanding* (2001a), pp. 1015–19.

18. See Ninian Smart, *World Philosophies* (1999), *passim*. Comparative studies can be found in Hans Küng, et al., *Christianity and World Religions* (1996), and my *Choosing A Worldview and Value System* (2000).

19. For an analysis of Secular Humanism, see my *Theologies of the Body* (1985), pp. 51–100.

20. Colin Renfrew, *Archaeology and Language* (1990), now dates the Indo-European expansion as early as 6000 BCE. Recently this standard theory of Indian origins is being attacked as having “European missionary bias”; see Navaratna S. Rajaram and David Frawley, *Vedic “Aryans” and the Origins of Civilization* (1995).

21. R.C. Zaehner, *The Dawn and Twilight of Zoroastrianism* (1961).

22. For the earlier dating of Zoroaster, see Mary Boyce,

Zoroastrians (1979).

23. For selections from this literature, see Ainslee T. Embree, ed., *The Hindu Tradition* (1972); Ralph T. H. Griffith, trans., *The Hymns of the Rigveda* (1973); and Robert E. Hume, ed. and trans., *The Thirteen Principal Upanishads* (1931).

24. See Helmuth von Glasenapp, *Buddhism* (1966). For a selection of texts see Stephan Beyer, *The Buddhist Experience* (1974), and Peter A. Pardue, *Buddhism* (1971).

25. Cf. John Deely, *Four Ages of Understanding* (2001a), p. 12. As he later summarized: "Philosophy is but a distinctive manner of intellectual exercise, neither Western nor Eastern, still less sectarian in the religious sense" (p. 190, n. 53).

26. The most convenient introduction is Sarvepalli Radhakrishnan and Charles E. Moore, *Source Book in Indian Philosophy* (1957). See also Surendranath Dasgupta, *A History of Indian Philosophy* (1922–55), and Karl H. Potter, ed., *Encyclopedia of Indian Philosophy* (1981). The analysis of themes by Ninian Smart in his article, "Indian Philosophy" (1967), is quite helpful.

27. See Youlan Feng, *A History of Chinese Philosophy* (1952–53), and Benjamin I. Schwartz, *The World of Thought in Ancient China* (1985).

28. Extensive information is given in G. Kuppuram and K. Kumudamani, eds., *History of Science and Technology in India* (1990). On China, see the comparison with Greece made in G. E. R. Lloyd, *Adversaries and Authorities* (1996).

29. For essays on the ethical and cultural hopes and dangers of globalization, see Max L. Stackhouse et al., eds., *God and Globalization* (2000); note especially, in vol. 1, pp. 231–45, David Tracy, "Public Theology, Hope and the Mass Media: Can the Muses Still Inspire?"

30. See Robert K. G. Temple, *The Genius of China* (1986), pp. 6–7, 9–10.

31. For the reasons that modern science, although it had Greek and medieval roots, did not begin rapid advance until the "scientific revolution" of the seventeenth century, see H. Floris Cohen, *The Scientific Revolution* (1994), pp. 241–68.

32. Among the most ardent Christian promoters of the new science were the Puritans; see Robert K. Merton, *Science, Technology and Society in Seventeenth Century England* (1970), and Charles Webster, *The Great Instauration* (1976).

33. See Isaiah Berlin, *The Roots of Romanticism* (1999), and

Duncan Wu, *A Companion to Romanticism* (1998).

34. On Secular Humanism as itself a religious form, in addition to my *Theologies of the Body* (1985), pp. 51–100, see John E. Sullivan, *Ideas of Religion* (1979).

35. Martin Heidegger, *The Question Concerning Technology and Other Essays* (1977); cf. Michael E. Zimmerman, *Heidegger's Confrontation with Modernity* (1990), and my article "Truth and Technology" (1993).

36. On this, see my *Choosing a Worldview and Value System* (2000), chap. 1, pp. 3–24. For discussion of the sociological definitions of religion see Robert D. Baird, *Category Formation and the History of Religions* (1971). Some, however, prefer a dynamic definition, that is, one that recognizes that the ways a religion functions can undergo change; but this recognition can easily be incorporated in a functional definition.

37. See David Maybury-Lewis, *Indigenous Peoples, Ethnic Groups, and the State* (1997); D. Michael Warren, L. Jan Slikkerveer, and David Brokensha eds., *The Cultural Dimension of Development* (1995); and James R. Leed, *Exploring the Gaps* (2000). On p. 183 of this last work, Leed lists five Principles of Cultural and Environmental Protection in International Trade: (1) The Right to Survive, (2) Diversity, (3) Least Distortion, (4) Sustainability, and (5) Ownership.

38. See the essay of Daniel Chandler, "The Sapir-Whorf Hypothesis," <http://www.aber.ac.uk/media/Documents/short/whorf.html> (last accessed May 2005). For Chomsky, see Geoffrey J. Huck and John A. Goldsmith, *Ideology and Linguistic Theory* (1996).

39. Some postmodernists, of course, reject such confidence as utterly naïve. I will justify it in the epistemological discussion of chapter 8. For a deep analysis of how late-modern/postmodern skepticism came about, see John Deely, *Four Ages of Understanding* (2001a); also, from another point of view, Ralph McInerney, *Characters in Search of Their Author* (2001).

40. See Jürgen Habermas, *Theory of Communicative Action* (1984), and *Postmetaphysical Thinking* (1992).

41. See Michel Foucault, *The Archaeology of Knowledge and The Discourse on Language* (1972).

42. Derrida is also a defender of the importance of the place of philosophy in the university curriculum and is seriously concerned for university reform. See Christopher Norris, *Derrida* (1987), p. 236.

43. "Anti-foundationalism" is associated especially with the thought

of Wilfrid Sellars and Willard Van Orman Quine. On this and other developments in American Neo-pragmatism such as that of Richard Rorty, see the essay of Cornell West, “The Politics of American Neo-Pragmatism” (1985). This tendency seems to deny philosophy any positive role, and hence to permit social groups to argue pragmatically for their special interests without fear of refutation by the appeal of their opponents to any principles commonly agreed to. If one were to take this position without qualification, it would seem to nullify any hope of fruitful dialogue. For a protracted discussion of this proposed “liberation of rationality” from first principles, or indeed any fixed mode of operation, see John D. Caputo, *Radical Hermeneutics* (1987).

44. These models were suggested to me by the 2001 lecture of Cardinal Avery Dulles, S.J., *Dialogue, Truth, and Communion*, but are somewhat modified as I here present them.

45. The revised second edition was titled *The Two Cultures: And a Second Look* (1964).

46. John Wilinsky, *Learning to Divide the World* (2000), shows how colonialism has tended to overwhelm the systems of higher education in other than Western cultures.

Chapter 2 The Historical Varieties of “Metaphysics” in Western Culture

1. Since a brief typology such as I have given in this chapter does not do justice to the authors schematized, in the following notes I have tried to provide secondary materials that provide the reader with bibliography and varied interpretations of the authors cited here.

2. See Patricia Curd, *The Legacy of Parmenides* (1998), pp. 94–97, for fragments 7 and 8 of Parmenides, with commentary. Also Giovanni Reale, *A History of Ancient Philosophy* (1987), vol. 1, pp. 86–87. Scholars differ on how to interpret this passage, but these two scholars and others hold that the sphere of Being is quantitative, not immaterial.

3. See G. B. Kerford, *The Sophistic Movement* (1981).

4. See A. A. Long, “Aristotle and the History of Greek Scepticism” (1981).

5. Sextus Empiricus, *Against the Logicians* (c. 225 CE), book I, chap. 16.

6. On the relation of Plotinus to Plato, see Lloyd P. Gerson’s introduction to his edition of *The Cambridge Companion to Plotinus* (1996), pp. 3–8. Gerson thinks that Plotinus’s principal polemic is against the materialism of the Stoics. In Plotinus, emanation has both positive and negative aspects as a fall (*tolma*); see N. Joseph Torchia, *Plotinus, Tolma, and the Descent of Being* (1993), pp. 130–31.

7. For a view that the Muslim commentators were more faithful to Aristotle than is usually recognized, see Arthur Hyman, “Averroes as Commentator on Aristotle’s Theory of Intellect” (1981). See also Edward Booth, O.P., *Aristotelian Aporetic*

Ontology in Islamic and Christian Thinkers (1983), and Barry S. Cogan, “The Problem of Creation in Late Medieval Jewish Philosophy” (1988), for important relations between the metaphysics of these three monotheistic faiths.

8. Aristotle, *Physics* I, chap. 2, 185a13–20; Aquinas, *Sententia super Physican* I, lect. 1, nn. 44–45.

9. See my *Theologies of the Body* (1985), pp. 251–412.

10. See Aquinas, *Summa theologiae* I, q. 1, a. 2. The circularity of such mental processes will be further discussed in chapter 8 where it will be shown that this is not a *vicious* circularity.

11. This point will be further discussed in chapter 7.

12. See Aristotle, *Nicomachean Ethics* VI, and *Metaphysics* VI, chap. 1, 1025b2–1026a32.

13. For example, Aristotle, *Metaphysics* IV, chap. 3, 1005b7.

14. Cf. John Deely, *Four Ages of Understanding* (2001a), pp. 82–84.

15. Aristotle, *Metaphysics* I, chap. 1, 981a31–981b; Aquinas, *Summa theologiae* I, q. 1, a. 6; q. 112, a. 4, ad 1.

16. See Abraham P. Bos, *Cosmic and Meta-cosmic Theology in Aristotle's Lost Dialogues* (1989). I have used the Italian original.

17. On these matters see, Gérard Verbeke, “Aristotle’s *Metaphysics* Viewed by the Ancient Greek Commentators” (1981).

18. The standard translation of Plotinus by Stephen McKenna (1992) does use the term “metaphysics” in book I, tr. 3–5, but in fact the term does not appear in the Greek text itself, only the terms *philosophia*, *physica*, *mathematica*, and *dialectica*.

19. The most recent thorough analysis of Ockham’s thought is that of Armand Maurer, *The Philosophy of William of Ockham in the Light of Its Principles* (1999). Maurer shows that Ockham’s nominalism was a result of his theology, with its emphasis on the freedom of the Creator.

20. In L. M. de Rijk, ed., *Nicholas of Autrecourt* (1994), p. 73. See also Julius Weinberg, *Nicholas of Autrecourt* (1964), pp. 96–99.

21. For Luther’s views on Aquinas and on the bad influence of the pagan Aristotle on theology, see Denis Janz, *Luther on Thomas Aquinas* (1989), pp. 17–24; see also Robert H. Fischer, *Luther* (1966). Calvin’s *Institutes*, although patristically learned and systematically arranged, makes little use of philosophy: cf. Charles Parker, *Calvin and Classical Philosophy* (1977), and William J. Bouwsma, *John Calvin: A Sixteenth-Century Portrait* (1988), chap. 1 of which gives a good account of Calvin’s education. It is fair to say that both great Reformers had the thinnest acquaintance with the Aristotelian-Thomist tradition.

22. Daniel Garber, *Descartes’ Metaphysical Physics* (1992); Nicholas Jolley, *The Light of the Soul* (1990); and John Cottingham, ed.,

The Cambridge Companion to Descartes (1992).

23. See above, p. 31.

24. Descartes avoided, however, the notion of “empty space” by filling it with tight *vortices* of atoms; how inalterable atoms packed tight could move he never undertook to explain.

25. See Richard P. McKeon, *The Philosophy of Spinoza* (1928), esp. on his view of God, pp. 161–96; Herman De Dijn, *Spinoza: The Way to Wisdom* (1996); and Marjorie Grene, ed., *Spinoza: A Collection of Critical Essays* (1973).

26. See Benson Mates, *The Philosophy of Leibnitz* (1986), and R. S. Woolhouse, ed., *Gottfried Wilhelm Leibnitz* (1993).

27. The importance of this point will become clear in chapter 3: see p. 77, text at note 29.

28. See John V. Burns, *Dynamism in the Cosmology of Christian Wolff* (1966), and John E. Gurr, *The Principle of Sufficient Reason in Some Scholastic Systems, 1750–1900* (1959); see also Lewis White Beck, *Early German Philosophy* (1969), pp. 256–75, and Richard J. Blackwell, “The Structure of Wolffian Philosophy” (1961).

29. Pope John Paul II, *Fides et Ratio* (1978), no. 47: “It should also be borne in mind that the role of philosophy itself has changed in modern culture. From universal wisdom and learning, it has been gradually reduced to one of the many fields of human knowing; indeed in some ways it has been consigned to a wholly marginal role. Other forms of rationality have acquired an ever higher profile, making philosophical learning appear all the more peripheral. These forms of rationality are directed not towards the contemplation of truth and the search for the ultimate goal and meaning of life. Instead, as ‘instrumental reason’, they are directed— actually or potentially—towards the promotion of utilitarian ends, towards enjoyment or power.”

30. This term, “induction,” ever after (e.g., in Mill), came to be thoroughly misused in modern thought in a simple-minded opposition to “deduction.” Charles Sanders Peirce, around 1866, was the first modern to see that, in fact, what the moderns call “deduction” confuses two distinct movements or types of thought: the drawing out of consequences of an idea once had (deduction properly speaking) and the testing of consequences against further experience (commonly called “hypothetico-deductive method”), which is not deduction at all but a further operation entirely. Thus there is the process of getting an idea from experience in the first place, drawing a “universal” from “particulars,” which Bacon called “induction,” but which Peirce suggested we call instead “*abduction*.” Second, there is the “symbolic growth”

whereby an idea, once possessed, begins to reveal its consequences, whether spontaneously (sometimes) or under critical analysis, which Peirce considered to be the proper use of the term “deduction.” Finally, there is the testing of a developed idea against further experience, which Peirce called “retroduction” or sometimes (risking confusion) “induction.” Semiotic scholars took this Peircean insight one step further, by showing the historical roots for Peirce’s considerations in the later Latin scholastic distinction between *ascending* induction (Bacon’s induction, Peirce’s abduction) and *descending* induction (Peirce’s retroduction), verified in the work of Poinset; see John Deely, *Introducing Semiotics* (1982), pp. 71–74. Finally, this triple movement of thought whereby an idea once had is developed, tested, then further modified has led to the idea of a “semiotic spiral” as the model for understanding the structured flux of human experience as a whole; see John Deely, *The Impact on Philosophy of Semiotics* (2003), part 3, esp. p. 164.

31. See Stephen Gaukroger, *Francis Bacon and the Transformation of Early Modern Philosophy* (2001), and Brian Bickers, ed., *Francis Bacon* (1996). See also Aloysius P. Martinich, *Thomas Hobbes* (1997); C. Leijenhorst, *The Mechanisation of Aristotelianism* (2002); and G. A. J. Rogers and Alan Ryan, eds., *Perspectives on Thomas Hobbes* (1991).

32. See the brief summary of the contrast in the “Maxim for Semiotics” proposed by John Deely (1987a).

33. On the importance of this underlying agreement for understanding the contrast between modernity and postmodernity in philosophy, see John Deely, *Four Ages of Understanding* (2001a), esp. chaps. 12 and 15.

34. For a general survey, see Stuart Brown, ed., “British Philosophy and the Age of Enlightenment” (1996). On Locke, see John W. Yolton, *Locke: An Introduction* (1985), especially his discussions of epistemology, pp. 166–205, and “Thinking Matter,” pp. 148–66, as covered in Locke’s *An Essay Concerning Human Understanding* (1690), book II, chaps. 10 and 27, and book IV, chap. 4. For other current interpretations of Locke’s empiricism see Vere Chappell, “Locke’s Theory of Ideas” (1994), and Roger Woolhouse, “Locke’s Theory of Knowledge” (1994). See also Michael R. Ayers, “The Foundations of Knowledge and the Logic of Substance: The Structure of Locke’s General Philosophy” (1999). Ayers does not entirely agree with Yolton’s interpretation of Locke’s doctrine of ideas. On the implications of Locke’s concluding proposal, however, that the modern mainstream notion of ideas as representations needs to be reconsidered in the context of a doctrine of signs or semiotic, see John Deely, *Four Ages of*

Understanding (2001a), particularly chap. 14.

35. On Newton's theological and metaphysical views, see John Henry, " 'Pray Do Not Ascribe That Notion to Me': God and Newton's Gravity" (1994); E. McGuire, *Certain Philosophical Questions* (1983); Edwin A. Burttt, *The Metaphysical Foundations of Modern Science* (1924); H. S. Thayer, ed., *Newton's Philosophy of Nature* (1953); and Margaret J. Osler and Paul Lawrence Farber eds., *Religion, Science, and Worldview* (1985).

36. See Herbert McLachlan, *The Religious Opinions of Milton, Locke, and Newton* (1972). McLachlan is a proponent of unitarianism, but his study is well documented. These thinkers pushed the Protestant principal of freedom of individual conscience to its limits, and while retaining a belief in the Creator, the immortality of the soul, prophecy, and Biblical inspiration, rejected Church authority, the Trinity, and the Incarnation. Jesus was "savior" in the sense of a model of virtue sent by God. Rejection of the Catholic doctrine of Eucharistic transubstantiation played a significant role in Locke's rejection of the scholastic views on substance. Thus these worldviews had a theological as well as a philosophical perspective.

37. Jonathan F. Bennett, *Locke, Berkeley, Hume* (1971); A.A. Luce, *The Dialectic of Immaterial* (1963); and C. B. Martin and D. M. Armstrong, eds., *Locke and Berkeley* (1968).

38. See n. 35 above; also p. 89ff. below.

39. See David Fate Norton, ed., *The Cambridge Companion to Hume* (1993); Farhang Zabeeh, *Hume, Precursor of Modern Empiricism* (1960); A. J. Ayer, *Hume* (1980); Tom L. Beauchamp and Alexander Roseberg, *Hume and the Problem of Causation* (1981); David Fate Norton, *David Hume, Common-sense Moralists, Sceptical Metaphysician* (1982); Lewis White Beck, *Essays on Kant and Hume* (1978); Ezra Talmor, *Descartes and Hume* (1980); Terence Penelhum, *David Hume* (1992); William Christopher, *A Cultivated Reason* (1999); and Julius Weinberg, *Ockham, Descartes, and Hume* (1977). Hume's assumption that the empirical basis for the relation of cause and effect is their temporal succession is not admitted by Aristotelians, for whom a proper cause and its effect must be *simultaneous*. For example, a billiard ball *begins* to move at the moment it is struck. The treatment of Hume on the subject of causality in John C. Cahalan, *Causal Realism* (1985), bears a careful reading.

40. See Thomas Reid, *An Inquiry Into the Human Mind* (1764); M. A. Stewart, "The Scottish Enlightenment" (1996); and Nicholas Wolterstorff,

Thomas Reid and the Story of Epistemology (2001).

41. In particular, see Robert Henle, "Thomas Reid's Theory of Signs" (1983b), and John Deely, *Four Ages of Understanding* (2001a), pp. 547–48.

42. See, on this point, the index entry "solipsism" in John Deely's *Four Ages of Understanding* (2001a), p. 996; see also p. 55, n. 22: "Bertrand Russell spoke in principle for the whole of modernity including Kant when, describing his own philosophical development, he confessed that he had never succeeded in moving beyond solipsism ... the position that the self can know nothing but its own modifications."

43. Signe Toksvig, *Emmanuel Swedenborg* (1948).

44. According to Otfried Höffe, *Immanuel Kant* (1994), pp. 201–8, and to the extensive study of Stephen R. Palmquist, *Kant's Critical Religion* (2002), Kant's aim was not to reject Christianity but to give it a critical foundation according to which no religion can be true except insofar as it conforms to the disinterested type of morality that Kant supported.

45. Paul Guyer, ed., *The Cambridge Companion to Kant* (1992); Lewis White Beck, *Essays on Kant and Hume* (1978); Piotr Hoffman, *The Anatomy of Idealism* (1982); H. J. De Vleeschauwer, *The Development of Kantian Thought* (1962); Albert W. J. Harper, *Discussion and Commentary on Kant's Critique* (1996); and Henry E. Allison, *Idealism and Freedom* (1996).

46. "Two things fill the mind with ever new and increasing admiration and awe, the oftener and the more steadily we reflect on them: the starry heavens above and the moral law within. I have not to search for them and conjecture them as though they were veiled in darkness or were in the transcendent region beyond my horizon; I see them before me and connect them directly with the consciousness of my existence. The former begins from the place I occupy in the external world of sense, and enlarges my connection therein to an unbounded extent with worlds upon worlds and systems of systems, and moreover into limitless times of their periodic motion, its beginning and continuance. The second begins from my invisible self, my personality, and exhibits me in a world which has true infinity, but which is traceable only by the understanding, and with which I discern that I am not in a merely contingent but in a universal and necessary connection, as I am also thereby with all those visible worlds. The former view of a countless multitude of worlds annihilates as it were my importance as an animal creature, which after it has been for a short time provided with vital power, one knows not how, must again give back the matter of which it was formed to the planet it

inhabits (a mere speck in the universe). The second, on the contrary, infinitely elevates my worth as an intelligence by my personality, in which the moral law reveals to me a life independent of animality and even of the whole sensible world, at least so far as may be inferred from the destination assigned to my existence by this law, a destination not restricted to conditions and limits of this life, but reaching into the infinite” (Kant, *The Critique of Practical Reason* [1788], Conclusion). T. K. Abbott’s translation is available at <http://eserver.org.philosophy/kant/critique-of-practicalreaso.txt> (last accessed May 2005).

47. While Kant viewed human nature pessimistically as caught in a struggle between emotion and reason, Rousseau emphasized the goodness of human feeling uncorrupted by civilization. Yet, since Kant’s moral theory was very abstract, he tended to look to Rousseau’s notion of a “moral sense” to give moral theory a more concrete character.

48. See John D. Mullen, *Kierkegaard’s Philosophy* (1995), and A. Hannay and G. D. Marino, eds., *The Cambridge Companion to Kierkegaard* (1998).

49. See Patrick Gardner, *Schopenhauer* (1963), and Christopher Janaway, *Self and World in Schopenhauer’s Philosophy* (1989).

50. See Ronald Hayman, *Nietzsche* (1999).

51. See R. D. Rollinger, *Husserl’s Position in the School of Brentano* (1999); Joseph J. Kockelmans, *Edmund Husserl’s Phenomenology* (1994); and Robert Sokolowski, ed., *Edmund Husserl and the Phenomenological Tradition* (1988).

52. See Christina Howell, ed., *The Cambridge Companion to Sartre* (1992).

53. Kevin Hart, in his *The Trespass of the Sign* (1989), p. 94: “For if there is any theological program to be deduced from Heidegger and grafted on to any current theology, it comes down to a form of quietism. Heidegger offers the possibility of a divine God being revealed to us, though one that is far removed from the God of biblical revelation, and about whom we cannot say anything at all.”

54. James G. Kennedy, *Herbert Spencer* (1978).

55. See R. D. Hollinger and David DePew, eds., *Pragmatism* (1995), and Cornel West, *The American Evasion of Philosophy* (1989). On Peirce, see Guy Debrock and Menno Hulswit, eds., *Living Doubt* (1994), and esp. “Pragmaticism Is Not Pragmatism,” in chap. 15 of John Deely, *Four Ages of Understanding* (2001a). Further in note 58 below.

56. See Mauricio Beuchot and John Deely, “Common Sources for

the Semiotic of Charles Peirce and John Poinsett" (1995). See also John P. Doyle, "The Conimbricenses on the Relations Involved in Signs" (1984), and Doyle's bilingual critical ed. *The Conimbricenses* (2001).

57. See Paul Kurtz, ed., *Humanist Manifestos I and II* (1973). Dewey's *A Common Faith* (1929) states his Secular Humanist faith.

58. Charles Saunders Peirce, "What Pragmatism Is" (1905). See the extended analysis by John Deely, "Pragmaticism Is Not Pragmatism," in chap. 15 of his *Four Ages of Understanding* (2001a); also in *The Red Book*, maintained on the University of Helsinki website by The Metaphysical Club.

59. See the index entries for "pragmaticism" and for "realism" in John Deely, *Four Ages of Understanding* (2001a), pp. 969 and 975, respectively.

60. See P. A. Schilpp, ed., *The Philosophy of Rudolf Carnap* (1963), and Michael Friedman, *Reconsidering Logical Positivism* (1999). For an answer to the attacks on metaphysics by Logical Positivism and related theories, see Max Horkheimer, "The Latest Attack on Metaphysics" (1972).

61. See John V. Canfield, ed., *Philosophy of Meaning, Knowledge and Value in the Twentieth Century* (1997), for a good survey. See also Nicholas Griffin, ed., *The Cambridge Companion to Bertrand Russell* (2003); Ann Banfield, *The Phantom Table* (2000); Andrew D. Irvine, ed., *Bertrand Russell* (1999); Victor Lowe, *Understanding Whitehead* (1962); and George P. Lucas, *The Rehabilitation of Whitehead* (1989).

62. Leszek Kolakowski, *Bergson* (2001), and John Mullarkey, *Bergson and Philosophy* (2000).

63. Ernest Nagel and James R. Newman, *Gödel's Proof* (1958); Harry J. Gensler, *Gödel's Theorem Simplified* (1984); and Egan Boerger, Erich Gradel, and Yuri Gurevich, *The Classical Decision Problem* (1997).

64. Lewis E. Hahn, ed., *The Philosophy of P. F. Strawson* (1998).

65. See the analysis of Mark Lilla, "The Politics of Jacques Derrida" (1998); for a detailed and generally positive analysis of Derrida's work in relation to Kant, Nietzsche, and Heidegger, see Kevin Hart, *The Trespass of the Sign* (1989).

66. See Thomas O'Meara, O.P., *Romantic Idealism and Roman Catholicism* (1982), for one account of this conflict. For a more general picture, see Gerald McCool, *Catholic Theology in the Nineteenth Century* (1977), and *From Unity to Pluralism* (1989); also his excellent shorter treatment, *The Neo-Thomists* (1994). Note that McCool practically ignores the Aristotelian trend that I favor in Thomism in the

United States, and he shows no awareness whatever of semiotic developments so central to postmodernity in philosophy.

67. Pope Leo XIII, *Aeterni Patris* (1879), sections 30 and 31.

68. On the crucial role played by Francisco Suarez, S.J, and particularly by his 1597 *Disputationes Metaphysicae*, in the modern break with Latin thought in the seventeenth century, consult John Deely, *Four Ages of Understanding* (2001a), chap. 11, esp. pp. 500–501.

69. Pope John Paul II, *Fides et Ratio* (1998), n. 49.

70. *Ibid.*, chap. 3, n. 34.

71. Ian G. Barbour, *Religion and Science* (1997), pp. 77–105; see also William A. Wallace, O.P., “Science and Religion in the Thomistic Tradition” (2001).

72. See Romanus Cessario, O.P., *A Short History of Thomism* (2005).

73. Cf. John Deely’s discussion of this general problem in his *Four Ages of Understanding* (2001a), p. 342, n. 200.

74. A fuller account is given in Gerald McCool, *From Unity to Pluralism* (1989).

75. The metaphysics of Garrigou-Lagrange is well represented by his *Reality: A Synthesis of Thomistic Thought* (1950), now available at <http://www.ewtn.com/library/Theology/Reality.htm> (last accessed May 2005). The first serious study of his thought has just been published by Richard Peddicord, O.P., *The Sacred Monster of Thomism* (2004).

76. These theses can be found with history and commentary in Pedro Lumbreras, O.P., *The Twenty-four Fundamental Theses of Official Catholic Philosophy* (1944).

77. Fabro, *La nozione metafisica di partecipazione secondo S. Tommaso d’Aquino* (1963), and *Participation et causalité selon S. Thomas d’Aquin* (1961). Fabro attempts a synthesis between Plato and Aristotle. Others, such as W. Norris Clarke, S.J., in *The Philosophical Approach to God* (1979), also emphasize the Platonic element in Aquinas’s metaphysics.

78. A. Little, *The Platonic Heritage of Thomism* (1949).

79. L. P. Geiger, O.P., *La Participation dans la philosophie de St. Thomas d’Aquin* (1953).

80. See Anthony M. Matteo, *Quest for the Absolute* (1992), and Ronald McCamy, *Out of A Kantian Chrysalis* (1998).

81. For the controversies aroused by these developments, in which Reginald Garrigou-Lagrange, O.P., was a leading opponent, see the study of Richard A. Peddicord, O.P., *The Sacred Monster of Thomism*

(2005).

82. Joseph Maréchal, *Le point de départ de la métaphysique* (1944–49). Essential passages are available in Joseph Donceel, ed., *A Maréchal Reader* (1970).

83. David Tracy, *The Achievement of Bernard Lonergan* (1970).

84. See my “Thomism and the Transition from the Classical World-View to Historical-Mindedness” (1992).

85. See Stephen M. Fields, *Being as Symbol* (2000), and Anton Losinger, *The Anthropological Turn* (2000).

86. W. Norris Clarke, *The One and the Many: A Contemporary Thomistic Metaphysics* (2001), pp. 14–18. Clarke gives no physical proof of the existence of an immaterial First Cause. The metaphysical approach he exemplifies will be discussed in chapters 5 and 8.

87. For example, Robert J. Henle, S.J., “Transcendental Thomism: A Critical Assessment” (1983c).

88. On this question see Mark F. Johnson, “Did St. Thomas Attribute a Doctrine of Creation to Aristotle?” (1989), who, with great textual detail, answers this question affirmatively. See also his “Aquinas’ Changing Evaluation of Plato on Creation” (1992).

89. Maritain himself, who began standing together with Gilson on the issue of “Christian philosophy,” at the end separated himself. See the extended discussion in John Deely, *Four Ages of Understanding* (2001a), pp. 257ff., especially (on Maritain’s final view) p. 260, n. 24. See also Joseph W. Evans, ed., *Jacques Maritain* (1963), and Ralph McInerny, *Art and Prudence* (1988). No good recent study of the completed work of Étienne Gilson seems to be available, but see A. C. Pegis, *A Gilson Reader* (1957).

90. Aquinas, *Sententia super Metaphysican* VI, lect. 1, n. 1170; cf. also III, lect. 4, n. 398, and XI, lect. 7, n. 2267.

91. The best exposition in English of Wojtyła’s philosophy is Rocco Buttiglione, *Karel Wojtyła* (1997).

92. See Luke Gormally, ed., *Moral Truth and Moral Tradition* (1994).

93. See Eleonore Stump’s brilliant study, *Aquinas* (2003).

94. See John Deely, “Semiotic in the Thought of Jacques Maritain” (1986).

95. See John Poinset, O.P., *Tractatus de Signis* (1632).

96. Thomas A. Sebeok, *Global Semiotics* (2001), p. xvii.

97. See “The First Latin Initiative in Philosophy: Sign in General,” in John Deely, *Four Ages of Understanding* (2001a), pp. 214–18. But see also Giovanni Manetti, *Theories of the Sign in Classical Antiquity* (1993);

"The Concept of the Sign from Ancient to Modern Semiotics" (1996). And see Robert Austin Markus, "St. Augustine on Signs" (1972).

98. See John Deely, *Four Ages of Understanding* (2001a), chap. 15. See further Richard J. Bernstein, ed., *Perspective on Peirce* (1986); Jacqueline Brunning and Paul Foster, eds., *The Rule of Reason* (1996); and James J. Liszka, *A General Introduction to the Semeiotic of Charles Sanders Peirce* (1996).

99. See "The Problem of Being as First Known" in John Deely, *Four Ages of Understanding* (2001a), pp. 341–54, esp. the diagram on p. 354.

100. See esp. Vincent Guagliardo, "Being and Anthroposemiotics" (1993), and "Being-as-First-Known in Poinot: A-Priori or Aporia?" (1994).

101. See "The Definition of Umwelt," appendix to John Deely, *What Distinguishes Human Understanding* (2002a).

102. Among those influenced by the River Forest group were Vincent Edward Smith, "The Prime Mover: Physical and Metaphysical Considerations" (1954); Antonio Moreno, O.P., "The Nature of Metaphysics," (1966); and James Weisheipl, O.P., "The Relationship of Medieval Natural Philosophy to Modern Science: The Contribution of Thomas Aquinas to Its Understanding" (1976). See also next note.

103. Others taking an Aristotelian position on the approach to metaphysics are L. B. Geiger, O.P., "Abstraction et séparation d'après S. Thomas' *In de Trinitate*, q. 5, a. 3" (1947); Herman Reith, C.S.C, *The Metaphysics of St. Thomas Aquinas* (1958), pp. 20–22; Leo. J. Elders, S.V.D., *The Metaphysics of Being of St. Thomas Aquinas in its Historical Perspective* (1993), pp. 1-32; and Mark Jordan, *Ordering Wisdom* (1986), pp. 158–60. Charles DeKoninck and his students at Laval University emphasized the dialectical character of modern science, but in conversations with me also accepted this position, as has Ralph McInerny of the University of Notre Dame. See also next note.

104. See James A. Weisheipl, O.P., ed. *The Dignity of Science* (1961), pp. xvii–xxxiii; and my articles "The River Forest School of Natural Philosophy" (1991), "Thomism and the Transition from the Classical World-View to Historical-Mindedness" (1992), "The Loss of Theological Unity: Pluralism, Thomism, and Catholic Morality" (1995a), and "The End of Philosophy and the End of Physics: A Dead End" (1997).

105. Thomas F. O'Meara, O.P., *Thomas Aquinas* (1997).

106. See Michael E. Zimmerman, *Heidegger's Confrontation with Modernity* (1990); Hugo Ott, *Martin Heidegger: A Political Life* (1993);

Rudiger Safranski, *Martin Heidegger: Between Good and Evil* (1998); *Richard Polt*, *Heidegger: An Introduction*; and *Hans Sluga*, *Heidegger's Crisis: Philosophy and Politics in Nazi Germany* (1999).

107. Martin Heidegger, *What Is Metaphysics?* is available at http://www.msu.org/e&r/content_e&r/texts/heidegger/heidegger_wm2.html (last accessed May 2005).

108. Cf. the assessment of John Deely in *Four Ages of Understanding* (2001a), pp. 509, 521, and esp. 667.

109. John D. Caputo, *Radical Hermeneutics* (1987). A helpful comparative study is Richard E. Palmer, *Hermeneutics* (1969).

110. A selection of his work is available in John Sallis, ed., *Deconstruction and Philosophy* (1987). For an introduction to this philosophical movement see John D. Caputo, *Deconstruction in a Nutshell* (1997).

111. See Barry Smart, *Michel Foucault: Critical Assessments* (1994); Hubert L. Dreyfus and Paul Robinow, *Michel Foucault: Beyond Structuralism and Hermeneutics* (1983); and James Miller, *The Passion of Michel Foucault* (2000).

112. See Ray Monk "What Is Analytic Philosophy" (1996), and *Ludwig Wittgenstein: The Duty of Genius* (1991); Russell Nieli, *Wittgenstein: From Mysticism to Ordinary Language and the Thought of Ludwig Wittgenstein* (1987); John Heaton and Judy Groves, *Introducing Wittgenstein* (1999); and John W. Cook, *Wittgenstein, Empiricism, and Language* (2000).

113. For this interpretation of Wittgenstein's achievement see Fergus Kerr, O.P., *Theology After Wittgenstein* (1986).

114. See Lewis E. Hahn, ed., *The Philosophy of P. F. Strawson* (1998).

115. On these authors see Lewis E. Hahn, ed., *The Philosophy of Hans-Georg Gadamer* (1997) and *The Philosophy of Paul Ricoeur* (1995); see also Charles E. Reagan, *Paul Ricoeur* (1996).

116. Pope John Paul II, *Fides et Ratio* (1998), section 55.

117. *Ibid.*, n. 91.

Chapter 3 Natural Science is Epistemologically First

1. In present English, the term "science" without a qualifier is generally used to designate "natural science" in its modern state, especially physics. In the Aristotelian tradition, *episteme*, Latin *scientia*, stood for any of several autonomous kinds or

disciplines of knowledge. I cannot avoid, however, using the term “science” and its derivatives, as in the phrase “scientific questions,” to refer to any and all of the critical disciplines. This, however, brings out that disciplines other than natural science model their structure after it and hence ask the same four fundamental types of questions (see below regarding these questions).

2. The order of books IV, V, and VI of the *Metaphysics* (see appendix 1) is puzzling and is perhaps the work of an editor other than Aristotle. It is in VI that Aristotle treats of the first scientific question about First Philosophy, namely, “Does it exist?” The answer to the second scientific question, “What is being?” (the subject of First Philosophy), is answered in *Metaphysics* IV, where it is shown that being is primarily substance. (The scientific questions are dealt with later in the chapter.) *Metaphysics* V is a philosophical dictionary whose function and placement is not very clear. Aquinas explains this by saying that, because First Philosophy deals with terms that may be common to all the disciplines, it is well to clarify them before actually comparing the different realities to which they refer. If the order is really Aristotle’s doing, perhaps it can be explained by saying that he thought it necessary to preface VI with an explanation of terms, as in IV, giving special attention to the terms “being” and “substance,” and then additional consideration to other terms in V. Having thus already answered in IV the second scientific question, “What is it?” in a preliminary way, and leaving further discussion of the question to later books, he did not find it necessary to say more about the question in VI or in the next book after VI. Whatever may be the rationale, it seems clearer to me to stick to the order of the scientific questions as Aristotle ordered them in the *Posterior Analytics*.

3. Aquinas, in *Questiones disputatae de veritate*, q. 1, a. 1, treats of *ens* as it is the *actus essendi* or actuality (in English “reality,” “actuality,” or existence) of anything, and thus the proper act of the intelligence as anything is first known. This is why question 1, “Does it exist?” must be answered before any other question. That the answer to this question is “true” for human reason means that one knows it conforms to the facts of sense experience immediately or mediately. Aquinas’s *Super Boetium De Trinitate*, q. 5, a. 9, ad 1, makes clear that the *ens* whose *actus essendi* is first known to human intelligence does not have the full extension known in metaphysics, but is that of *ens mobile*, sensible, material, changing being.

4. Aristotle *Posterior Analytics*, I, chap. 12, 77a36ff.; Aquinas, *Expositio Libri Posteriorum* I, lect. 21.

5. On the distinction between a natural science properly speaking and a metascience or “philosophy” of nature, see William A. Wallace, O.P., *The Modeling of Nature* (1996); and my review of this book with Eric Reitan (Ashley and Reitan 1997).

6. This is the argument of chaps. 1–9 of Aristotle’s *Posterior Analytics* II; see especially chap. 9, 93b21–28, and also ch. 19, 99b15ff.

7. *Ibid.*, II, chap. 1, 89b21–26, and Aquinas, *Expositio Libri Posteriorum* II, lect. 1, 407–17.

8. Aquinas, *Summa theologiae* I, q. 76, a. 5, c, “Omnes autem alii sensus fundarur supra tactum” (“All the senses are grounded in touch”). Aristotle had pointed him this way: see *De Anima* III, ch. 8, 432a2ff. On the centrality of the sense of touch to philosophical realism, see Charles DeKoninck, “Sedeo ergo sum” (1950), and Robert J. Henle, “The Basis of Philosophical Realism Re-examined” (1982).

9. See O. I. Zangwill, “Isolation Experiments” (1987).

10. Duns Scotus thought that the notions of finite and infinite being

(God) are included in what he held was the univocal metaphysical concept of Being and its modes. See William A. Frank and Alan B. Wolter, *Duns Scotus Metaphysician* (1995), pp. 18–27, for the text of Scotus’s *Questions on the Metaphysics: Prologue and Reportatio I A*, Prologue, q. 3, a. 1, with commentary on pp. 28–39.

11. Aristotle, *Posterior Analytics* I, chap. 1, 71a11.

12. *Ibid.*, chap. 32, 88b4.

13. The different meanings of *existere* and *esse* can be confusing, because the English “existence” is usually taken in a minimal sense. This problem is discussed by John Nijenhuis, “Existence vs. Being: An All-important Matter of Terminology” (1995), in debate with Russell Pannier and Thomas D. Sullivan, “Being, Existence, and the Future of Thomistic Studies” (1995).

14. On the different senses in which the more universal and the more particular are prior and posterior in knowledge, see Aquinas, *Expositio Libri Posteriorum* I, lect. 1, nn. 42–43bis (commenting on Aristotle *Posterior Analytics* I, chap. 2, 72a30ff.).

15. Karl Popper, *The Logic of Scientific Discovery* (1959), and *Conjectures and Refutations* (1963).

16. Aquinas, *Sententia super Metaphysicam*, IV, lect. 4, nn. 570–76; Aristotle, *Metaphysics* IV, chap. 2, 1004a1 seq.

17. See chapter 2 above, n. 30.

18. But see in this chapter the discussion of the reliability of the senses even for reading instruments.

19. See Allan B. Wolter, O.F.M., in *The Philosophical Theology of John Duns Scotus* (1990), pp. 15–16.

20. Aristotle, *Physics* I, chap. 7, 191a8–12.

21. See appendix 2.

22. See Aquinas, *Expositio Libri Posteriorum* I, lect. 42 (on Aristotle, *Posterior Analytics* I, chaps. 30–31, 87b5ff.).

23. Aristotle, *Physics*, III, chap. 1, 201a10.

24. See Annibale Fantolli, *Galileo: For Copernicanism and for the Church* (1994), chap. 1, n. 123.

25. Cf. “Relations and the Knowledge of Essences” in John Deely, *Four Ages of Understanding* (2001a), pp. 652–60; see also part 4 in his *The Human Use of Signs* (1994a).

26. For a detailed discussion of this Aristotelian notion, see “Chance Events” in John Deely, *Four Ages of Understanding* (2001a), pp. 66–67. For understanding the role of chance in a world (such as our own) where the environment itself is a changing reality, see John Deely, “The

Philosophical Dimensions of the Origin of Species” (1969a), and Benedict Ashley, “Change and Process” (1973).

27. Although natural, free, and chance events all fall under the First Cause, this does not remove their different modes of causation; see Aquinas, *Summa theologiae* I, 1, q. 22, aa. 2 and 4.

28. “But even if we could by pure understanding say anything synthetically in regard to *things-in-themselves* (which, however, is impossible), it still could not be applied to appearances, which do not represent things-in-themselves. In dealing with appearances I shall always be obliged to compare my concepts, in transcendental reflection, solely under the conditions of sensibility; and accordingly space and time will not be determinations of things-in-themselves but of appearances. What the things-in-themselves may be I do not know, nor do I need to know, since a thing can never come before me except in appearance” (Immanuel Kant, *The Critique of Pure Reason* [1781–87], “Analytic of Principles,” II, chap. 3, appendix 1; now available at <http://www.hkbu.edu.hk/~ppp/cpr/toc.html> (last accessed May 2005).

For Kant and Aristotle alike, only the sensible properties of a substance are directly known. For Aristotle, however, the essence and existence of the substance is knowable through these properties, as a cause is known through its effects. For Kant, by contrast, though the sensibly observed properties as phenomena make us certain that the substance exists, the essence of the substance remains unknowable since causality is an order that mind *imposes* on its sense data. The root of this difference is that Kant thinks, with Parmenides, Plato, and Descartes, that certain truth can never be grounded in sense knowledge, because sensible things change, whereas Aristotle thinks that a modest certitude can be grounded on the *relative* stability of these same changeable sensed things.

29. Recall the discussion in chapter 2 of the semantic shift in the meaning of “*a priori* knowledge” that took place in the seventeenth century. Here we see illustrated the original sense of the phrase *a priori*, meaning an argument from cause to effect, used in contrast to an *posteriori* argument from effect to cause. This ancient and medieval sense must not be confused with the modern sense given it (especially by Kant) in philosophy after the eighteenth century. For Kant, the expression meant a truth known “prior to sense experience” and a necessary condition for sense experience. For Aristotle and Aquinas, the whole content of intellectual knowledge is derived from sense experience, and the *a priori* element reflects only the critically organized deductive phase that knowledge sometimes achieves in philosophical

and scientific reflection.

30. While the authenticity of the *Categories* has often been questioned, specialists now generally accept it as genuine. See William Wians's introduction to his editing of the essays by various authors in *Aristotle's Philosophical Development* (1996), p. xiii. He notes that Valentin Rose, "the first modern editor of the fragments, was convinced [that the *Categories* and the *Eudemian Ethics*] were spurious because they conflicted with the doctrines of the corpus." Werner Jaeger thought that "the *Categories* are not by Aristotle but by a Peripatetic pupil writing after most of the corpus was completed." These doubts have been overcome by post-Jaeger theories of Aristotle's development. The categories are also listed in *Topics* I, chap. 9, 103b1ff, generally thought to be an early work. See Hippocrates Apostle, "Ackril on Aristotle's *Categories*" (1976), on misunderstandings of this text.

31. Like the term "metaphysics," so the term "organon" (or "instrument") as title for his logical writings was not Aristotle's term but one chosen by his later editors. See "The Instrument of All the Sciences" in John Deely, *Four Ages of Understanding* (2001a), pp. 87–91, for a discussion of the content of the Aristotelian writings grouped together as *Organon*.

32. Aristotle, *Categories*, chap. 4, 1b25ff.

33. Aristotle, *Metaphysics* V, chap. 8, 107b10–26, and chaps. 13–14, 1020a1–b25, but only substance, quantity, quality, and relation are mentioned. The *Categories* are dated early by most writers on Aristotle's development. According to Bertrand Dumoulin, *Analyse Genetique de la Métaphysique d'Aristote* (1986), pp. 403f. Book V of the *Metaphysics* in its present form is probably from Aristotle's late period.

34. In Francisco Suarez, S.J., *Disputationes Metaphysicae* (1597), the discussion of the categories is some 700 pages long, from *disputationes* 33 to 63, pp. 312–1014! Suarez's was the first important attempt at a treatise on metaphysics other than commentaries on Aristotle's work and had a profound influence on the scholastic manuals, even those of the opposing Thomistic school; see "The Boethius of Modernity: Francisco Suarez," in John Deely, *Four Ages of Understanding* (2001a), pp. 500–501.

35. Thus John Poinsot (John of St. Thomas) treats of the categories at length (but not as exhaustively as Suarez does in his metaphysics) in the logical part of his *Cursus Philosophicus* (1631–35), Log. II, q. 14–19, vol. 1, pp. 500–637.

36. Joseph Gredt, O.S.B., *Elementa Philosophiae Aristotelico-*

Thomisticae (1937), vol. 1, pp. 135–63 in logic; and vol. 2, pp. 120–44 in metaphysics.

37. See Lewis White Beck, *Early German Philosophy* (1969), pp. 477–79. For Kant, these were quantity (subdivided into unity, plurality, and totality), quality (reality, negation, limitation), relation (substantiality, causality, reciprocity), and modality (possibility, existence, and necessity), and they were deduced transcendently (*a priori*) from the logical notion of judgment. To be applied to empirical reality they required the ordering of empirical data in the schemas of space and time proper to sense cognition.

38. See the remarks on the Kantian categories in John Deely, *Four Ages of Understanding* (2001a), pp. 569–70. In general, see the index entry “categories,” p. 863.

39. John Deely, in his *Four Ages of Understanding* (2001a), argues that the formal denial of any mind-independent status to relations among the accidents is the very essence of nominalism, a thesis that develops over the course of his study. For the discussion of Ockham in this context, see pp. 385ff. For a discussion of Ockham on relations, see also Frederick Copleston, *History of Philosophy* (1946), vol. 3, pp. 68–71, and Armand Maurer, *The Philosophy of William of Ockham in the Light of Its Principles* (1999), pp. 47–53.

40. For Aquinas’s explanation of why relations are real but not intrinsic properties of a substance, see *Summa theologiae* I, q. 26, a. 1, c. and ad 4. For a thorough discussion of the foundational notion of relation in Aristotle, see John Deely, *Four Ages of Understanding* (2001a), pp. 73–78.

41. This is illustrated in Deely’s diagram of the full categorial scheme, p. 77 of the *Four Ages of Understanding* (2001a).

42. Aquinas, *Sententia super Physicam*, VII, lect. 3, nn. 1781–97 (commenting on Aristotle, *Physics* VII, chap. 2, 243a3ff.).

43. See the presentation of Aristotle’s causal scheme in John Deely, *Four Ages of Understanding* (2001a), pp. 64–65.

44. The merits of the case are debated under the title “A Lair for Later Nonsense: from Teleology to Teleonomy,” in John Deely’s *Four Ages of Understanding* (2001a), pp. 65–66.

45. Though Newton did not publish his reflections on this point, he ended by concluding that gravitational attraction is able to have its effect at a distance, simply because God has willed this to be so! This fits his Protestant theological views on the mysterious character of the will of God, which had their origin in Nominalist theology. See references in chapter 2, note 35, above.

46. In the *Physics*, Aristotle omits this category; and when naming it in the *Categories* as *echein*, “to have or possess” (traditionally translated in Latin as *habitus*), he gives as an example of its categorial uses only “to have on a garment” (chap. 15, 15b21). How is this a category of natural rather than artificial being? Some Thomists explain this as I have done, by saying that *echein* (*habitus* or “habitat,” “environment”) differs from *topos* (place) as the location of a body in a region (environment) of surrounding bodies, while place is the location of that body by the *immediately* surrounding and actually contacting bodies. This is of considerable importance for Aristotle’s natural science, since he holds that various types of bodies have specific “natural places” in which they are most stable. Such natural “places” apply not only to place in the strict sense, but as well to position and to environment as I have described them. For example, an oceanic fish is in its natural place when immediately surrounded by water, but also when it is not “belly-up,” and when this water is a natural body of salt, not fresh water, existing in nature, not in an aquarium.

47. See “Time and Space” in John Deely, *Four Ages of Understanding* (2001a), pp. 70–72.

48. The fact that radium is a radioactive type of atom and thus “spontaneously decays” raises a question that, as far as I know, remains unsolved. To say that this results from the “weak nuclear force” cannot be the whole story, since to say that a natural entity “self-destructs” seems almost as paradoxical as to say that it is “self-caused.” Might such radioactive atoms cease to decay in certain environments, so that it could be said that their present gradual decay is due to a lack of that natural environment? A similar question has to be raised as regards the life spans of living organisms. Do they self-destruct, or, as seems more evident, die because of injuries caused by or accumulated in a harmful environment?

49. I am informed by Prof. John Deely that Charles Sanders Peirce makes this distinction between scientific knowledge founded on unaided sense observation and that founded on observation with artificial instruments and experiment in terms of “coenoscopic” (from Greek for “directly viewed”) vs. “idioscopic” (from Greek for “specially viewed”) knowledge, a terminology Peirce took from Jeremy Bentham. Deely himself (esp. in *Four Ages of Understanding* [2001a] and *The Impact of Philosophy on Semiotics* [2003] takes up this distinction with some changed spelling (“ideoscopic” vs. “cenoscopic” knowledge), which I will follow when referring to the point in the present work.

50. In James Jeans, *Physics and Philosophy* (1946). Jeans’s

philosophy of science was markedly Kantian: see p. 16 of this work.

51. John Deely makes this point by distinguishing *sensation* strictly taken (or, as he says, following Peirce, “prescissively”) from *perception*, the former of which is *selective* but not interpretive, while the latter is *interpretive*, further arranging sensations into objects categorized as to be sought (+), to be avoided (-), or safely ignored (0). See Deely’s short book, *What Distinguishes Human Understanding?* (2002a). See also the discussion in chapter 7 below of *negative* error of the senses.

52. For example, Aquinas, *Sententia super Metaphysicam* V, lect. 8, n. 876, on Aristotle, *Metaphysics* V, chap. 6, 1016b32, and Aquinas, *Super Boetium De Trinitate* q. 4, a. 2, ad 4.

53. Aquinas, *Summa theologiae* I, q. 47, a. 1.

54. The most thorough treatment of Scotus’s views on angels with which I am acquainted is unfortunately not translated: Étienne Gilson, *Jean Duns Scot* (1952b), chap. 5, pp. 390–431. According to Gilson, it was not only Scotus’s doctrine of individuation that affected his view, but also the fact that, for him, intelligence, whether human or angelic, has *ens* in its totality for its subject. Hence the specific difference between humans and angels does not arise from their intelligence, and thus neither would such difference specify the angels. Humans differ from angels only by reason of our bodily materiality, which is not found in pure spirits. Hence, while angels are specified by different functions given them by God, they are not specifically different in nature.

55. For Aquinas, see esp. his *Summa theologiae* I, q. 50, a. 4. See the thorough commentary on Aquinas’s views by John Poinset in his *Tractatus de Angelis* (1643).

56. Male semen contains approximately equal numbers of sperm with and without the X chromosome that makes the embryo male. Attempts to control the production of male or female births other than through *in vitro* fertilization have not yet been demonstrated to be successful. Yet sperm containing the Y chromosome do differ from those that do not in motility, and perhaps chemically, and claims are being made that this can be used to obtain a desired male or female child—for example, by regulating the time of intercourse.

57. Aquinas makes use of the ancient four temperaments (choleric, melancholic, sanguine, and phlegmatic) theory. For example, *Summa theologiae* I-II, q. 32, a. 7 ad 2, and II-II, q. 156, a. 1 ad 2, on the special tendency of melancholic persons to seek sensual pleasures. For modern theories of “personality” differences, see Salvatore R. Maddi, *Personality Theories* (1996), pp. 13–24.

58. Thomas S. Kuhn, in his *The Structure of Scientific Revolutions* (1970), gave rise to an important controversy about how science evolves. On this see William A. Wallace, O.P., *Causality and Scientific Explanation* (1974), vol. 2, pp. 238ff.

59. Brian Greene, *The Elegant Universe* (1999), p. 108.

60. See David Lindley, *The End of Physics* (1993), for an account of the present paradoxical state of physics.

61. This I attempted in my book, *Aristotle's Sluggish Earth* (1958), originally published as two articles in *The New Scholasticism* 32 (1958): "Problematics of the De Caelo," and "Media of Demonstration."

62. "If there is no substance other than those which exist in a way that natural substances do, with which the philosophy of nature deals, the philosophy of nature will be the first discipline. But if there is some immobile substance, this will be prior to natural substance, and therefore the philosophy, which considers this kind of substance will be First Philosophy" (Aquinas, *Sententia super Metaphysicam*, VI, lect. 1, n. 1170; also III, lect. 4, n. 398; and XI, lect. 7, n. 2267).

Chapter 4 The Culminating Foundational Theorem of Natural Science

1. Joseph Silk, *The Big Bang* (1989).

2. Vincent Edward Smith, *The General Science of Nature* (1958), pp. 366ff.

3. See Fred Hoyle, *The Nature of the Universe* (1950), reviewed in Joseph Silk, *The Big Bang* (1989), pp. 5–7. For more recent information, see Brian Greene, *The Elegant Universe* (1999), pp. 345–70. We will have occasion to discuss the objections raised by modern science to the classical proofs of the existence of God in chapter 5, section D.2, below.

4. Joseph Silk, *The Big Bang* (1989), pp. 7–8.

5. Aquinas, *Summa contra Gentiles* I, chap. 13. While it might be argued that, since this work is apologetic, Aquinas uses Aristotle only because Muslims recognize Aristotle's philosophical authority. Yet surely for this purpose he would not have used an argument which he thought could be successfully disproved.

6. In fact, it is Aristotle's argument in this very form that Thomas Aquinas presents as the "first and more manifest way" of demonstrating the reality of the subject matter to be studied in theology, namely, God—a demonstration that theology presupposes in order to warrant its claim to be a science that concerns a mind-independent reality. This is in line with the Aristotelian view that no science proves its own subject matter, but must rather begin with a subject matter known to exist in order to be a science of the real, as we will see in chapter 5 below. Aquinas, *Summa theologiae* I, q. 2, a. 3, c. See the extended commentary on the *quia* (or *a posteriori*) nature of Aquinas's reasoning in John Deely, *Four Ages of Understanding* (2001a), esp. pp. 266–72.

7. See the discussion in Etienne Gilson, *History of Christian Philosophy in the Middle Ages* (1955), pp. 455–59, on why Scotus rejected Aristotle’s proof of the First Cause.

8. For an argument that the First Way requires a metaphysical interpretation to be valid, see David B. Twetten, “Clearing a ‘Way’ for Aquinas: How the Proof from Motion Concludes to God” (1996).

9. *Summa contra Gentiles* I, 13, nn. 109–10.

10. *Ibid.*

11. Aquinas argues for the “perfection” of the universe, but only a limited perfection. “In a properly understood creationist perspective such as that of Saint Thomas, it makes no sense even to speak of ‘the best possible world.’ Only God can be ‘the best possible.’ Anything else can only participate in that goodness and therefore can never be ‘the best possible,’ not even in that sense of ‘the best possible that God could create,’ as Leibnitz’s idea would have it” (Oliva Blanchette, *The Perfection of the Universe according to Aquinas* [1992], p. 134).

12. Aquinas, *Sententia super Metaphysicam* VI, lect. 1, 1164.

13. Aquinas, *Sententia super Physicam* VIII, lect. 21, 1153.

14. Aquinas, *Summa contra Gentiles* I, 13, n. 112.

15. See Aquinas, *Summa theologiae* I, q. 50, a. 2, ad 3; *Summa contra Gentiles* II, chaps. 30–31.

16. See the article of James Glanz, “Listen Closely: From Tiny Hum to Big Bang” (2001).

17. John Deely, in his *Four Ages of Understanding* (2001a), chap. 11, has proposed that we ought to recognize the development of knowledge ideoscopically as the essential meaning of “science” in the modern sense, reserving the term “philosophy” rather for those cenoscopic doctrines that can be established apart from ideoscopy, whether absolutely (as in the case of the Unmoved Mover) or only relatively (in cases where the problem to be resolved arises directly from ideoscopic developments impacting the human good). This does not change the fact established in our last chapter (pp. 85–87, esp. text at note 51) to the effect that were cenoscopic use of sensory information not valid in its own right then ideoscopic extensions of our knowledge could have no validity either.

18. For Aristotle and Aquinas the location of a body in its natural place is a property of that body produced with its substance by the efficient cause of the entire body, substance and properties. Thus the properties of a substance are not caused by its essence by efficient causality, but by a natural “emanation”: “The emanation of the proper accidents from a subject is not by some transmutation but through a natural resultancy, as from one thing another naturally results, as color

from light" (*Summa theologiae* I, q. 77, ad 3). Thus, for Aristotle, the motion of a body located outside its natural position in the order of the universe does not require any other natural efficient cause than the one that brought it into existence in the first place, any more than fire requires another efficient cause to be hot.

19. On the history of the impetus theory see Annaliese Maier, *On the Threshold of Exact Science* (1982), essays 3, 4, and 5.

20. See references in chapter 2, note 29.

21. Immanuel Kant, *The Critique of Pure Reason* (1781–87) I, The Transcendental Doctrine of Elements second part, second division, bk. 2, chap. 3, sections 3–7, pp. 496–531. For the argument that only three kinds of proof are necessary, see pp. 499f.

22. On this, see David Lindley, *The End of Physics* (1993), esp. chap. 6, "Grand Ideas," pp. 157–82.

23. See above, note 6.

24. Aquinas, *Summa theologiae* I, q. 2, a. 3, c. "Prima autem et manifestior via est, quae sumitur ex parte motus" ("The first and most evident way [to answer the question whether God exists] is from motion"). See also *Scriptum super Libros Sententiarum* I, Dist. 3; *Quaestiones disputata de veritate*, q. 5, a. 2; *Quaestiones disputata De potentia*, q. 3, a. 5; *Compendium theologiae*, chap. 3; *Sententia super Metaphysicam* XII, lect. 5, sq. The fullest exposition is in *Summa contra Gentiles* I, chaps. 13–16 and 44.

25. For further discussion as to why St. Thomas terms the proof from motion the "more manifest way," see John Deely, *Four Ages of Understanding* (2001a), p. 270.

26. "Ergo necesse est devenire ad aliquid primum movens, quod a nullo movetur, et hoc omnes intelligunt Deum" ("Therefore it is necessary to come to some prime mover and by this everyone understands 'God'"), *Summa theologiae* I, q. 1, a. 3, c.

27. Aristotle, *De Anima* 3, chap. 5, 430a10ff.; in Aquinas's commentary III, lect. 10, n. 728. In Aquinas, see further *Summa contra Gentiles* II, chaps. 56–81. A. M. Festugiere, O.P., "La place du *De Anima* dans le système Aristotélicienne d'après S. Thomas" (1932), shows that, for Aristotle, the *Historia Animalium* and the *De Partibus Animalium* precede the *De Anima*. Hence the *De Anima* was not first, as Aquinas thought (cf. his commentary on the *De Sensu et Sensato* I, lect. 1) because he lacked the former works in their complete form. Both opinions can be saved, however, by noting that Aristotle properly follows the *via inventionis* from effect to cause while Aquinas follows the *via*

doctrinae from cause to effect.

28. This is most thoroughly argued in two letters of Descartes to Henry More; see John Cottingham, Robert Stoothoff, and Dugald Murdoch, eds, *The Philosophical Writings of Descartes* (1984–91), vol. 3, pp. 365–66 and 374.

29. Bear in mind that *all* pure relations as such are nonmaterial, in that they cannot be directly detected by sense (cf. John Deely, “A Sign Is *What?*,” [2001b]), which was precisely one of the nominalist reasons for denying that they have any mind-independent reality.

30. See John Deely, “The Immateriality of the Intentional as Such” (1968).

31. See esp. the sections “Why Sensations Do Not Involve Mental Icons” and “Why Perceptions Do Involve Mental Icons,” in John Deely’s *Four Ages of Understanding* (2001a), pp. 345–47.

32. For Aquinas’s view on the intellect, see *Summa theologiae* I, qq. 76 and 79.

33. Eleonore Stump in an important essay, “The Mechanisms of Cognition: Ockham on Mediating Species” (1999), after well answering two objections against Aquinas’s explanation of cognition, raises a third for which she says, “I think Aquinas has no answer of any sort and it is hard to see how he could provide one by using the species account. . . . Something else besides the acquisition and storage of species is needed to distinguish our experience of perception from our experience of imagining or remembering” (p. 178). Yet for Aquinas “perception,” in the sense Stump uses that term, is the act of the intellect, which has as its object being (existence, answer to the first question, “Does it exist?”), yet which it knows only in an abstract *species expressa* that conveys an essence, conjoined through the *species expressa* in the external senses with the external, especially the sense of touch, which, although it requires a *species impressa*, needs no *species expressa*, because it directly contacts the object in its existence. Thus we are aware of the difference between an imagined object and an existing object by this conjoint activity of intellect and sense when we are awake, but not in fantasizing or dreaming, or even in sense remembering (since the object no longer exists). Thus the difference between perception and imagination that puzzles Stump is well enough solved by Aquinas’s account.

34. In *Summa theologiae* I, q. 67, a. 1, c., Aquinas indicates that the agent intellect is analogically compared to a “light” because just as the sense of sight sees nothing until its object is illuminated, so the possible intellect knows nothing until the agent intellect makes the sensible

experience object intelligible.

35. The terms *intellectus agens* and *intellectus possibilis* are commonly literally translated as “agent intellect” and “possible intellect,” but this is misleading. Therefore I have rendered *intellectus agens* as “abstractive intellect” because it is a first power (a prime mover) that is always in act. Consequently when the human thinker imagines a suitable image this first power immediately abstracts the essence of the imagined object from its concrete sensible conditions. Thus it makes that essence an abstract *species impressa* with which it actualizes the second power (the knowing power) so that it becomes able to perform a specific act (*species expressa*) of knowledge rendering the object present to the human thinker. The Latin *possibilis* (from *posse*, to be able to do something) does not mean “possible” in the English sense. The term was used by medieval writers to distinguish this knowing intellect from the imagination that some medievals called the *intellectus passibilis* or “receptive” intellect, by which they really meant not the intellect but the imagination. It is the knowing (*possibilis*) intellect that is actually “able to know some object.” On this difficult question see John Poinsett, *Cursus Philosophicus* (1631–35), vol. 3, *Philosophia Naturalis*, q. 10, aa. 1–5, pp. 295–339.

36. Aquinas, *Summa theologiae* I-II, q. 9, a. 2, ad 3, citing Aristotle, *Politics* I, chap. 5, 1254b5; cf. Aquinas, *Sententia Libri Politicorum I*, lect. 2, nn. 2–3.

37. In semiotics, Sebeok has famously insisted that language radically considered is a nonbiological capacity that is species-specific to human beings for modeling the world according to possibilities that do not reduce to sense perception. See Thomas A. Sebeok, “Communication, Language, and Speech: Evolutionary Considerations” (1986a); “The Problem of the Origin of Language in an Evolutionary Frame” (1986b); and “Toward a Natural History of Language” (1986c). This is exactly a postmodern counterpart to the Aristotelian Thomistic idea of intellect in its difference from sense, as appears from John Deely, *Four Ages of Understanding* (2001a), p. 301, n. 106.

38. Cf. the article by Mark Derr, “Brainy Dolphins Pass the ‘Mirror Test’” (2001).

39. The only modern study that I know of that has approached this question on the basis of a close textual analysis of the views of St. Thomas Aquinas is John Deely’s article, “Animal Intelligence and Concept-Formation” (1971). He shows that the Neo-scholastic tendency to contrast “sense” to “intellect” is generally oversimplified to a discrediting degree. It fails to adequately analyze sensation (as the pure

work of external sense) as distinct from perception (the work of the internal senses together with the external senses). Moreover, it does not sufficiently examine perception as providing the material of “concept-formation” (the phantasm) according to what it has in common with intellect, namely, reliance on both a *species impressa* and *species expressa* (in contrast to sensation which employ only a *species impressa*). He has developed this in a purely doctrinal way in his more recent *What Distinguishes Human Understanding* (2002a). On all these points, see the last of the great Latin Thomistic commentators, John Poinset, *Tractatus De Signis* (1632), book 1, question 6 (on animal behavior and sensation), and book 2, questions 1–4 (on the differentiative and common role of *species* in sensation, perception, and intellection).

40. See Thomas A. Sebeok, “Naming in Animals” (1981).

41. See Thomas A. Sebeok and Robert Rosenthal, *The Clever Hans Phenomenon* (1981).

42. Jacques Maritain, “Language and the Theory of Sign” (1986), p. 53.

43. See John Deely, “The Supplement of the Copula” (1992).

44. See John Poinset, *Tractatus De Signis* (1632), first preamble, “On Mind-Dependent Being,” and second preamble, “On Relation.”

45. For Plato, see the *Meno*; Aristotle attacks the reality of mathematical Ideas at great length in *Metaphysics* XIII–XIV.

46. While Aristotle clearly says in *De Anima* III, chap. 5, 430a20–25, that we know by an intelligence that is not material, and in chap. 8, 431b20ff clearly distinguishes the intellect from the senses and says that “The soul is in a way all existing things,” yet it is often been argued that he may have thought that there is only one intelligence for all human beings. Aquinas rejects this interpretation as inconsistent with Aristotle’s general principles, as will be discussed in chapter 6 below.

47. *Summa theologiae* I, q. 78, a. 2; *Summa contra Gentiles* II, chaps. 59–81; *Quaestiones disputatae De Potentia* q. 3, a. 9, 11; *Quaestio disputata De Spritualibus Creaturis*, a. 2; *Quaestio disputata De anima*, a. 1, 14; III *Sentencia Libri De anima* III, lect. 7.

48. For Aristotle’s distinction between sense and intellect knowledge, see *De Anima* III, chaps. 4–8, 429a10ff.

49. See John Locke, *An Essay concerning Human Understanding* (1690), book 2, chap. 11, nn. 9–10, in which he recognizes the mental activity of “abstraction” as specific to human beings but considers abstract concepts as merely generalizations of “simple ideas” which are

sense impressions. See the analysis of “Sense and Understanding” in the modern Empiricist line in John Deely, *Four Ages of Understanding* (2001a), pp. 535–36.

50. This will be further discussed in chapter 8.

51. The objection could be raised that current physics (like that of Leibnitz and Boscovich, who in the past reduced matter to points) speaks of electrons as “point particles.” This, however, is a mathematical stratagem not to be taken literally. We also hear of an electron “cloud” surrounding the nucleus. In fact, in quantum physics the position of an electron is not determinant until observed in a special way.

52. I shall return to this point in chapter 8 below.

53. Compare the analysis of the *Cogito* in Deely, *What Distinguishes Human Understanding* (2002a), pp. 8–12 and *passim*.

54. Reference was made in the preceding chapter, note 8, to the modern experiments with “sense deprivation” that show that, if the sense of touch is inhibited, the person often begins to lose contact with reality and begins to dream.

55. John Locke, *Essay on Human Understanding* (1690), book 4, chap. 9, n. 3; Immunuel Kant, *Critique of Pure Reason* (1781–87), “The Paralogisms of Pure Reason,” pp. 368–72. Again Kant, following Wolff’s distinction of rational and empirical psychology, argued that our empirical experience cannot be the basis of concluding to the existence of a substantial self. Nor can it be known *a priori* because the concept of self means “thinking subject” and does not include the concept of substance.

56. See Douglas Hofstadter, *Gödel, Escher, Bach* (1979), chap. 11, pp. 438–60.

57. See J. P. Lucas, “Minds, Machines, and Gödel” (1961); also the criticism of Lucas by Anthony Hutton, “This Gödel Is Killing Me” (1976) with Lucas’s reply (1977). For more details on this controversy, see the second edition of my *Theologies of the Body* (1985/1996), p. 343, n. 82.

58. Aristotle, *Posterior Analytics* I, chap. 32, 88b4.

59. See note 46, above.

60. His wrong view of the brain and heart was empirically based on information from medical experts of his time, on the one hand, and on empirical but faulty chemical theory, on the other hand.

61. On Aristotle’s astronomical error, see my articles “Problematics of the De Caelo” and “Media of Demonstration,” reprinted in *Aristotle’s Sluggish Earth* (1958). See also my “Change and Process” (1973); and see “Preparing the Way for Galileo and Darwin: Celestial Matter,” in John Deely, *Four Ages of Understanding* (2001a), pp. 79–81.

62. Aristotle, *De Partibus Animalium* II, 656a25ff.

63. See *History of Animals* VI, chap. 3, 561a4ff.

64. Aristotle, *De Anima* III, chap. 5, 430a20–25. In *Metaphysics* XII, where one might have supposed Aristotle would have again taken the question up, he says nothing about it.

65. This is treated most extensively in *Summa contra Gentiles* II, chaps. 76–78, and in his treatise *Aquinas against the Averroists: On There Being Only One Intellect* (1270).

66. Aristotle, *De Anima* III, chap. 5, 430a23. Because of his special concern for the ambiguities of the Greek text, I give the translation of Hippocrates Apostle, *Aristotle's On the Soul (De Anima)* (1981), p. 51 (original emphasis). See also his commentary on its difficulties, pp. 163–68.

67. This is perhaps the most decisive point at which Aquinas's development of the metaphysics of *esse* intersects with Aristotle's psychology of living material substance as a matterform composite; see the remarks in John Deely, *Four Ages of Understanding* (2001a), pp. 302–3.

68. Aquinas, *Summa theologiae* I, q. 75, a. 2; *Quaestio disputata De Anima*, a. 7.

69. “Transcendental relation” was a view the later scholastics developed to express the Aristotelian idea that finite substances can neither be nor be understood except by taking into account their dependency upon interaction with other substances, that is to say, in the context of an *environment*. A “transcendental relation,” then, in contrast to a “predicamental relation” (i.e., a relation in the category of relation), is not actually a relation but a condition of being and intelligibility upon which actual relations follow, which relations depending upon circumstance. A substance *is not* a relation, but it *can neither be nor be understood* except in some context or another: that requirement the scholastics expressed by calling substance “transcendentally relative.” Hence, to say that the human soul separate from the body retains a transcendental relation to the body is simply to say that the human soul begins as and remains a *form of a body*, in contrast to the form, say, of an angel, which has no transcendental relation to matter, because matter is not part of the context on which the being of angels depends in its proper existence. On the origins of this distinctive Latin notion, see John Deely, *Four Ages of Understanding* (2001a), esp. pp. 226–32.

70. See Chapter. 11.

71. Thus the Vatican found it necessary to insist that reference to the angels be inserted in the famous “Dutch Catechism” (Kerin Smyth, trans., *A New Catechism* [1967]) that had omitted any reference to them.

72. That all efficient causality is to be immediately attributed to God and not to created secondary causes was held by some Islamic theologians and by the Cartesian Nicholas Malebranche (1638–1715). These thinkers wanted to honor the Creator but actually detracted from his power and generosity in giving to creatures a participation in his power.

73. Leo J. Elders, S.V.D. *Aristotle's Cosmology* (1965), pp. 27–33. See Aristotle, *De Caelo* I, 279a18–22; II, 286a 9–11, 288a27–b7, 292a20; IV, 311a9–12, for references to immaterial causes of the celestial motions. I note that Elders speaks of this question as a “metaphysical” one, but I consider that the proof of the *existence* of pure spirits pertains to natural science, a study of their *nature* to metaphysics. The dating of Aristotle’s works remains highly controversial. See William Wians, ed., *Aristotle's Philosophical Development* (1996). The essay in this collection by John J. Cleary, “Mathematics and Cosmology in Aristotle’s Philosophical Development” (1996), after commenting on the puzzling structure of the *De Caelo*, suggests that “it might be an early work modeled after the *Timaeus* [of Plato]” (p. 195). On the dating problem, see also the essays in this collection by Charlotte Witt, “The Evolution of Developmental Interpretations of Aristotle” (1996), pp. 67–82; and the balanced evaluation of their success by John M. Rist, “On Taking Aristotle’s Development Seriously” (1996), pp. 359–74. For the historical background of *Metaphysics* XII, see Leo J. Elders, S.V.D., *Aristotle's Theology* (1972), Introduction, pp. 1–68.

74. The eminent Thomistic scholar of Laval University, Charles DeKoninck, who, however, so far as I am aware, did not publish his views on the subject, convinced me that the argument for more than one immaterial cause of the universe has the kind of certitude proper to natural science. His notes on the subject are perhaps preserved in the Maritain Archives of the University of Notre Dame, CDK 7/27, 7/28, 7/30, 7/31, but I have not had the opportunity to examine these materials.

75. Aristotle, *Metaphysics* XII, chap. 8, 1073a13ff.

76. Aquinas, *Summa theologiae* I, q. 70, a. 3; *Summa contra Gentiles* II, chap. 70; III, chaps. 23–24; *Quaestio disputata De spiritualibus creaturis*, a. 6.

77. Actually, the idea of a “spiritual matter” was somewhat common among early Christian thinkers, a fuzzy notion that continued to be perpetuated up to and including the time of Aquinas, who definitively rejected it. For an extended discussion of the question, including a close examination of the hidden contradiction such an idea entails, see John Poinsoot’s *Tractatus de Angelis* (1643), esp. disp. 39, “De Existencia et

quidditate angelorum,” art. 2, “Utrum Angelus careat omni compositione materiae et formae,” pp. 457–64, esp. nn. 7–14 (pp. 459–61).

78. The nature of pure spirits will be discussed further in chapter 6.

79. Aquinas, *Summa theologiae* I, q. 50, a. 1.; *Summa contra Gentiles* II, chap. 46.

80. A weakness in this argument is that modern biology shows that the species of insects is far greater than the species of vertebrates. Yet, as is well known, the distinction of species is controversial, and the difference between species of insects is often minimal. Moreover, in dialectical argumentation the premises need only have a general plausibility that can admit of exceptions.

81. For a discussion of such views, see Richard Morris, “Are There Parallel Worlds?” (2002).

82. See <http://www.seti-inst.edu/about-us/welcome.html> (last accessed May 2005), the website for the Society for Extraterrestrial Intelligence founded in 1984 under Sagan’s inspiration.

83. See “The Ultimate Limits of Computers,” available at <http://www.arstechnica.com/wankerdesk/01q2/limits/limits-1.html> (last accessed May 2005).

84. See the *Catechism of the Catholic Church* (1997), #328.

85. Bearing in mind the profound difference between “pragmatism” as commonly understood and the “pragmaticism” that Peirce insisted upon as continuous with scholastic realism, as we saw in chapter 2.

86. Thus, “while the theoretical sciences are more to be desired than the other sciences, this [First Philosophy] is more to be desired than the other theoretical sciences.” Aristotle, *Metaphysics* VI, chap. 1, 1026a21.

87. The famous theory of *mimesis* or imitation proposed by Aristotle to explain the fine arts does not reduce them to photography. He says in the *Poetics*, chap. 9, 1452b5–7, that “Poetry is something more philosophical and of graver import than history, since its statements are of the nature rather of universals, whereas those of history are of particulars”; and in chap. 4, 1448b4–20, he writes: “Poetry in general seems to have sprung from two causes, each of them lying deep in our nature. First, the instinct of imitation is implanted in man from childhood, one difference between him and other animals being that he is the most imitative of living creatures, and through imitation learns his earliest lessons; and no less universal is the pleasure felt in things imitated. We have evidence of this in the facts of experience. Objects that in themselves we view with pain, we delight to contemplate when reproduced with minute fidelity: such as the forms of the most ignoble animals and of dead bodies. The cause of this again is that to learn

gives the liveliest pleasure, not only to philosophers but also to men in general; whose capacity, however, of learning is more limited. Thus, the reason why men enjoy seeing a likeness is, that in contemplating it they find themselves learning or inferring, and saying perhaps, 'Ah, that is he.' For if you happen not to have seen the original, the pleasure will be due not to the imitation as such, but to the execution, the coloring, or some such other cause."

88. It is often claimed that Aristotle's works contain little on the subject of the freedom of the will, yet Anthony Kenny, in *Aristotle's Theory of the Will* (1979), has shown this is completely misleading, since the freedom of the will is obviously presupposed in the discussion of responsibility in the *Nicomachean Ethics* III, chaps. 1–5. In chap. 2, 1111b4, Aristotle distinguishes between the voluntary act that proceeds from internal motivation (present even in animals) and *choice* specific to human beings. The will's freedom is implied by intellectual deliberation and moral responsibility.

89. For both Plato and Aristotle, the purpose of the fine arts is to enrich human life through a contemplative form of recreation; but while Plato in his *Republic* III sees the arts as inferior and deceitful forms of knowledge, Aristotle in his *Politics* VIII and *Poetics* assigns them a proper role in human life, although one moderated by virtue and true learning.

90. For more on the "mathematicals" in Platonism, see Philip Merlan, *From Platonism to Neoplatonism* (1953).

91. See "How Mathematics Applies to the Physical Environment," in John Deely, *Four Ages of Understanding* (2001a), p. 78.

92. That Cajetan's statements can be reconciled with those of Aquinas, see E. D. Simon, "The Thomistic Doctrine of the Three Degrees of Formal Abstraction" (1954).

93. Charles Sanders Peirce, "The Logic of Mathematics: An Attempt to Develop My Categories from Within" (c. 1896; in CP 1.444): "The term 'logic' is unscientifically by me employed in two distinct senses. In its narrower sense, it is the science of the necessary conditions of the attainment of truth. In its broader sense, it is the science of the necessary laws of thought, or, still better (thought always taking place by means of signs), it is general semeiotic, treating not merely of truth, but also of the general conditions of signs being signs (which Duns Scotus called *grammatica speculativa*), also of the laws of the evolution of thought, which since it coincides with the study of the necessary conditions of the transmission of meaning by signs from mind to mind, and from one state of mind to another, ought, for the sake of taking

advantage of an old association of terms, be called *rhetorica speculativa*, but which I content myself with inaccurately calling objective logic, because that conveys the correct idea that it is like Hegel's logic." See also the commentary by John Deely, "Logic Within Semiotics" (1990b).

94. See John Deely, "On the Problem of Interpreting the Term 'First' in the Expression 'First Philosophy' " (1987b). See also his "Semiotics and First Philosophy" (1988); an earlier work, "Finitude, Negativity, and Transcendence: The Problematic of Metaphysical Knowledge" (1967); and most recently "The Starting Point of Metaphysics," in his *Four Ages of Understanding* (2001a), pp. 308–13, where he concedes more to the viewpoint of Transcendental Thomism than I am prepared to do.

95. See the typology in chapter 2 for the position of these schools.

96. That is, on the usual understanding of "text." This is an area in which semiotics has proposed some revolutionary considerations, which I do not propose to go into here. See "Textuality," part 2 of John Deely's *The Human Use of Signs* (1994a), ¶s 134–91.

97. On the difference between so-called natural and sacred theology in the history of philosophy, consult the index entry "theology" in John Deely, *Four Ages of Understanding* (2001a), p. 1003.

98. See the collection of essays by Robin W. Lovin and Frank E. Reynolds, eds., *Cosmogony and Ethical Order* (1985).

99. Aquinas, *Summa theologiae* I-II, qq. 101–3.

100. See Ninian Smart, *World Philosophies* (1999), and my *Choosing a Worldview and Value System* (2000), for brief accounts of the philosophies that follow. On Jainism see, Smart, pp. 26–27. A recent important work is Natubhai Shah, *Jainism: The World of Conquerors* (1998). Especially useful is Ben-Ami Scharfstein, *A Comparative History of World Philosophy* (1998), which is an excellent comparative anthology. See also Scharfstein's earlier *Philosophy East/Philosophy West* (1978).

101. On Buddhism, see Ninian Smart, *World Philosophies* (1999), pp. 12–19, 53–56; and Heinz Bechert, "The Historic Buddha: His Teaching as a Way of Redemption" (1996).

102. On Hinduism and Shankara, see Ninian Smart, *World Philosophies* (1999) pp. 22–61; and Karl H. Potter, ed., *Encyclopedia of Indian Philosophies* (1981).

103. Ninian Smart, *World Philosophies* (1999), pp. 62–123 and 331–43; the standard work is Youlan Feng, *A History of Chinese Philosophy* (1952–53).

104. This is the term used by Chad Hansen, *A Daoist Theory of*

Chinese Thought (1992).

105. See William Cenkner, O.P., *A Tradition of Teachers* (1983).

Chapter 5 The Existence and Essence of Metascience

1. The most thorough treatment is C. L. Shircel, O.F.M., *The Univocity of the Concept of Being in the Philosophy of Duns Scotus* (1942). On Scotus's notion of modes of being, see William A. Frank and Alan B. Wolter, *Duns Scotus Metaphysician* (1995), pp 150–56. The authors compare the notion of modes to various degrees of the hardness of a crystal, and speak of it as “intensive” but “non-additive” (pp 153f.) This later work has an up-to-date select bibliography, pp. 209–18, on Scotus, the interpretation of whose authentic opinions has always been very controversial.

2. William A. Frank and Alan B. Wolter, *Duns Scotus Metaphysician* (1995), text of Scotus, *Reportatio*, I, A. d. 2, qq. 1–4, and commentary for the proof of the existence of God, pp. 40–107; and texts of Scotus, *Reportatio*, I, d. 3, qq. 1–2 and *Lectura*, I, d. 3, q. 3, and commentary, pp. 108–83, on the univocal concept of Being and its modes.

3. So G.W.F. Leibnitz, *Monadology* (1714), n. 45, writes, “Thus God alone (or the necessary Being) has this prerogative that He must necessarily exist, if He is possible. And as nothing can interfere with the possibility of that which involves no limits, no negation and consequently no contradiction, this [His possibility] is sufficient of itself to make known the existence of God *a priori*. We have thus proved it, through the reality of eternal truths. But a little while ago we proved it also *a posteriori*, since there exist contingent beings, which can have their final or sufficient reason only in the necessary Being, which has the reason of its existence in itself.”

4. Immanuel Kant, *Critique of Pure Reason* (1781–87), chap. 3, “The Ideal of Pure Reason,” sections 1–7, pp. 485–531).

5. Aquinas, *Summa theologiae* I, q. 2, aa. 1 and 2. See Kant's discussion of proofs for God's existence discussed in chapter 4 above.

6. See Ralph McInerny, *Aquinas and Analogy* (1996), for a thorough analysis of this question. See also his earlier works, *The Logic of Analogy* (1961) and *Studies in Analogy* (1968). For a collection of Aquinas's texts see George Klubertanz, *St. Thomas Aquinas on Analogy* (1960). For an update and extension of the discussion based on McInerny's correction of the turn Thomistic discussion took after Cajetan, see John Deely, “The Absence of Analogy” (2002b).

7. In contrasting the notion of “unknowability” as it occurs in Kant's philosophy with the meaning of “unknowable” in the thought of Aquinas, John Deely makes the following point in *Four Ages of Understanding* (2001a), p. 574, n. 60: “If in no way were there a grasp of *what* it is that is involved in the discovery *that* anything is, the one investigating, as Maritain put it, ‘would not know of what it was positing the existence’ and would not have a clue as to how to follow up on the discovery. Situations even close to that occur but rarely, not as the normal situation in investigation, and never as the permanent situation.”

8. Aquinas, *Summa theologiae* I, q. 4, a. 3.

9. Aquinas, *Sententia super Metaphysicam* I, lect. 4, n. 64–66.

10. See Thomas de Vio, Cajetan, *De Nominum Analogia et De Conceptu Entis* (1498).

11. Cajetan's interpretation has its roots in Aquinas's own interpretation of earlier work by Boethius; see John Deely, *Four Ages of Understanding* (2001a), pp. 225–26.

12. Aristotle, *Physics* III, chap. 2, 193b35; *Metaphysics* VI, chap. 1, 1026a7. Aristotle uses the term *chorismos*, that is, "separate" in thought.

13. For Avicenna, I have used the French translation of Georges C. Anawati, O.P.; see Avicenna, *Avicenne: La Metaphysique du Shifa'* (1020–27). For Scotus, I have used William A. Frank and Allan B. Wolter, *Duns Scons Metaphysician* (1995); see esp. Scotus's *Questions on the Metaphysics*, nn. 16–18, at pp. 19–27, with commentary on pp. 31–39. The relevant text of Averroes from his commentary on *Physics* I, n. 81, is translated in Frank and Wolter, n. 10, p. 22.

14. In the *Proemium* to *Sententia super Metaphysicam*, but even more clearly when he says: "All existent things are contained under common being, but not God, but rather common being is contained under His power, since the divine power is even more extended than what has actually been created." Also note *Super Librum Dionysii De divinis nominibus*, chap. 5, lect. 2, n. 660: "To be divine is not to be common, but is to be distinct from every other being." Cf. also *Summa contra Gentiles* I, chap. 26.

15. Giovanni Reale, *The Concept of First Philosophy and the Unity of the Metaphysics of Aristotle* (1980).

16. Martin Heidegger, *An Introduction to Metaphysics* (1959), p. 5.

17. The element of truth in Berkeley's saying is that ultimately nothing would exist if God did not know it. Yet it does not exist because God knows it, but because he has freely *willed* it. Hence, for any created mind, the existence of beings is entirely independent of their knowledge of them, except when a creature by a free act of will makes something and hence has a productive knowledge of it, as God has for all creation.

18. The assertions found often in books about quantum physics, that without the action of an observer an elementary particle would not exist, is called by the Nobel Laureate in physics Murray Gell-Man "flapdoodle" or an absurd misinterpretation; cf. his *The Quantum and the Jaguar* (1994), pp. 152–54, 171–76.

19. In chapter 3 above.

20. On the contemporary scene, semiotics has perhaps given the most profound realization of this relation so far. See John Deely's memorial essay for Thomas A. Sebeok, *The Impact of Philosophy on*

Semiotics (2003).

21. See Steven Weinberg, *The Dream of a Final Theory* (1994), chap. 4, “Quantum Mechanics and Its Discontents,” pp. 65–89.

22. Refer to the discussion of final causality or “teleonomy” in chapter 3 above.

23. See my articles “Final Causality” (1967b) and “Teleology” (1967d); and the discussion in chapter 3 above concerning preferring the term “teleonomy” to the oft-misunderstood “teleology,” text and note 44.

24. For a recent discussion of this doctrine and its history, see Leo J. Elders, S.V.D., *The Metaphysics of Being of St. Thomas Aquinas in its Historical Perspective* (1993), chap. 12, “The Real Distinction Between Essence and Being,” pp. 170–89. Some of the famous Thomas commentators, probably under Scotistic influences, had their doubts about this thesis, but it is fundamental to St. Thomas’s thought.

25. See Richard Cross, *The Physics of Duns Scotus* (1998), pp. 18–20, 66–68.

26. See Maurice J. Grajewski, O.F.M., *The Formal Distinction of Duns Scotus* (1944), and Allan B. Wolter, O.F.M., *The Philosophical Theology of John Duns Scotus* (1990), pp. 27–41.

27. For Scotus’s view, see Allan B. Wolter, *The Philosophical Theology of John Duns Scotus* (1990), pp. 38–39, 281–84. Wolter holds that for Scotus the formal distinction between essence and existence founded in reality results from the fact that our knowledge of existence is intuitive, but our knowledge of essence is abstractive. For Suarez, see *Disputationes Metaphysicae* (1597), Disp. 31, sec. 6, n. 13, II, p. 246.

28. See Desmond M. Clarke, *Descartes’ Philosophy of Science* (1982), pp. 83–86 for references.

29. For a recent defense of this interpretation of Aquinas, see John Haldane, “Thomism and the Future of Catholic Philosophy” (1998), Blackfriars Aquinas Lecture, available at <http://www.assumption.edu/users/gcolvert/jjhbf1998.htm> (last accessed May 2005).

30. Notably John Deely, “On the Problem of Interpreting the Term ‘First’ in the Expression ‘First Philosophy’ “ (1987b). See also his “Semiotics and First Philosophy” (1988).

31. This controversy is vigorously explored by John F. X. Knasas in his *The Preface to Thomistic Metaphysics* (1990), especially as regards the views of Étienne Gilson, Jacques Maritain, John F. Wippel, and Joseph Owens, whose position Knasas prefers. His extensive references make detailed bibliography unnecessary here. See the summary critique from John Deely’s *Four Ages of Understanding*

(2001a), p. 311, n. 132.

32. Lawrence Dewan, O.P., "St. Thomas, Physics, and the Principle of Metaphysics" (1997).

33. *Ibid.*, pp. 551f. Of the natural science approach to metaphysics as presented by James A. Weisheipl, Dewan says that "Thomas nowhere presents us with such a view of the formation of metaphysical concepts: he everywhere treats the metaphysicals as a domain unto themselves, even though they are objects first encountered by us in sensible reality." But in that case, how did Thomas arrive at the judgment that these "objects" as first encountered transcend the competence of physics? This is the question Dewan everywhere avoids.

34. Maurer cites Avicenna, *Metaphysics* 1.3; see S. van Riet, ed., *Avicenna Latinus* (1977–80), 1:20.77–23.28.

35. *Super Boetium De Trinitate*, as translated by Armand Maurer in *The Division and Methods of the Sciences* (1958), chap. 2, qq. 5 and 6, a. 1. It was composed about 1257–59, a little before the *Summa contra Gentiles*, and is contemporary with the disputed questions *De Veritate*, generally considered to exhibit St. Thomas's mature epistemology. On the dating, see James A. Weisheipl, O.P., *Friar Thomas D'Aquino* (1974), pp. 136f and 381f; and Jean-Pierre Torrell, O.P., *Saint Thomas Aquinas* (1996), vol. 1, p. 345. Note that the contrast between the *via inventionis* by which principles are discovered and the *via resolutionis* by which they are applied in demonstration is not identical with that between the *via resolutionis* that analyzes a whole into its parts and the *via compositionis* that again synthesizes these parts.

36. Aquinas, *Sententia super Metaphysicam* VI, lect. 1, n. 1170; also III, lect. 4, n. 398, and XI, lect. 7, n. 2267. On this Dewan (1997) comments: "Aristotle there in fact says nothing about discoveries made by natural science . . . he is saying that physics would be metaphysics if there were no separate entity. It is not said that physics discovers the existence of a separate entity. What certainly could be said is that, until they discover the existence of separate entity, the thinkers who do it, though they are metaphysicians, might not be able to distinguish themselves from physicists" (p. 553). He also remarks: "A thinker who does not draw the erroneous conclusion that all beings are bodies might well recognize that he was doing something different from the physicists even before he has succeeded in concluding to existence of separate entity" (p. 554, n. 11).

37. Dewan (1997) says: "If we find, in the treatments pertaining to physical science, some approach from the viewpoint of being, this will be, not properly physical science . . . , but a case of the physicists taking

on the role of the metaphysician. Along these lines, Thomas tells us that the geometer proves his own principles by taking on the role of the metaphysician” (p. 557, n. 18). He supports this by quoting Aquinas: “For no science proves its own principles. . . . He [Aristotle] says ‘according as it is geometry’ since it happens in some science that the principles of that science are proved in so much as that science assumes what is proper to another science, as geometry proves its own principles according as it assumes the form of metaphysics.” But a Metascience (if it has been shown to be valid) demonstrates the principles of the particular sciences only by deciding whether they pertain to *all* Being (*ens commune*), not only the subject of some special science. We teach geometry to children to whom, Aquinas says in *Sententia Libri Ethicorum* VI, lect. 7, we cannot teach metaphysics. Dewan also quotes Aquinas, *Sententia super Metaphysicam* IV, lect. 1, on Aristotle, *Metaphysics* IV, chap. 1, 1003a28–32, that early philosophers were seeking the highest causes, and suggests that these pre-Socratics, although they did not recognize the existence of immaterial things, “were already metaphysicians, not natural scientists.” But did they think these highest causes were immaterial?

38. Dewan (1997), p. 558, n. 20.

39. *Ibid.*, p. 588.

40. *Ibid.*, p. 563.

41. Aquinas, *Sententia super Metaphysicam* IV, lect. 5, n. 593 on Aristotle, *Metaphysics* IV, chap. 3, 1005a31–b2, and commented by John T. Wippel, *The Metaphysical Thought of St. Thomas Aquinas* (1984), pp. 55–57. For a review of this work see Emmanuel Tourpe (2001), pp. 303–6, who, while commending its scholarship, criticizes it for failing to show the relevance of Aquinas’s thought to current problems. I believe this sterility of Existential Thomism is a result of its mistaken Gilsonian reading of Aquinas on how the subject of metaphysics is established.

42. For a thorough criticism of Gilson’s thought, see John M. Quinn, O.S.A., *The Thomism of Étienne Gilson* (1971), a work that unfortunately has received little attention, perhaps because of its overly polemic style.

43. See especially Étienne Gilson, *Being and Some Philosophers* (1952), p. 46; cf. also pp. 40–51, 154–67. In the appendix to this revised edition, see pp. 216–32. See also his introduction to *The Christian Philosophy of St. Thomas Aquinas* (1956), pp. 3–28. In the extensive notes to this otherwise excellent work, references to Aquinas’s Aristotelian commentaries are few and far between, with the exception of the commentary on the *De Anima*. The references to the commentary on

the *Metaphysics* are given chiefly to praise Aquinas *at the expense* of Aristotle. Gilson attempted to answer his critics, especially L. M. Regis, O.P. (1951), who, in his critical review, courteously praised Gilson while at the same time showing how exaggerated was Gilson's contention that esse can *only* be known by judgment, and therefore cannot be conceptualized. John M. Quinn, O.S.A., *The Thomism of Étienne Gilson* (1971), pp. 53–91, shows that Gilson's attempt to escape Regis's critique was wholly unsuccessful. See further the remarks in Ralph McInerny, *Boethius and Aquinas* (1990), and in John Deely, *Four Ages of Understanding* (2001a), pp. 290–97, "A Note on the Distinction between Essence and Existence," and pp. 357–58 on "Single-Issue Thomism."

44. David B. Burrell, *Analogy and Philosophical Language* (1973), p. 184.

45. Leo J. Elders, S.V.D., *The Metaphysics of Being of St. Thomas Aquinas in its Historical Perspective* (1993), p. 19, though he supports the natural science approach to metaphysics, agrees with Gilson that Aristotle did not reach an adequate account of existence. I think it truer to say that Aquinas clarified and amplified the implications of what he had learned from Aristotle.

46. George Klubertanz, S.J., *Introduction to the Philosophy of Being* (1955).

47. Leo Sweeney, *A Metaphysics of Authentic Existentialism* (1965).

48. Jacques Maritain, *Court Traité de l'Existence et de l'Existant* (1947b), n. 14: "Il y a une différence de vocabulaire, il n'y a aucune différence de doctrine." See the discussion in John Deely, *Four Ages of Understanding* (2001a), on "The Starting Point of Metaphysics," pp. 308–13.

49. John F. Wippel, *The Metaphysical Thought of St. Thomas Aquinas* (2000).

50. For a discussion of these difficulties and a solution see David Twetten, "Clearing a 'Way' for Aquinas: How the Proof from Motion Concludes to God" (1996), part of a special supplement of the *American Catholic Philosophical Quarterly* devoted to the "Philosophy of Technology." The author lays out all the doubts about whether the proof of the Prime Mover leads to God, with the relevant texts and documentation of opinions. I agree that only when Metascience revises this proof in terms of potency and act taken in the broad sense with relation to *ens commune* does the "first and more manifest way" of Aquinas (or any of the other "ways," for that matter) arrive explicitly at

the Creator God as such. Yet I would argue that natural science need only prove the existence of a First Cause as *other than the contingent universe*. Thus, Twetten's claim that what is proved is "what is generally meant by God" does apply to the natural science proof, but what such a "God" must be like remains a question for Metascience.

51. Wippel, in *The Metaphysical Thought of St. Thomas Aquinas* (2000), pp. 61–62, quotes George Klubertanz, S.J., *Introduction to the Philosophy of Being* (1955): "Either 'is' is freed from its sensible and changing context (prior to the proof of the existence of immaterial being, and thus is meaningful when we conclude to the existence of such being) or 'is' remains as we first find it immersed in sensibility and change. In the latter case, 'is' means 'is sensible, material, and changeable,' and to assert that 'An *immaterial, immobile* thing is *sensible, material and changeable*' is a contradiction." Wippel then says that he himself "would not go quite so far," but still avoids saying more than that the rejected approach is "possible." He fails to note that Klubertanz's objection, however, ignores Aquinas's insistence that in arguing validly from effect to cause the term "is" can be analogical, and hence no contradiction is involved. But Wippel also says: "I do not wish to exclude the possibility that one might proceed in a different way [to discover the object of metaphysics]. If one has succeeded in demonstrating the existence of some positively immaterial being in physics, well and good. Then it may be easier for such a person to formulate the negative judgment [of the separation of the judgment of Being as Being from that of material being] and to conclude that being may be considered not merely as mobile but as being, although in a new and different science. In my opinion, however, such an approach is not required for one to discover being as being through separation and hence to begin metaphysics." See also his earlier *Metaphysical Themes in Thomas Aquinas* (1984), p. 52, n. 28.

52. Wippel, in *The Metaphysical Thought of St. Thomas Aquinas* (2000), minimizes the importance of the texts that favor the Aristotelian approach, as follows: (1) Their context is a dialectical refutation of pre-Socratic materialism. (2) "If such were Thomas's recommended procedure, knowledge of such a being would no longer be held out [by Thomas] as the end or goal of metaphysics but would be presupposed by it" (56). (3) "Moreover Thomas's distinction between considering something directly as the subject of science and considering it only indirectly as a cause or principle of that subject would seem to be endangered. If prior knowledge of separate entity presupposed for us to discover being as being, the subject of metaphysics, then why not make

separate entity itself the subject of this science?" (p.57). He adds (4) that Aquinas in these texts does not mention the demonstration of the immateriality of the soul. I reply: (1) the refutation of materialism is the main difficulty in defending a valid Metascience; (2) the goal of a science with which it ends is not the subject with which it begins; (3) Metascience is both a theology of separate substances and an ontology of the ways in which the material effects of these immaterial causes analogically resemble their causes; and (4) the consideration of the immateriality of the human soul pertains less to demonstrating their existence than to explaining by analogy the nature or essence of these separate intelligences.

53. James A. Weisheipl, O.P., *Friar Thomas D'Aquino* (1974), asks why Aquinas, who never taught philosophy, undertook the heavy task of commenting on Aristotle at the very time he was fully engaged in writing his great *Summa theologiae*. It must have been to defend his use of Aristotle in theology against the attacks of other theologians of the University of Paris, for whom Aristotle was under suspicion as a source of heresy in the arts faculty that taught the Aristotelian texts. Hence Aquinas was careful to interpret Aristotle in conformity with Christian faith. Where this was not honestly possible he explicitly states his disagreements. Consequently, these commentaries can and should be used as expressing Aquinas's personal view, except when he explicitly states otherwise. Moreover, Aquinas adopts this same approach in works under his own name, such as in the *Super Boetium De Trinitate*, q. 5, a. 1, and again in the *Proemium* of the *Sententia super Metaphysicam*, when he says: "[This science] is called 'metaphysics' in as much as it considers Being and its properties; for these 'transphysicals' are found *in via resolutionis*, as the more common after the less common." Would it not be odd for Aquinas in his *Proemium* to his commentary to express a view that differs from that presented in the commentary itself, and yet not note that fact? James C. Doig, *Aquinas on Metaphysics* (1972), pp. 3–22 and *passim*, discusses this question in detail, not only as to the 'why' but as to the 'how' of Aquinas's commentary. Doig concludes that in it St. Thomas agrees with Aristotle as he understood him. Doig also thinks that by emphasizing *esse* Aquinas "transformed" the Aristotelian metaphysics. Yet Doig's detailed analysis seems to show that this "transformation" is only an explication of what is really implicit in Aristotle's text, and that this is why Aquinas could read him and agree with him as he did.

54. John F. Wippel, *The Metaphysical Thought of St. Thomas Aquinas* (2000), p. 61.

55. Ibid.

56. Ibid., pp. 60–61: “I would ask the reader evaluating my approach to distinguish two questions and, corresponding to this, two kinds of intelligibilities. One question searches for that by reason of which something is recognized as real or sharing in being. Another seeks after that by reason of which something enjoys a kind of being. If these are two different questions, it seems that one is justified in offering two different answers for them. That intelligible content in a thing by reason of which it is recognized as enjoying reality or being should be distinguished from that intelligible content by reason of which it is recognized as enjoying this or that kind of being. To be material, or living, or mobile is to enjoy a given kind of being, it would seem. Without presupposing that there is any being which is not living and material and mobile, we can still ask why a thing which we experience enjoys being. To ask this is very different from asking what kind of being it enjoys. If these two questions are not identical, it follows that the answer to one does not have to be identified with the answer to the other. That by reason of which something is recognized as enjoying being need not be identified with that by reason of which it enjoys this or that kind of being. Therefore, we may investigate one and the same physical and changing thing from two different perspectives. We may study it insofar as it is material and mobile, or insofar as it is living, or insofar as it is quantified. But we may also study it insofar as it enjoys reality at all, i.e., insofar as it is a being.”

57. Ibid., p. 46. I give the key passage as cited by Wippel in the translation by Armand Maurer, but with some words italicized. The bracketed words are my insertions. On this complicated topic see Patrick Lee, “Aquinas on Knowledge of Truth and Existence” (1986), against Gilson and Owens.

58. Louis B. Geiger, O.P., “Abstraction et séparation d’après S. Thomas’ *In de Trinitate*, q. 5, a.3” (1947). In this same year, independently, the text was also brought to the fore by J. D. Robert, “La métaphysique, science distincte de toute autre discipline philosophique selon Saint Thomas d’Aquin” (1947). See “The Starting Point of Metaphysics,” in John Deely, *Four Ages of Understanding* (2001a), pp. 308–13.

59. John F. Wippel, *The Metaphysical Thought of St. Thomas* (2000), p. 47.

60. Ibid., pp. 60–61.

61. Ibid., p. 49.

62. John F. X. Knasas, *The Preface to Thomistic Metaphysics*

(1990), pp. 9–27.

63. Joseph Owens, C.Ss.R, *An Elementary Christian Metaphysics* (1963).

64. See Knasas's article, "Does Natural Philosophy Prove the Immaterial? An Answer to Mark Johnson" (1999). Similarly, in his earlier "Thomistic Existentialism and the Proofs *Ex Motu* at *Contra Gentiles* I, ch. 13" (1995), Knasas argues—circularly—that the argument is metaphysical because it deals with the *esse* of mobile being.

65. John F. X. Knasas, *The Preface to Thomistic Metaphysics* (1990), p. 74. In this quotation Knasas does not adequately describe the Aristotelian approach, since, as I have shown in chapter 4, this approach begins with the evident truth of the *esse* of sensible material being, just as do Knasas and Owens. Only then does one (or can one) inquire about the essence of the material existent as this essence is composed of matter and form. Unlike Owens and Knasas's view, however, the Aristotelian approach does not consider the full exploration of the existential actuality of material things to be properly the task of physics, since physics considers them only as material realities, leaving the consideration of their immaterial aspects as they resemble their immaterial causes to metaphysics.

66. John F. X. Knasas, *The Preface to Thomistic Metaphysics* (1990), p. 74. See Joseph Owens, C.Ss.R, *An Interpretation of Existence* (1968), and John R. Catan, ed., *St. Thomas Aquinas on the Existence of God: Collected Papers of Joseph Owens* (1980). See further the listing in John F. Wippel, *Metaphysical Thought* (2000), pp. 609–10.

67. John F. X. Knasas, *The Preface to Thomistic Metaphysics* (1990), p. 76.

68. John F. Wippel, *The Metaphysical Thought of St. Thomas Aquinas* (2000), p. 58, n. 110. Note, however, that Wippel writes "establish" instead of Aristotle's and Aquinas's "demonstrate," because he avoids the demonstration of this subject through natural science and "establishes" it only by the judgment of separation whose truth, as Owens and Knasas rightly note, Wippel and company fail to verify by any demonstration.

69. John Deely, *Four Ages of Understanding* (2001a), p. 312, n. 132.

70. Joseph Owens, in John R. Catan, ed., *St. Thomas Aquinas on the Existence of God* (1980), pp. 59f.

71. Ralph McInerny and John Deely are two contemporary Thomist writers thoroughly familiar with the relevant literature who have

addressed this point directly, McInerny in his *Boethius and Aquinas* (1990), and Deely in his *Four Ages of Understanding* (2001a), pp 290–97.

72. Aristotle, *Posterior Analytics* II, chap. 6, 74b5ff.

73. A logical reconstruction of the proof from motion by Jan Salamucha (1903–1944) of the Polish or Krakow School of Thomism is available as “Salamucha’s Proof “ex motu” of the Existence of God (Reconstruction),” *Philosophia Analytica in Polonia*, <http://www.geocities.com/Athens/Academy/8692/sal1.htm>. (last accessed May 2005).

74. See Allan B. Wolter, *The Philosophical Theology of John Duns Scotus* (1990), pp. 164–66. He also refers to Roy Effler, *John Duns Scotus and the Principle ‘Omne quod movetur ab alio movetur’* (1962), which I have not seen.

75. Suarez considers this principle more probable but not certainly demonstrated, since living things seem to move themselves, *Disputationes Metaphysicae* (1597), Disp. 18, sec. 7, vol.1, pp. 631–50, and Disp. 29, sec. 1, n.7, vol. 2, p. 23.

76. As for what remains valid and what has been falsified in Aristotle’s own science, see my book, *Aristotle’s Sluggish Earth* (1958).

77. Roger Penrose, *The Emperor’s New Mind* (1991), p. 448.

78. In fact, contrary to the claims of many evolutionary biologists, John Deely has argued that the data of biology itself is inconsistent with any claim that natural selection is the only anti-chance factor in evolution, from the fact that the developmental stages of an organism’s life exhibit a more immediate counter to chance occurrences, as does also the teleonomic behavior of organisms in their “struggle for existence.” See his “The Philosophical Dimensions of the Origin of Species” (1969a), p. 111: “There are two anti-chance factors in evolution, therefore, both located at the descriptive level: one at the level of the individual organism as such—epigenesis, the source of homeostasis and teleonomy; and another one at the level of populations—natural or evolutionary selection, the process whereby the occurrence of favorable mutations increases the adaptive fitness of organisms to meet the requirements of their environments and subsequently to better survive and reproduce.”

79. See Steven Weinberg, *Dreams of a Final Theory* (1994), pp. 236–39. He cites the view of Robert Nozick, *Philosophical Explanation* (1981), chap. 2, who grants that a final theory cannot be deduced by pure logic (!), but Weinberg then suggests that “we should search instead for arguments that would make it somehow more satisfying than

a mere brute fact.” To do this, he refers to Nozick’s suggestion of a “principle of fecundity” according to which all possible universes with their own laws actually exist. Thus, Weinberg argues (p. 258), “if these other universes are totally inaccessible and unknowable, then the statement that they exist would seem to have no consequences, except to avoid the question of why they do not exist. The problem seems to be that we are trying to be logical about a question that is not really susceptible to logical argument; the question of what should or should not engage our sense of wonder.” What is being avoided by Weinberg is a serious consideration of the arguments for the existence of a First Cause that is not material and has created by a free choice the universe we actually know. He is admitting discomfort, however, in treating our universe simply as a “brute fact,” that is, as uncaused. David Lindley, *The End of Physics* (1993), p. 244, says that Einstein hoped to show that God had to choose this universe out of all possible universes, and that this is what “[Stephen] Hawking evidently means when he asks, ‘What place, then, for a creator?’ ”

80. See chapter 4 above.

81. See chapter 2 above, the discussion of abduction/deduction/induction in note 30.

82. For Kant’s much controverted discussion of natural laws known as synthetic *a priori* in answer to Hume, see *The Critique of Pure Reason* (1781–87), I The Transcendental Doctrine of Method, chap. 1, sect. 2, pp. 606–20. Kant was attempting to strike a middle course between Hume’s skepticism and Leibnitz’s dogmatism.

83. Aristotle’s awareness of this is evident from two facts: (a) much of his discussion of questions in natural science is dialectical, that is, merely probable, and Aquinas frequently notes this fact; (b) Aristotle holds that natural laws hold only *in pluribus*, because one natural cause can interfere by chance with the effect of another. “The same certitude is not to be sought in all matters,” as he says in *Nicomachean Ethics* I, chap. 1, 1094b13–22. Aquinas states, “Hence in the study of contingents, such as are natural events and human affairs, that certitude suffices that [a proposition] be true in the majority of cases, although it fails in the minority of cases” (*Summa theologiae* I–II, q. 96, a. 1, ad 3).

84. Tycho Brahe had already raised serious difficulties about the inalterability of the heavens by his observations on the nova (new star) of 1572 and the orbits of comets; see Annibale Fantoli, *Galileo: For Copernicanism and for the Church* (1994), pp. 30–32. The Aristotelians had attempted unsuccessfully to answer this difficulty.

85. Aquinas, *Summa theologiae* I, q. 46, a. 1.

86. Aristotle does not discuss the freedom of the First Cause. It is a question that properly belongs to Metascience, which demonstrates it by the analogy of human freedom: the First Cause must be free since it creates humans and pure spirits with free will. See below, chapter 13, section B.2.

87. See Joseph Silk, *The Big Bang* (1989), 390–91.

88. See Fred Hoyle, *The Nature of the Universe* (1950), as discussed in John Deely, *Four Ages of Understanding* (2001a), p. 105.

89. Brian Greene, *The Elegant Universe* (1999), p. 366, writes, “Valiant attempts by physicists such as Stephen Hawking and James Hartle . . . have tried to bring the question of cosmological initial conditions within the umbrella of physical theory but all such attempts remain inconclusive.” See also David Lindley, *The End of Physics* (1993), pp. 242–43, who argues that in fact the first state of the universe cannot really be considered a “singularity” (since it would be one of quantum indetermination), but that Hawking’s claim that “the boundary condition of quantum cosmology is that there should be no boundary” is in fact logically circular.

90. For a fuller discussion see Willem B. Drees, *Beyond the Big Bang* (1990), pp. 51–56, and appendix 4, pp. 233–36. He says that this “theory is a timeless description of the [possible] states of the Universe” (p. 53).

Chapter 6 Unity, Plurality, and Efficient Causality

1. The theme of the transcendentals is so familiar to Thomists and scholars of later scholasticism that it can come as a surprise to learn that it is a theme that was explicitly introduced into philosophy as late as the childhood of St. Thomas Aquinas by the work of Philip Cancellarius, *Philippi Cancellarii Parisiensis Summa de Bono* (c. 1225–78). The later influence of Aquinas in particular has ensured that this theme became a common one among Latin thinkers, but in the national language traditions of modern thought this theme is far from a common one. To see this theme in perspective, I recommend consulting the index to John Deely’s *Four Ages of Understanding* (2001a), pp. 1005–6, both the entries “transcendental” and esp. “transcendentals as properties of being.” The best contemporary work in this area is probably to be found in Jorge Gracia, ed., the special issue of *Topoi* 11.2 on “The Transcendentals in the Middle Ages” (1992), and in Ian Aertsen, *Medieval Philosophy and the Transcendentals* (1996).

2. On the history of the “supertranscendentals,” see John P. Doyle, “Another God, Chimerae, Goat-Stags, and Man-Lions: A Seventeenth-Century Debate about Impossible Objects” (1995), and “Between Transcendental and Transcendental: The Missing Link” (1995).

3. See, e.g., the discussion of “Nonbeing in Latin Philosophy,” in John Deely,

Four Ages of Understanding (2001a), pp. 350–54.

4. Aristotle, *Metaphysics* X, chap. 1, 1052a5ff.; Aquinas, *Sententia super Metaphysicam* X, lect. 1, nn. 1920–36. See also Aristotle, *Metaphysics* V, chap. 6, 1016b4, and Aquinas, *Sententia super Metaphysicam* V, lect 8, n. 666.

5. Aristotle, *Metaphysics* X, chap. 2, 1053b9 sq.; Aquinas, *Sententia super Metaphysicam* X, lect. 3, nn. 1961–81.

6. Aristotle, *Metaphysics* X, chaps. 9–10, 1058b29; Aquinas, *Sententia super Metaphysicam* X, lect. 11–12.

7. Note that in this correlation of essence and existence, matter and form, the relationality in question does *not* pertain to the category of relation because it is not an accidental relation but rather a “transcendental relation,” which is defined as a “relativity intrinsic to something and identical with its subjective being,” rather than as accident. Transcendental relativity cannot be an accidental property, since such properties are distinct from the thing itself, whereas the transcendental relative is the thing itself according to its requirements for actual existence and intelligibility. For further discussion refer back to chapter 4, note 71, where we first introduced this term.

8. On Democritus, see R. E. Allen, ed., *Greek Philosophy* (1991), which gives the important fragments, and Robert S. Brumbaugh, *The Philosophers of Greece* (1981), chap. 9.

9. See Aristotle, *Physics* I, chap. 5, 188a18; and IV, chap. 5, 213a31.

10. For a detailed account, see Daniel Garber, *Descartes’ Metaphysical Physics* (1992).

11. Simon Saunders and Harvey R. Brown, eds., *The Philosophy of the Vacuum* (1991). Note that the term “philosophy” in this title, in current terminology, probably means “metaphysics.” In fact, the essays are by scientists who confine themselves almost entirely to considerations proper to natural science itself. Note also the following quotation: “In quantum mechanics, the vacuum is a much more complex entity [than in classical mechanics]; it is far from featureless and far from empty. Actually the quantum vacuum is just one particular state of a quantum field. It is the quantum mechanical state in which no field quanta are excited, that is, no particles are present. Hence, it is the ‘ground state’ of minimum energy” (G. D. Coughlan and J. E. Dodd, *The Ideas of Particle Physics* (1991), p. 33).

12. Virtual processes are unobservable and do not conserve energy and momentum over microscopic timescales (G. D. Coughlan and J. E. Dodd, *The Ideas of Particle Physics* [1991], pp. 32–33, 227).

13. Sten Odenwald, “Space-Time: The Final Frontier” (1996).

14. Aquinas, *Summa theologiae* I, q. 75, a. 4, ad 2: “Not every particular substance is a hypostasis or person, but only what has the complete nature of the species. Hence a hand or foot cannot be called a hypostasis or person, and similarly neither can the [human] soul, since it is a part of the human person.”

15. John Locke, *An Essay Concerning Human Understanding* (1690), bk. I, chap. 3, n. 19: "Idea of substance not innate. I confess there is another idea which would be of general use for mankind to have, as it is of general talk as if they had it; and that is the idea of substance; which we neither have nor can have by sensation or reflection. If nature took care to provide us any ideas, we might well expect they should be such as by our own faculties we cannot procure to ourselves; but we see, on the contrary, that since, by those ways whereby other ideas are brought into our minds, this is not, we have no such clear idea at all; and therefore signify nothing by the word substance but only an uncertain supposition of we know not what, i.e. of something whereof we have no [particular distinct positive] idea, which we take to be the substratum, or support, of those ideas we do know."

16. Alfred Norsh Whitehead, *Process and Reality* (1929), p. 34: "It is fundamental to the metaphysical doctrine of the philosophy of organism [Whitehead's own system], that the notion of an actual entity as the unchanging subject of change is completely abandoned. An actual entity is at once the subject experiencing and the superject of its experiences. It is subject-superject, and neither half of this description can for a moment be lost sight of. The term 'subject' will be mostly employed when the actual entity is considered in respect to its own real internal constitution. But 'subject' is always to be constructed as an abbreviation of 'subjectsuperject.'" Whitehead, in agreeing on this point with F. H. Bradley, also says (p. vii), "This whole metaphysical position is an implicit repudiation of the doctrine of 'vacuous actuality.'" (Whitehead did not have in mind the Existential Thomists, to be sure; but "vacuous actuality" comes very close to describing their notion of *esse* in what they claim as its "metaphysical" character detached from all finite essences!) By "superject" Whitehead means somewhat the same as an Aristotelian would mean by "teleonomy."

17. "The schema of substance is permanence of the real in time, that is, the representation of the real as a substrate of empirical determination of time in general, and so as abiding while all else changes. (The existence of what is transitory passes away in time but not time itself. To time, itself non-transitory and abiding, there corresponds in the [field of] appearance what is non-transitory in its existence, that is, substance. Only in [relation to] substance can the succession and coexistence of appearances be determined in time)" (Immanuel Kant, *The Critique of Pure Reason* [1781–87] IV, Analytic of Principles, chap. 1, "The Schematism of the Pure Concepts of Understanding," p. 184). It follows that the concept of an immaterial

substance outside time is empty.

18. For a clear explanation of this method, see Robert Sokolowski, *Introduction to Phenomenology* (2000), especially pp. 185–210, and the appendix, pp. 211–27.

19. This scholastic dictum is based on Aristotle, *Posterior Analytics* I, chap. 31, 87b27; Aquinas, *Expositio Libri Posteriorum*, lect. 42, nn. 376–80. Science is neither of chance events nor of sensible particulars.

20. For a more nuanced statement of Ockham's views on relation, consult the sources cited earlier, in chapter 3, note 39.

21. Aquinas, *Sententia super Metaphysicam* I, chap. 6, lect. 10, n. 158, and X, lect. 3, nn. 1963ff.

22. See the article by Richard S. Ruder, "Nelson Goodman" (1967).

23. Herbert A. Davidson, *Alfarabi, Avicenna, and Averroes on Intellect* (1992), studies the views of each of these authors on the immortality of the soul; see especially the summary on pp. 34–43. The tragic fate of philosophy in Islamic religion is outlined by John Deely in chap. 5, "The Geography of the Latin Age," in his *Four Ages of Understanding* (2001a), pp. 161–211, esp. 188–93, 543.

24. On "intermediary" spiritual beings, see Henri Maurier, *The Other Covenant* (1968), pp. 93–108.

25. On this see Armand Maurer, *The Philosophy of William of Ockham in the Light of its Principles* (1999), pp. 460–70.

26. According to A. L. Basham, *The Origins and Development of Classical Hinduism* (1991), pp. 36–50, this doctrine of the transmigration of souls is not Aryan and Vedic and did not appear in India until about the seventh century BCE, thus not very much before its appearance in the thought of Pythagoras in Greece, and was part of the worldwide religious reform of the "Axial Period." The Indian and Greek views are probably independent but may go back to an as yet unidentified common source. They probably arose out of a pessimistic milieu as an answer to the problem of evil.

27. Origen, *On First Principles* (c. 230 CE), chaps. 8–10, pp. 116–46.

28. See Aquinas, *Summa contra Gentiles* II, chaps. 68–72, and *Summa theologiae* I, q. 76.

29. For this whole theory of the angels, see Aquinas, *Summa theologiae* I, qq. 50–64 and qq. 107–14, and Poinso't's commentary, *Tractatus de Angelis* (1643), which, however, avoids entirely the astronomical arguments concerning angels made so tenuous in the wake of the Galileo condemnation of then-recent (1633) memory!

30. Aquinas, *Summa theologiae* I, q. 50, a. 3, and q. 112, a. 4, ad 2; *Summa contra Gentiles* I, chap. 102.; *De substantiis separatis*, c. 2, 19.

31. This point, it will be remembered, came up in chapter 4, text and note 82. This “argument from suggestion” holds well enough for the small number of elements, the greater number of inorganic compounds, and the vast number of species of living things, but, as we earlier noted, it runs into a counterfactual in the case of the insects, of which the number of species is greater than for vertebrates. Yet even here, if specific difference is judged not merely in terms of anatomy but of specific abilities, it is not so certain that all these insect species are genuine species; and, in any case, dialectical arguments do not lose their value because of some exceptions.

32. Aquinas, *Summa theologiae* I, qq. 106–14. Maritain, in his *The Degrees of Knowledge*, (1959a) p. 221, remarks that Aquinas’s theological tract on the angels “virtually contains a purely metaphysical treatise concerning the ontological structure of immaterial subsistents, and the natural life of a spirit detached from the constraints of our empirical world,” a virtuality, we may say, which Poincot brings to the fore in his 1643 *Tractatus de Angelis*.

33. Aquinas, *Summa theologiae* I, q. 10, a. 5, c; q. 53, a. 3; q. 61, a. 2, ad 2.

34. This is an interesting problem not many have dealt with: the question of how could a pure spirit go astray. See Jacques Maritain, *The Sin of the Angels* (1959b).

35. Aquinas, *Summa theologiae* I, q. 68.

36. For details of this problem, I refer the reader to Disputation 45, “De locutione et illuminatione angelorum,” in Poincot’s *Tractatus de Angelis* (1643), pp. 813–35. But I will also point out that this is proving to be a fertile field in the contemporary development of semiotics, with historical roots in the work of Aquinas. See John Deely, *Four Ages of Understanding* (2001a), pp. 333–41, esp. 338–40, and the index entry “angels,” p. 844.

37. Aquinas, *Summa theologiae* I, qq. 107, 111.

38. Plato, *Apology* (c. 399/90 BCE), 33c: “You have often heard me speak of an oracle or sign which comes to me, and is the divinity which Meletus ridicules in the indictment. This sign I have had ever since I was a child. The sign is a voice which comes to me and always forbids me to do something which I am going to do, but never commands me to do anything, and this is what stands in the way of my being a politician.” Some take this to be simply the “voice of conscience”; but Socrates believed in the oracle of Delphi and often speaks of spiritual beings.

39. Aquinas, *Summa theologiae* I, qq. 108–9. On the identity and influence of the Pseudo-Dionysius on medieval Christian thought, both philosophical and theological, see John Deely, *Four Ages of Understanding* (2001a), esp. pp. 130–35 and 141–44; consult further the index entry “Pseudo-Dionysius,” p. 871.

40. Aquinas, *Summa theologiae* I, q. 53, aa. 2 and 3.

41. See William James, *The Varieties of Religious Experience* (1902).

42. William James, *A Pluralistic Universe* (1909).

43. Available in translation by Colm Luibheid, *Pseudo-Dionysius: The Complete Works* (1987).

44. An interesting development in this regard deserves to be clearly noted. Pope Pius XII, writing in 1950, still considered the evolutionary origin of the human species to be no more than a tenable but highly debatable hypothesis. Thus, in his encyclical of that year, *Humani Generis*, section 36, he wrote that “the Teaching Authority of the Church does not forbid that, in conformity with the present state of human sciences and sacred theology, research and discussions, on the part of men experienced in both fields, take place with regard to the doctrine of evolution, in as far as it inquires into the origin of the human body as coming from pre-existent and living matter—for the Catholic faith obliges us to hold that souls are immediately created by God. However, this must be done in such a way that the reasons for both opinions, that is, those favorable and those unfavorable to evolution, be weighed and judged with the necessary seriousness, moderation and measure, and provided that all are prepared to submit to the judgment of the Church, to whom Christ has given the mission of interpreting authentically the Sacred Scriptures and of defending the dogmas of faith. Some, however, rashly transgress this liberty of discussion, when they act as if the origin of the human body from pre-existing and living matter were already completely certain and proved by the facts which have been discovered up to now and by reasoning on those facts, and as if there were nothing in the sources of divine revelation which demands the greatest moderation and caution in this question.”

His later successor, Pope John Paul II, writing in 1996, considered that subsequent advances in the physical sciences had raised the evolutionary origins of *Homo sapiens* to the level of fact, albeit one for which the full explanation is far from achieved. In his “Message to the Pontifical Academy of Sciences” in that year, he was able to say: “Today, almost half a century after the publication of the Encyclical [*Humani Generis*] new knowledge has led to the recognition of the theory

of evolution as more than a hypothesis. It is indeed remarkable that this theory has been progressively accepted by researchers, following a series of discoveries in various fields of knowledge. The convergence, neither sought nor fabricated, of the results of work that was conducted independently is in itself a significant argument in favour of this theory. . . . And, to tell the truth, rather than *the* theory of evolution, we should speak of *several* theories of evolution. On the one hand, this plurality has to do with the different explanations advanced for the mechanism of evolution, and on the other, with the various philosophies on which it is based. . . . Consequently, theories of evolution which, in accordance with the philosophies inspiring them, consider the mind as emerging from the forces of living matter, or as a mere epiphenomenon of this matter, are incompatible with the truth about man. Nor are they able to ground the dignity of the person. . . . Consideration of the method used in the various branches of knowledge makes it possible to reconcile two points of view which would seem irreconcilable. The sciences of observation describe and measure the multiple manifestations of life with increasing precision and correlate them with the time line. The moment of transition to the spiritual cannot be the object of this kind of observation, which nevertheless can discover at the experimental level a series of very valuable signs indicating what is specific to the human being. But the experience of metaphysical knowledge, of self awareness and self-reflection; of moral conscience, freedom, or again, of aesthetic and religious experience, falls within the competence of philosophical analysis and reflection, while theology brings out its ultimate meaning according to the Creator's plans."

Already early in the twentieth century, Mortimer J. Adler had shown in Thomistic philosophy the grounds on which "being human," even in an evolutionary context, is like being pregnant—that is, a matter of either/or. See his *Problems for Thomists* (1940), "Solution of the Problem of Species" (1941), and "The Hierarchy of Essences" (1952). In the second half of the century, John Deely further developed the Thomistic grounds for this thesis, and demonstrated its compatibility with modern genetic theory, in "The Emergence of Man: An Inquiry into the Role of Natural Selection in the Making of Man"(1966a). Shortly thereafter he made a full-scale Thomistic synthesis of the whole matter, "The Philosophical Dimensions of the Origin of Species" (1969a).

45. See my article, "Cosmic Community in Plotinus, Aquinas, and Whitehead" (1995b). See also my articles "Causality and Evolution" (1972), and "Change and Process" (1973); and consult the index entry "Evolution" in my *Theologies of the Body: Humanist and Christian*

(1985), p. 740.

46. See Yves R. Simon, “An Essay on the Classification of Action and the Understanding of Act” (1971).

47. Pierre Teilhard de Chardin, *The Phenomenon of Man* (1950).

Chapter 7 Unity and Plurality in Other Sciences

1. Aquinas, *Super Boetium De Trinitate*, q. 6, a. 1; cf. Leo J. Elders, S.V.D., *Faith and Science* (1974), pp. 124–28.

2. Aquinas, *Super Boetium De Trinitate*, q. 6, a. 1.

3. Aquinas, *Summa theologiae*. I, q. 85, a. 1.

4. See Carl B. Boyer, *A History of Mathematics* (1989); see also an excellent survey in J. L. Berggren, et al., “The History of Mathematics” (1974).

5. John Deely, in *Four Ages of Understanding* (2001a), p. 66, suggests a parallel for Metascience to consider, according to which “teleonomy” should replace “teleology” as the general term, just as “astronomy” replaced “astrology,” in order to jettison the excess baggage of anthropomorphisms with which the latter term has come to be burdened.

6. Aquinas, *Summa theologiae* I, q. 115, a. 4.

7. “What was distinctive of the Greeks’ contribution to mathematics—and what in effect made them the creators of ‘mathematics’ as that term is usually understood—was its development as a theoretical discipline. This means two things, statements are general, and they are confirmed by proof” (J. L. Berggren, et al., “The History of Mathematics” [1974]).

8. See esp. pp. 24ff.

9. “Plotinus largely ignores mathematics. Yet having distinguished intelligible and sensible, Plotinus, like Plato, needed to demonstrate their connections. What in Plotinus’ philosophy takes the place held by mathematics in Plato? The short answer . . . is that for Plotinus sensible objects link with intellect in so intimate a way as to need no other than sensible beauty, the unmistakable signal of the *presence* of intellect. . . . Plotinus believed that sensible beauty speaks for itself; it does not need mathematics to express its source” (Margaret R. Miles, *Plotinus on Body and Beauty* [1999], p. 35).

10. On Aristotle’s views, see Sir Thomas L. Heath, *Mathematics in Aristotle* (1949).

11. I again refer the reader to “How Mathematics Applies to the Physical Environment,” in John Deely, *Four Ages of Understanding* (2001a), p. 78.

12. Yet experts speak of certain solutions to mathematical questions as “beautiful,” and beauty is the goodness of the truth as truth and pertains to final causality. This finality, however, is not really in the mathematical object as such, but in the process of mathematical thinking whose goal is the clarity and beauty of an elegant solution.

13. Aquinas, *Super Boetium De Trinitate*, q. 6, aa. 1 and 2.

14. Aquinas, *Sentencia Libri De anima* II, lect. 12; *Summa theologiae* I, q. 78, a. 4.
15. Aquinas, *Super Boetium De Trinitate*, q. 6, a. 2; *Sententia super Metaphysicam*, VII, lect. 10, nn. 1494–96.
16. See C. H. Edwards, *The Historical Development of the Calculus* (1979).
17. See Abraham Pais, *Inward Bound* (1986), pp. 105–8. Discovered by Sadi Carnot, this is one of the basic conservation laws of physics.
18. For discussion of string theory, see one of its main proponents, Brian Greene, *The Elegant Universe* (1999).
19. Aquinas, *Summa theologiae* I, q. 10, a. 1, ad 1.
20. See Sir Thomas L. Heath, *A History of Greek Mathematics* (1921), vol. 1, pp. 354–430.
21. See Richard Courant and Herbert Robbins, *What Is Mathematics* (1941), pp. 214–34.
22. On this achievement see Stephen Gaukroger, *Descartes: An Intellectual Biography* (1995), pp. 299–304.
23. Aristotle, *Physics* V, chap. 3, 227a 17–36.
24. Aquinas, *Sententia super Metaphysicam* IX, lect 8, nn 2089–93; Aristotle, *Metaphysics* IX, chap. 6, 1057a.
25. On the Arabian invention of algebra, see J. L. Berggren, *Episodes in the Mathematics of Islam* (1986).
26. See Richard Courant and Herbert Robbins, *What Is Mathematics* (1941), pp. 88–103.
27. C. H. Edwards, *The Historical Development of the Calculus* (1979).
28. On the history and present state of this question, see A. W. Moore, *The Infinite* (1990), which also has an extensive bibliography.
29. See J. Bell, “Category Theory and the Foundations of Mathematics” (1981). The description in the text is paraphrased from the *Stanford Encyclopedia of Philosophy*, available at <http://plato.stanford.edu> (last accessed May 2005).
30. See Stephan Körner, *The Philosophy of Mathematics* (1960), and his discussion and criticism of logicist (Russell), formalist (Hilbert), and intuitionist (Brouwer) systems.
31. Aquinas, following Aristotle, analyzed sensation on the basis of a distinction between proper and common sensibles (what can be detected by one sense only vs. what can be detected by more than one sense alone) instead of the modern distinction between primary and

secondary qualities (qualities supposed to be mind-independently characteristic of things vs. ones that may be supposed to exist only in our perception). It has often been noted that the two lists of qualities that result from these two approaches are the same overall, but what is surprising is to find that a detailed comparison of the manner in which the final list is arrived at in the two cases reveals that the modern approach has logically inevitable idealistic consequences easily avoided in the other approach, which proves to be more sound according to what we have learned of the role of signs in the structuring of experience. See the extended discussion in John Deely, *Four Ages of Understanding* (2001a), “The Qualities Given in Sensation,” pp. 522–36.

32. Aquinas, *Summa theologiae*, I, q. 1, a. 1, ad 2.

33. On this see William A. Wallace, O.P., “Science and Religion in the Thomistic Tradition” (2001). Friedrich Bessel measured the first stellar parallax in 1838 for the star 61 Cygni, whose parallax places it at a distance of about eleven light-years. Other evidence had convinced the Holy See by 1820 that Copernicus was right.

34. Duhem’s pioneering history of science in ten volumes is *Le Système du Monde* (1913–1959). He has also greatly influenced the one U.S. Catholic writer who has done the most to promote good relations between Catholicism and science, Stanley L. Jaki, O.S.B.; see Jaki’s *Scientist and Catholic* (1991), and his Gifford Lectures for 1974–1976, *The Road of Science and the Ways to God* (1978). Unfortunately, Jaki accepts Duhem’s “save the appearances” view of science and underrates the Aristotelian tradition in science.

35. See Jacques Maritain, *The Degrees of Knowledge* (1959a), pp. 136–218, and *Philosophy of Nature* (1951).

36. Aristotle, *Posterior Analytics* I, chap. 2, 71b8f.

37. This is the argument of Charles De Koninck, *The Hollow Universe* (1964); see also his “The Unity and Diversity of Natural Science” (1968). See Yves R. Simon, “Maritain’s Philosophy of the Sciences” (1943), and my article, “Does Natural Science Attain Nature or Only the Phenomena?” (1961), for further discussion.

38. See William A. Wallace, O.P., *From a Realist Point of View* (1983).

39. See the discussion in chapter 4 above concerning *positive* error of the senses.

40. *A Meeting with the Universe: Science Discoveries from the Space Program* (National Aeronautics and Space Administration, Washington, DC, 1981), esp. “The Edge of the Universe,” available at <http://www.hq.nasa.gov/office/pao/History/EP-177/ch4-9.html> (last

accessed May 2005).

41. In lecture 17 of a helpful, beautifully illustrated set of astronomy lectures available at <http://abyss.uoregon.edu/~js/ast123/lectures/lec17.html>.

42. Among Catholic ethicists there are certain controversies about the autonomy of ethics that cannot be discussed in detail here. I refer the reader to my article "What Is the End of the Human Person: The Vision of God and Integral Human Fulfillment" (1994). In this article, I argue against the position of Germain Grisez, who isolates ethics from anthropology and replaces a natural ultimate end of human life with a set of incommensurable goals. For a defense of Grisez's theory, see James G. Hanink, "A Theory of Basic Goods: Structure and Hierarchy" (1988). See also my article "Fundamental Option and/or Commitment to Ultimate End" (1997b). As for the difficult theological question raised by Henri de Lubac, S.J., in his *Surnaturel* (1946), about whether or not human life has a natural as well as a supernatural goal, I prefer the view of Jean-Hervé Nicolas, O.P., *Les profondeurs de la grace* (1969), as a more correct reading of Aquinas and better protective of the gratuity of grace. De Lubac's concern was to avoid "extrinsicism," but if the natural end is subordinate to the supernatural end, as I believe Aquinas held, it is not extrinsic to the supernatural end but intrinsic to it. In Aquinas's philosophy, the notion that human nature could lack an innate final cause of the same order or that *in its natural state* apart from its fallen condition it would be unable to obtain this end by its own powers in their natural state is absurd. When Aquinas speaks of the "natural desire" for the beatific vision I believe he only means a *conditional* desire for perfect happiness that in fact transcends natural possibilities.

43. For a discussion of the problems involved, see Paul C. Stern and Linda Kalof, *Evaluating Social Science Research* (1996).

44. Aristotle and Aquinas add "military prudence." This seems correct, because military officers confront a special ethical problem, the guidance of their soldiers who must risk their lives and who are also tempted to acts of unjust violence. Yet it seems that there are also special prudential problems in other organizations. Thus, the administration of a large business corporation is not simply a technological, economic task, but also one requiring the management of personal relationships.

45. See the classical treatise of Josef Pieper, *The Four Cardinal Virtues* (1965).

46. On the ultimate end of human life, see Aristotle, *Nicomachean Ethics* X, chaps. 6–7, with Aquinas's commentary thereon; and further in

Aquinas, *Summa theologiae* I-II, qq. 1–5.

47. See Jean Porter, *The Recovery of Virtue* (1990), and Linda Trinkaus Zagzebski, *Virtues of the Mind* (1996).

48. Plato, *Republic* IV, 428–33 lists these four chief virtues and, in *Protagoras*, 340, 359, adds “holiness”; but for Plato these are simply aspects of the single virtue of “wisdom.” Aristotle, however, *Nicomachean Ethics* III, chap. 6 to V, chap. 11 discusses courage, temperance, and justice, in that order, and then, in VI, chap. 5, prudence, each as distinct virtues each having its proper object. Aquinas follows Aristotle; see Aquinas, *Summa theologiae* I-II, q. 61, a. 2, c. On Aquinas’s views, see esp. Josef Pieper, *The Four Cardinal Virtues* (1965).

49. Aquinas, *Summa theologiae* I-II, q. 75.

50. This famous controversy began with Jules A. Baisnée, “Two Catholic Critiques of Personalism” (1945), which implied that Charles De Koninck, *De la Primauté du Bien Commun contre les Personnalistes* (1943) was a criticism of Jacques Maritain’s political views, which Baisnée grouped with those of Immanuel Mounier, editor of the journal *Esprit*, and other “personalists.” This aroused I. Th. Eschmann, O.P., to write his passionate “A Defense of Jacques Maritain” (1945). In fact De Koninck’s book never mentioned Maritain, and my revered teacher Yves Simon had in “The Common Good” (1944) already argued that De Koninck, Maritain, and himself were in basic agreement on this issue. De Koninck then replied in a lengthy “In Defense of St. Thomas: A Reply to Eschmann’s Attack on the Primacy of the Common Good” (1945), in which again he did not attack Maritain but provided a much more detailed textual study of Aquinas’s views than can be found in Maritain’s works, including his *The Person and the Common Good* (1947a), published while the controversy was still fresh.

51. Aristotle, *Politics* IV, chaps. 7–9, 1293a35 sq.; Aquinas, *Summa theologiae* I-II, q. 105, a. 2.

52. Aquinas, *Summa theologiae* I, q. 113, a. 8.

53. See Stuart A. Queen, R. W. Habenstein, and Jill S. Quadaquo, *The Family in Various Cultures* (1985); William J. Bennett, *The Broken Hearth* (2001); Judith S. Wallerstein, Julie Lewis, and Sandra Blakeslee, *The Unexpected Legacy of Divorce* (2000); and E. Mavis Hetherington and John Kelly, *For Better or for Worse* (2002).

54. See Yves R. Simon, *A General Theory of Authority* (1962).

55. A concept made famous by the Darwinist biologist Richard Dawkins in his *The Selfish Gene* (1976). He did not intend “selfish” in an

ethical sense but in a behavioral, sociobiological sense applying to the efforts of all living species to survive by reproducing competitively.

56. The principle of subsidiarity requires that decisions be kept as close to the community directly affected by the decision as is compatible with the common good on the presumption that they are best informed as to its possible consequences. A corollary to the principle of subsidiarity is the principle of corporatism, which requires that, instead of relegating decisions to the central authority that has responsibility for the common good, particular groups, such as labor, professions, churches, and other productive corporations, should make these decisions, which should then be coordinated and supported by the central government insofar as they are compatible with the common good. Pope Pius XI, in his encyclical *Quadragesimo Anno* (1931), advocated corporatism in order to moderate capitalism while avoiding socialistic centralization. Corporatism was adopted by some countries but got a bad name through its abuse by fascist governments that used it to control labor unions. Nevertheless in countries that applied it correctly it has proved beneficial. See Oswald von Nell-Breuning, S.J., “The Drafting of *Quadragesimo Anno*” (1986).

57. Thomas Hobbes, *Leviathan* (1651), part 1, chap. 13, and part 2, chap. 17.

58. See Paul T. Durbin, “Advances in Philosophy of Technology? Comparative Perspectives” (1998), for controversies about the value of modern technologies.

59. Aristotle deals with the ethics of the family in *Politics* I. The *Economica* in the Aristotelian corpus is almost certainly spurious.

60. See Noel Carroll, *Philosophy of Art* (1999), for a clear statement of current issues in art criticism, especially on the relation of representation, formalism, and expression.

61. Aristotle, *De Partibus Animalium* I, chap. 5, 644b21–26.

62. See Robert Rosenblum, *Cubism and Twentieth-century Art* (1966).

Chapter 8 Truth and Formal Causality

1. Aristotle, *Metaphysics* VI, chap. 3, 1028a29.

2. It is in connection with this point that John Deely’s discussion of first philosophy as semiotics raises a question in my mind; see his “Semiotics and First Philosophy” (1988).

3. Aquinas, *Summa theologiae* I, q. 12, a. 4, c.; q. 14, a. 2, ad 2; q. 9, a. 2. Recall our discussion of self-awareness in chapter 4 above.

4. See Bernard Lonergan, *Method in Theology* (1972), pp. 130–33. This conversion can be moral and religious as well as intellectual, and can be defined as a “transformation of the subject and his world” (p. 130). In early works Lonergan called it “self-appropriation,” i.e., the selfunderstanding and free acceptance of the subject.

5. Which is exactly why Peirce coined the name “pragmatism” upon seeing his original coinage “pragmatism” veer toward ruin in lesser hands, as we mentioned earlier (in chapter 2, text and note 58). That process continues today, in the work of Rorty and others.

6. Charles Sanders Peirce, “What Pragmatism Is” (1905).

7. G. E. Moore claimed that it is a logical fallacy to argue from the “is” to the “ought.” True enough, since the first principles of ethics are evident from moral experience without demonstrations. Nevertheless, this intuitive knowledge presupposes that we know that we have natural needs that must be satisfied if we are to be happy, and the fact that we have such needs and why we have them are theoretical questions of “is.” See John Deely, “Evolution and Ethics” (1969b), which includes a discussion of the fallacy of Moore’s fallacy.

8. John Dewey, *Art As Experience* (1934a).

9. Among anthropologists, Paul Radin, in *The World of Primitive Man* (1971) and *Primitive Man As Philosopher* (1957), showed that so-called “primitives” are not so different in their reflections from “modern man.”

10. On this, see Walter J. Ong, S.J., *Orality and Literacy* (1991).

11. Arnold Pacey, in *Technology in World Civilization* (1991), states the pro and con of this development.

12. For illustrative selections, see Sarvepalli Radhakrishnan and Charles E. Moore, *Source Book in Indian Philosophy* (1957). For analysis, see Surendranath Dasgupta, *A History of Indian Philosophy* (1922–55); Karl H. Potter, ed., *Encyclopedia of Indian Philosophies*, vol. 3 (1981); and Ninian Smart’s article, “Indian Philosophy” (1967).

13. See Youlan Feng, *A History of Chinese Philosophy* (1952–53); and for the period before 221 BCE, Benjamin I. Schwartz, *The World of Thought in Ancient China* (1985).

14. On this trend, see James T. Burtchaell, C.S.C., *The Dying of the Light* (1998), and George Marsden, *The Soul of the American University* (1994).

15. The most authoritative statement of the self-understanding of the Catholic Church is the “Dogmatic Decree on the Constitution of the Church” (*Lumen Gentium*) of Vatican II (1964). Those churches separated from the Roman Catholic Church each have their own view of what Church Jesus founded, or even if he founded a “church”!

16. For the history of Jewish philosophy and its relatively small influence on Orthodox rabbinical Judaism, see, in the *Encyclopedia Judaica*, the entry by Arthur Hyman, “Philosophy” (1972), and Julius Guttmann, *Philosophies of Judaism* (1964).

17. For Islam, see John L. Esposito, *Islam: The Straight Path* (1998). He writes (p. 74): “Ironically, despite the genius of Muslim philosophers their impact on Islamic thought was marginal.” This was in part the result of the great influence of a Sufi mystic, al-Ghazali, who, in a famous work titled *The Incoherence of the Philosophers* (c. 1095 CE), attacked the great medieval Arabic philosophers as dangerous to faith and unnecessary. For the general picture, see John Deely, “The Contribution of Islam to Philosophy in the Latin Age,” in *Four Ages of Understanding* (2001a), pp. 186–93; for detail on the al-Ghazali case, see W. Montgomery Watt, *Muslim Intellectual: A Study of al-Ghazali* (1963).

18. Pope John Paul II, *Fides et Ratio* (1998). The text is also available on the Catholic Information Network (CIN) at <http://www.cin.org/jp2/fides.html> (last accessed May 2005).

19. See my *Choosing a Worldview and Value System* (2000); for a more general discussion of theories of apologetics, see Avery Dulles, S.J., *A History of Apologetics* (1999).

20. John (Juan) J. Arintero, O.P., *The Mystical Evolution* (1979), is a profound treatise on Catholic mysticism with much historical information and quotation from mystics about their experiences.

21. See E. E. Evans-Pritchard, *Theories of Primitive Religion* (1965), and Mircea Eliade, *Myth and Reality* (1963).

22. This is not to deny that sophisticated philosophical thought developed in these traditions as, for example, in the late-eighth-century CE writings of Shankara.

23. For discussion and bibliography, see Sandra Stahlman, “The Relationship Between Schizophrenia and Mysticism: A Bibliographic Essay” (1992). The upshot of present research seems to differentiate between psychotic “mysticism” and religious experiences of normal subjects, but is too often based on reductionist assumptions.

24. See Mircea Eliade, *Yoga: Immortality and Freedom* (1969), on yoga techniques and their aims.

25. Jacques Maritain, “The Natural Mystical Experience and the Void” (1943b). This is studied in detail by James Arraj, *On the Road to the Spiritual Unconscious* (1993), who shows that Maritain distinguishes three forms of contemplation: (1) metaphysical, (2) nature mysticism, and (3) infused contemplation.

26. Aquinas, *Summa theologiae* I, q. 19, a. 10.

27. Aquinas, *Summa theologiae* II-II, q. 2, a. 3.

28. Walter T. Stace, *Mysticism and Philosophy* (1960).

29. According to St. Thomas, the essence of mysticism properly so-

called is an action of God directly upon the soul of the mystic; see John Poinset, "De Donis Spiritus Sancti," (1637), and summary discussion in John Deely, *Four Ages of Understanding* (2001a), p. 127.

30. See J. A. DiNoia, O.P., *The Diversity of Religions* (1992).

31. The classic treatment of this subject is Ronald A. Knox, *Enthusiasm* (1950).

32. The *Catechism of the Catholic Church* (1997), # 1673, states: "When the Church asks publicly and authoritatively in the name of Jesus Christ that a person or object be protected against the power of the Evil One and withdrawn from his dominion, it is called exorcism. Jesus performed exorcisms, and from him the Church has received the power and office of exorcizing. In a simple form, exorcism is performed at the celebration of Baptism. The solemn exorcism, called "a major exorcism," can be performed only by a priest and with the permission of the bishop. The priest must proceed with prudence, strictly observing the rules established by the Church. Exorcism is directed at the expulsion of demons or to the liberation from demonic possession through the spiritual authority which Jesus entrusted to his Church. Illness, especially psychological illness, is a very different matter; treating this is the concern of medical science. Therefore, before an exorcism is performed, it is important to ascertain that one is dealing with the presence of the Evil One, and not an illness." In 1999, on issuing new rules for the conduct of exorcisms, John Paul II also emphasized the importance of care in distinguishing demonic possession from mental illnesses.

33. See Aristotle, *Posterior Analytics* I, chap. 2, 71b9ff. For the diversity and autonomy of sciences, see I, chap. 28, 87b5.

34. Aristotle, *Metaphysics* IV, chap. 3, 1005a19; and Aquinas's commentary, *Sententia super Metaphysicam* IV, lect. 5.

35. See especially Plato's works *Protagoras*, *Gorgias*, and *Theaetetus*; and W. K. C. Guthrie, *History of Greek Philosophy* (1962–81), of which vol. 3 deals with the Sophists. S. Mailloux, ed., *Rhetoric, Sophistry, Pragmatism* (1995), provides essays relating ancient sophistry to modern authors.

36. An interesting introduction with a variety of interpretations is Myles Burnyeat and Michael Frede, eds., *The Original Sceptics* (1997). For a selection of texts, see Julia Annas and Jonathan Barnes, *The Modes of Scepticism* (1985); also Richard H. Popkin, *The History of Scepticism* (1979), and *The High Road to Pyrrhonism* (1980).

37. See P. Couissin, "The Stoicism of the New Academy" (1983), and Cicero, *Academica* (c. 47 BCE).

38. Unfortunately, as we shall further see, after the twelfth century,

Islamic civilization lost the confidence in reason that the Christian European civilization managed to retain, and seems as a whole to have fallen victim to fideism ever since; see John Deely, *Four Ages of Understanding* (2001a), pp. 188–93.

39. See Augustine, *Against the Academicians* (386 CE).

40. See Lloyd P. Gerson, *Plotinus* (1994); John Dillan and Lloyd P. Gerson, ed., *Neoplatonic Philosophy: Introductory Readings* (2004); and Lloyd P. Gerson, ed., *Cambridge Companion to Plotinus* (1996).

41. The great modern authority on this esoteric tradition was Gerhsom Gerhard Scholem who died in 1982; see his *Kabbalah* (1974).

42. Peirce went so far as to dismiss the Cartesian origins of modern philosophy on just this ground, the artificialness of its doubt!

43. Descartes' main texts are *Discourse on Method* (1637) and the *Meditations on First Philosophy* (1641), available in the translations by John Cottingham, Robert Stoothoff, and Dugald Murdoch, *The Philosophical Writings of Descartes* (1984–91). For analysis, see John Cottingham, ed., *The Cambridge Companion to Descartes* (1992).

44. For an introduction to Bacon, see F. H. Anderson, *The Philosophy of Francis Bacon* (1948).

45. On Harvey, see W. C. Harrison, *Dr. William Harvey and the Discovery of Circulation* (1967). Harvey (1578–1657), a contemporary of Galileo, Poinot, and Descartes, studied at the University of Padua, as did Galileo. Harvey's scientific methodology is thoroughly Aristotelian, although some writers emphasize his use of quantitative arguments. But there is nothing un-Aristotelian about this, especially in that he uses only quantitative arguments of rough proportionality.

46. This anti-Aristotelian division is proposed in Bacon's *Novum Organum* (1620); cf. F. H. Andersen, *The Philosophy of Francis Bacon* (1948), pp. 144–80, on the classification of the sciences.

47. See chapter 2 above.

48. The only current history of philosophy which has taken thematic note of this fact, both in itself and in its consequences for distinguishing true postmodern from mere late modern (or "ultramodern") philosophy is John Deely's *Four Ages of Understanding* (2001a). See chaps. 12, 13, 15, and 16 in particular.

49. In Neo-scholastic thought generally, and in the work of Mortimer J. Adler in particular, it became fashionable to insist on the *quo/quod* distinction, as between our concepts and the things known through them. In fact, in the context of Thomistic thought, this is a reductionist error, for St. Thomas insists on distinguishing between sensation, in

which there is only a *species impressa*, which is the *quo* whereby the senses are put in contact with the very things of the immediate physical environment, and perception, which, like intellection, depends not only on a *species impressa* as “quo” but more immediately on the *species impressa* as “in quo.” Thus concepts, as distinct from and superordinate to sensations, “precisively taken as such,” are never simply that *through or by which* we know things, but rather *that on the basis of which* we are related to things as objects known. On this important point, see John Poinset, *Tractatus de Signis* (1632), book 2, question 2, “Whether a concept [a *species expressa*] is a formal sign”; question 3, “Whether an impressed specification [a *species impressa*] is a formal sign”; and question 4, “Whether an act of cognizing is a formal sign.” What Poinset calls a “formal sign” is precisely the *species expressa*, distinguished from the *species impressa* as “id in quo” from “id quo,” and both alike distinguished from “id quod” or “that which” is known. So there is, for a Thomism that is not *over* simplified, no *quo/quod* dichotomy, but rather a *quo/in quo/quod* trichotomy, without which it is impossible to correctly explain the difference between either “sense and intellect” or “intellection and perception.” For an up-to-date discussion of this important topic, see John Deely, *What Distinguishes Human Understanding?* (2002a).

50. See “Journey’s End, Journey’s Beginning,” in John Deely, *Four Ages of Understanding* (2001a), pp. 584–89.

51. See Robert Henle, S.J., “Thomas Reid’s Theory of Signs” (1983b). See further John Deely, “What To Do with Common Sense?” in *Four Ages of Understanding* (2001a), pp. 547–48, and the dialogue in part 3 of his *The Impact on Philosophy of Semiotics*, (2003), pp. 192–93.

52. On Wittgenstein and Russell, see John Deely, *Four Ages of Understanding* (2001a), pp. 581–84.

53. See chapter 2 above, for discussion of these trends.

54. Willard Van Orman Quine, “Two Dogmas of Empiricism” (1980). This was directed, in particular, against the Logical Positivism of his teacher, Rudolf Carnap.

55. For a brief introduction to this current philosophical movement, see John E. Thiel, *Neofoundationalism* (1994), pp. 1–37, with bibliography, p. 119. Wilfrid Sellars’s position is stated in his “The Structure of Knowledge” (1975). For more detailed argumentation, see Jonathan Dancy, *Introduction to Contemporary Epistemology* (1985), with helpful bibliography, pp. 243–50.

56. Jonathan Dancy, *Introduction to Contemporary Epistemology* (1985), p. 116.

57. Willard Van Orman Quine, "Two Dogmas of Empiricism" (1980), p. 44.

58. For a concise statement of this argument, see Frederick Grinnell, "Radical Intersubjectivity: Why Naturalism Is an Assumption Necessary for Doing Science" (1994), an answer to Phillip Johnson's *Darwin on Trial* (1993). Consult also <http://www.leaderu.com/orgs/fte/darwinism/chapter8.html>.

59. See the discussion in chapter 2 above.

60. W. Norris Clarke, S.J., in his text *The One and the Many* (2001), treats the existence of God as a purely metaphysical question, and does not distinguish (as does Aquinas) between the demonstration of God's existence in *philosophia naturalis* and the discussion of His essence and attributes in metaphysics. Clarke holds that there are two basic types of philosophical (metaphysical) argument for the existence of God (p. 215): "A. *The Cosmic or Outer Path* taking the whole world around us, including ourselves, as starting point, and concluding to a single Ultimate Source of all being. This is the traditional path through efficient and final causality. B. *The Inner Path*, exploring the depths of our inner conscious life to find God as the Ultimate Goal of one's inner drive toward the fullness of Truth and Goodness (Love). This Inner path reaches God as *my* ultimate Good and Goal, but not immediately as the Source of all being, the full notion of God. Hence it must be completed by the Cosmic Path to be philosophically adequate, though an individual may well be psychologically satisfied by the inner path alone." This inner path is the same as that proposed by Transcendental Thomists. Clarke, in his earlier work, *The Philosophical Approach to God* (1979), dealt with the same two paths. But at that time, for the outer, "cosmic" path, he preferred the fourth way from participation (formal causality) derived from Platonism. In *The One and the Many*, for the "cosmic path" he now privileges efficient causality (p. 215). He says that the Transcendental Thomist inner path, "to be philosophically adequate," must "be completed by the Cosmic Path." Thus he has now, in this respect, again come closer to the traditional Thomist position I advocate. The fourth way of participation stressed in *The One and the Many* still plays an essential role in Clarke's arguments for answering questions about the unity and essence of God. I have no disagreement with this, provided the question of whether "God" exists is given priority over the question of "what" God is.

61. Maritain, no mean Thomist, himself a "transcendental" when it comes to the question of to which category of modern Thomism does he finally belong (since no one contains him, just as no category contains a

transcendental property of being), “pins on it the basis of realism itself in philosophy,” according to John Deely in *Four Ages of Understanding* (2001a), p. 345.

62. See the remarks on induction in chapter 2 above, note 30, in connection with the replacement, or supplementation, of the “hypothetico-deductive” model of scientific experience with that of “abduction-deduction-induction,” expressing the action or role of signs in human understanding.

63. Aristotle, *Posterior Analytics* II, chap. 3, 90b17ff.

64. In postmodern thought, this point, probably for the first time in philosophy’s long history, has been foregrounded under the heading of *Umweltsforschung*, a promising development for philosophy that I can only mention here. See Kalevi Kull, ed., *Jakob von Uexküll: A Paradigm for Biology and Semiotics* (2001); and “The Definition of Umwelt,” appendix to John Deely, *What Distinguishes Human Understanding* (2002a), pp. 126–43.

65. The explicit awareness of mind-dependent being as an objective, not simply a subjective, element of human awareness, occurs very late, and, it would seem, as part of the fascinating story of the Latin debt to the Arab philosophers before fideism became the dogmatic view of Islam after the fateful twelfth century; see John Deely, *Four Ages of Understanding* (2001a), chap 6, esp. pp. 229–32.

66. For example, John Poinset, *Cursus Philosophicus*, (1631–35), I, Log. II, q. 17, a. 11, line 34ff. See also his *Tractatus de Signis* (1632), appendices 1 and 2.

67. Aquinas, *Summa theologiae* I, q. 78, a. 4. In animals, it is called the *vis aestimativa* or *ratio particularis* or “animal intelligence”; see John Deely, “Animal Intelligence and Concept-Formation” (1971). In this matter, the reader needs to assimilate in particular the difference between the popular “quo/quod” dichotomy and the more authentically Thomistic “quo/in quo/quod” trichotomy, introduced in this chapter previously; see note 49 above.

68. Such as monogamy for human males in child-rearing, which I have suggested (chapter 7) would have been a selection pressure on *Homo sapiens sapiens* counter to the polygamous pressure on male primates generically.

69. See Asa Kasher, ed., *The Chomskyan Turn* (1991), for more recent essays on Chomsky’s linguistics. Also, as John Deely has pointed out, *Four Ages of Understanding* (2001a), p. 728, n. 167, the linguistics of Chomsky are more properly Kantian than Cartesian in thrust.

70. See my remark in chapter 4, note 96 above.

71. We have every reason to expect this parlous condition of science in its originary modern period will be remedied early in the postmodern era with the addition to the previously dichotomously conceived “hypothetico-deductive model” of the process of abduction, as mentioned earlier (chapter 2, note 30).

72. See Piotr Jaroszynski, “A Brief History of Lublin Thomism” (2002) The leading thinker of this school is Mieczyslaw A. Krapiec; see his *I-Man; An Outline of Philosophical Anthropology* (1983), and *Metaphysics: An Outline of the History of Being* (1992). With a personalist emphasis, this work proposes a way to return to an “existential” Thomism that employs phenomenological methods. Karol Wojtyla taught at Lublin, as well as at Cracow, and is often considered a member of the Lublin school.

73. John Deely, in his *Four Ages of Understanding* (2001a), p. 219, notes that St. Augustine only included cognitive states under his concept of “sign” as did the medievals, but Deely further shows that the modern notion of “cathexis” or signs that are affective psychological states is also valid. See his *The Impact on Philosophy of Semiotics* (2003) part 3, pp. 111–12; 195–97 (on overcoming the “inner/outer” distinction), esp. n. 64; and 201–2, text and n. 84. Cf. Talcott Parsons and Edward Shils, eds., *Toward a General Theory of Action* (1951).

74. John Deely has suggested to me that this may well have been the ultimate theoretical cause of Husserl’s break with Heidegger in their abortive effort to reach a common formulation of the phenomenological method. See Martin Heidegger’s draft for Edmund Husserl toward a proposed joint article for the *Encyclopedia Britannica*, “The Idea of Phenomenology” (1922).

75. This term has received currency especially through its use by Wojtyla during his tenure as pope; see Pope John Paul II, *Theology of the Body* (1997). I have treated the subject in my *Theologies of the Body* (1985).

76. Surprisingly, semiotics has proven to be the context in which the most complete picture of causality has emerged, precisely because the notion of “semiosis” as the action consequent upon the being proper to signs (*agere sequitur esse*) demands a full explicitation of the notion of formal cause we are here discussing. See John Deely, “How Do Signs Work?,” chap 6 in his book, *New Beginnings* (1994b). A summary can be found in his *Four Ages of Understanding* (2001a), p. 633, n. 73.

77. Cornelio Fabro, *La nozione metafisica di partecipazione secondo S. Tommaso d’Aquino* (1950), and *Participation et causalité selon S. Thomas d’Aquin* (1961).

78. See Rudi A. te Velde, *Participation and Substantiality in Thomas Aquinas* (1995).

79. Information theory was the invention of Claude Shannon (1917–2001), and deals with the reduction of “information” (in the more general sense that includes all kinds of knowledge) to its expression in digital code.

80. For discussion of the role of the genome from a Thomistic perspective, see the article by Benedict M. Ashley, O.P., and Albert Moraczewski, O.P., “Cloning, Aquinas, and the Embryonic Person” (2001).

81. Pierre Teilhard de Chardin’s famous *The Phenomenon of Man* (1959) was heavily influenced by Henri Bergson’s *Creative Evolution* (1909). This latter work was penetratingly criticized in Thomistic perspective by Jacques Maritain, *Bergsonian Philosophy and Thomism* (1968). For a Thomistic evaluation directly of Teilhard, I recommend John Deely, “The vision of Man in Teilhard de Chardin” (1966).

82. G. D. Coughlan and J. E. Dodd, *The Ideas of Particle Physics* (1991), pp. 195–96, and Brian Greene, *The Elegant Universe* (1999), p. 177.

83. Murray Gell-Mann, *The Quark and the Jaguar* (1994), pp. 131–34.

84. Aquinas, *Summa theologiae* I, q. 91, a. 2.

85. See the criticisms of Darwinism by Michael J. Behe, *Darwin’s Black Box* (1996), and Niles Eldredge, *Reinventing Darwin* (1995). On behalf of Darwinism, see Richard Dawkins, *The Blind Watchmaker* (1986), and Daniel C. Dennett, *Darwin’s Dangerous Idea* (1995).

86. See John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological Principle* (1986). The principle has a “strong” form and a “weak” form. The strong form would make it possible to predict from natural laws that intelligent life will eventually emerge, while the weak form simply states that, given the fact of life, the laws and history of the universe must have been such as to permit intelligent life to arise. My argument refers only to the weak form. John Deely’s argument in “The Philosophical Dimensions of the Origin of Species” (1969) would support rather some version of the strong form.

87. In his *Dreams of a Final Theory* (1994), Weinberg expresses his hope (which he thinks may be realized in our times): “In my view, our best hope along this line is to show that the final theory, though not logically inevitable, is logically *isolated*. That is, it may turn out that, although we shall always be able to imagine other theories that are totally different from the true final theory (like the boring world of particles

governed by Newtonian mechanics), the final theory we discover is so rigid that there is no way to modify it by a small amount without the theory leading to logical absurdities. In a logically isolated theory every constant of nature could be calculated from first principles; a small change in the value of any constant would destroy the consistency of the theory” (p. 236). Yet earlier he has refuted the significance of the anthropic cosmological principle with its theistic implications by arguing that perhaps our universe with intelligent creatures is only one of many (p. 221). His opinion of philosophy is not very high, “The insights of philosophers have occasionally benefitted physicists, but generally in a negative fashion—by protecting them from the preconceptions of other philosophers” (p. 166). He, however, is something of a philosopher in exploring these issues, but unfortunately fails to examine his own presuppositions, such as his basic assumption that there can be natural laws that are not teleonomic, that is, expressive of the predetermined outcome of efficient forces making for a universe sufficiently stable to be known scientifically.

88. Stephen Jay Gould, *The Structure of Evolutionary Theory* (2002).

89. See William A. Dembski, *The Design Inference* (1998).

90. Stuart A. Kauffman, *The Origins of Order* (1993), p. xiii and *passim*, and *At Home in the Universe* (1995).

91. For an introduction, see James Gleick, *Chaos* (1987).

92. “Demiurge” is from the Greek for craftsman. On this see Renford Braumbaugh, “Demiurge” (1967).

Chapter 9 Truth in the Special Sciences

1. See Thomas McGovern, S.J., “The Division of Logic” (1955), and “The Logic of the First Operation” (1956), in which he shows that the later Latin scholastic division of logic into “formal” and “material” as classically presented in John Poinset, *Cursus Philosophicus* (1631–35) I, prologue, p. 5, wholly defensible on its own terms, is yet not the line of development directly suggested in or founded on the original views of Aristotle and Aquinas, as we will see in this chapter.

2. See Pierre Conway, O.P., and Benedict M. Ashley, O.P., *The Liberal Arts in St. Thomas* (1959). Also John Deely, “Semiotic and the Liberal Arts” (1985b), and “The Origin of the Liberal Arts” and “The Seven Liberal Arts” in *Four Ages of Understanding* (2001a), pp. 183–86.

3. See chapter 3, section C, above.

4. In the medieval world, the theory of defining terms was elaborately developed on the basis of a little book on the subject written c. 271 CE, by Porphyry the Phoenician entitled *Isagoge*. For a clear summary treatment of this matter, see “The

Tree of Porphyry” in John Deely, *Four Ages of Understanding* (2001a), pp. 144–54.

5. Lewis Carroll, *Through the Looking Glass* (1871).

6. This is a principal theme of David B. Burrell’s study of *Analogy and Philosophical Language* (1973).

7. See Ralph McInerny, *Aquinas and Analogy* (1996), for a thorough analysis of this question. See also his earlier works, *The Logic of Analogy* (1961), and *Studies in Analogy* (1968), pp. 279–86, and his essay, “The Analogy of Names Is a Logical Doctrine” (1986). For a collection of Aquinas’s texts, see George Klubertanz, *Thomas Aquinas on Analogy* (1960). A valuable parallel study of the question is Bernard Montagnes, O.P., *La doctrine de l’analogie de l’être d’après Saint Thomas D’Aquin* (1963). The discussion is further advanced by John Deely, “The Question of Analogy,” in *Four Ages of Understanding* (2001a), pp. 313–31, and “The Absence of Analogy” (2002b).

8. The Greek word *analogia* was used by Aristotle only in an ontological sense. He used other terms for analogy in the linguistic sense as discussed here; cf. McInerny, *Aquinas and Analogy* (1996), pp. 30–50, and Deely, “The Question of Analogy,” in *Four Ages of Understanding* (2001a), pp. 313–31.

9. See Marcel Danesi, *Cool* (1999).

10. Aristotle, *Poetics*, chap. 22, 1449a5–6.; cf. all of chaps. 21–22.

11. See the later sections of John Deely, “The Absence of Analogy” (2002b).

12. See David B. Burrell, *Analogy and Philosophical Language* (1973), pp. 57–60.

13. Aristotle, *De Interpretatione*, chap. 1, 9–18; Aquinas, *Expositio Libri Peryermentias* I, lect. 3, n. 35.

14. For a full analysis of this matter, see John Deely, “The Supplement of the Copula” (1992).

15. Aristotle, *Posterior Analytics* I, chap. 10, 76a30 sq.; Aquinas, *Expositio Libri Posteriorum* I, lect. 18, n. 151.

16. See the section “Neither Monism nor Dualism but ‘Trialism’: The Triad of Act, Potency, and Privation,” in John Deely, *Four Ages of Understanding* (2001a), 67–70.

17. A notable example is the collection of 158 constitutions of Greek states Aristotle gathered in preparation for writing his *Politics*, only one of which (that of Athens) survives. The list of Aristotle’s works given by Diogenes Laertius, *Lives and Opinions of Eminent Philosophers* (c. 220 CE), vol. 1, pp. 464–74, contains many lost works, of which many were probably “histories,” collections of data.

18. See the discussion in chapter 2, note 30. In the *Posterior Analytics* II, chap. 19, 99a15ff. (Aquinas, *Expositio Libri Posteriorum* II, lect. 20, nn. 582–96), Aristotle sums up his view on how we know indemonstrable first principles, namely, by direct intuition from sense experience. See also *Metaphysics* I, chap. 1. While this might be called an “induction,” it is not an inductive *argument*, since these premises are

indemonstrable; and, as we have seen, as an induction it is an *ascending* induction, that is, an *abduction*.

19. Robert Sokolowski, *Introduction to Phenomenology* (2000), pp. 7 and 206–8, holds that Phenomenology and Thomism are not contradictory and differ principally in that the latter is developed within a Christian framework and the former is not.

20. Aristotle, *De Anima* II, chap. 12, 424a18; Aquinas, *Sententia Libri De anima* II, lect. 24, nn. 551–54.

21. John Poinset, *Cursus Philosophicus* (1631–35) I, log. II, a. 2, a. 4, pp. 304–6.

22. See David B. Burrell, *Analogy and Philosophical Language* (1973), pp. 57–86.

23. Although in fact there is no real difference between Nominalism and Conceptualism, as Peirce emphatically observed (1909: “Meaning,” CP 1.27), concluding that “Their calling their ‘conceptualism’ a middle term between realism and nominalism is itself an example in the very matter to which nominalism refers”—“but another example,” he avers, of a “loose and slapdash style of thinking.” See the discussion of “The Problem of ‘Universals’ and the First Florescence of Nominalism,” in John Deely, *Four Ages of Understanding* (2001a), pp. 243–47; also “The Second Florescence of Nominalism,” *ibid.*, pp. 386–88.

24. Goodman, in his *Ways of Worldmaking* (1978), pp. 94–97, argues for a “constructive nominalism,” according to which thought is a matter of constructing a tenable worldview. In his own words: “The message, I take it, is simply this: never mind mind, essence is not essential, and matter doesn’t matter. We do better to focus on versions rather than worlds.”

25. While the forms of formal logic are the same in all sciences, and the discussion of their application in the *Posterior Analytics* applies in all sciences in a general manner, yet each autonomous science presents certain methodological peculiarities. For example, in mathematics the existence of entities is proved by “construction” demonstrations that are hardly feasible in other sciences; and the practical sciences differ from the theoretical in that their demonstrations are always from the relation of means to ends.

26. Aquinas, *Expositio Libri Peryermenias*, Proemium, nn. 1–3.

27. And see also Aquinas, *Summa theologiae*, I, q. 54, a. 5; q. 58, aa. 3 and 4.

28. See “How To Deal with Contradictions?” for the ancient metascientific context in which this question first came to the fore, in John Deely, *Four Ages of Understanding* (2001a), pp. 125–26.

29. For logic in India, see Anton Dumitriu, *History of Logic* (1977), vol. 1, pp. 12–39.

30. See “Logic, Ontology, and Language in Ancient China: A Survey of Contemporary Studies,” available at <http://www.formalontology.it/chinese-philosophy.htm> (last accessed May 2005). See also “Chinese mathematics: An overview of Chinese mathematics,” available at <http://www-groups.dcs.st-and.ac.uk/~history/Indexes/Chinese.html> (last accessed May 2005).

31. See Walter J. Ong, *Ramus, Method, and the Decay of Dialogue* (1958).

32. For the ups and downs of the history of logic, see Anton Dumitriu, *History of Logic* (1977); also William Kneale and Martha Kneale, *The Development of Logic* (1962), and I. M. Bochenski, *A History of Formal Logic* (1970), the single most useful source book.

33. My much admired friend and mentor in Aristotelian studies, Hippocrates Apostle, in his *Aristotle’s Philosophy of Mathematics* (1952) held that Aristotle thought there was a “general mathematics” broader than geometry and arithmetic, with more universal principles. I am convinced by Charles B. Crowley, O.P., *Universal Mathematics in Aristotelian-Thomistic Philosophy* (1980), that this is not the case.

34. See Stephan Körner, *The Philosophy of Mathematics* (1960), for thorough explanation and critique of the logicians, formalists, and intuitionist theories; also Paul Benacerraf and Hilary Putnam, eds., *Philosophy of Mathematics* (1964).

35. On this see Willard Van Orman Quine, *Word and Object* (1960), pp. 233–76. It should be noted that Quine contrasts Platonic Realism against Nominalism and prefers what he calls Nominalism. As he describes his “Nominalism,” it in fact seems to be very much like what Thomists call “Moderate Realism,” since, while Quine rejects the notion that logical classes are real objects, he admits that they apply univocally to their members.

36. *Ibid.*, p. 262.

37. See Brouwer’s essays, “Intuitionism and Formalism” and “Consciousness, Philosophy, and Mathematics” (1964).

38. By “theory” in literary criticism is often meant a method derived from the Marxist inspired “critical theory” of the Frankfurt School (see note 42 in this chapter below), for which see Trent Schroyer, *The Critique of Domination* (1973).

39. On this, see Enrico Berti’s essay, “Does Aristotle’s Conception of Dialectic Develop?” (1996), criticizing Terence Irwin’s also very helpful book, *Aristotle’s First Principles* (1988).

40. Aristotle, *Topics* I, chap. 2, 101a25–26.

41. See chapter 5, notes 36 and 37, for Lawrence Dewan's argument that, since metaphysical principles are prior to all human thought, metaphysics cannot presuppose any other science.

42. For an introduction, see Rolf Wiggerhaus, *The Frankfurt School* (1994), and the work of Martin Jay, *The Dialectical Imagination* (1996). For Habermas, see his *The Theory of Communicative Action* (1984), and Raymund Geuss, *The Idea of a Critical Theory* (1981).

43. Aristotle, *Rhetoric* I, chap. 1, 1354a12–31.

44. *Ibid.*, chap. 2, 1356a5–15.

45. Clement Greenburg, *Art and Culture* (1979), was the outstanding proponent of formalism in art criticism in the United States. Roger Fry and Clive Bell had promoted similar views in England. This view dominated art criticism in the twentieth century but has now been supplanted by more politically directed views.

46. Aristotle, *Physics* II, chap. 5, 196b10ff.

47. Nick Herbert, *Quantum Reality* (1985). Briefly, the eight options are as follows: (1) The Copenhagen interpretation of Niels Bohr: "There is no quantum world; only an abstract quantum description"; (2) Phenomenalism: "All we can know as real are the observed, measured phenomena"; (3) Contextualism: "The world is a seamless whole in which the distinction between the observer and what is observed is unknowable"; (4) Many-worlds: "All possibilities are actually real in some of many worlds, but we only observe our own world at this moment"; (5) Quantum logic: "The logic of quantum reality is different than the logic of our human world"; (6) Neo-realism (Einstein): "There must be hidden objects yet to be discovered acting by deterministic laws that ground quantum theory"; (7) Creative consciousness: "It is our conscious act of observation that produces the observed quantum fact"; and (8) the potentialactual theory of Heisenberg: "Quantum theory states the potentialities of material reality, but what we observe is the actualization of only particular possibilities."

48. Clearly discussed by Nick Herbert, *Quantum Reality* (1985), chap. 12, pp. 211–32. This theorem was proposed by John Stewart Bell, an Irish physicist, in 1964, and continues to be a source of much debate. See Murray Gell-Mann, *The Quark and the Jagaur*, pp. 172–76, who, however, thinks to claim that *actio in distans* is involved is mere "flapdoodle."

49. Aquinas, *Sentencia Libri De anima* II, lect. 14, nn. 404–34. This point is made even more explicitly by St. Albert the Great in his *De Anima* commentary, book II, tract. 3, chap. 10, as follows: "For as we

have proved in our commentary on the *Physics* [II, tract. 2, chap. 8], the generation of every form in matter is instantaneous when as a whole and equally that matter is prepared to receive the form; and is thus prepared both at its surface and in depth, although limited by its surface. And therefore immediately at the rise of the sun light is generated as present equally at every distance, near and far, to which the compass of the illuminating body can be extended; and although light seems to be moved from place to place, this is only the instantaneous renewal of its original generation.”

50. See Bibhutibhusan Datta and Avadhesh Narayan Singh, *History of Hindu Mathematics* (1935), and Yan Li and Shiran Du, *Chinese Mathematics: A Concise History* (1987).

51. On this subject see Robin George Collingwood, *The Idea of History* (1946); Hans Meyerhoff, *The Philosophy of History in Our Time* (1959); C. T. McIntire, ed., *God, History, and Histories* (1977); and Keith Windschuttle, *The Killing of History* (2000).

52. Newman, in his *An Essay in Aid of the Grammar of Assent* (1870), distinguished between “notional” and “real” assent, and argued that the latter arises from a convergence of probabilities for those seeking to know the truth.

53. In his *Enquiry Concerning Human Understanding* (1748), sec. 10, part 1, Hume borrows the argument of the Anglican divine, Dr. Tillotson, that Eucharistic transubstantiation leads to skepticism, since it denies the evidence of our senses on which all certitude rests. Hume then presses this argument further: “I flatter myself, that I have discovered an argument of a like nature, which, if just, will, with the wise and learned, be an everlasting check to all kinds of superstitious delusion, and consequently, will be useful as long as the world endures. . . . Suppose, for instance, that the fact, which the testimony endeavours to establish, partakes of the extraordinary and the marvelous; in that case, the evidence, resulting from the testimony, admits of a diminution, greater or less, in proportion as the fact is more or less unusual. The reason why we place any credit in witnesses and historians, is not derived from any *connexion*, which we perceive *a priori*, between testimony and reality, but because we are accustomed to find a conformity between them. But when the fact attested is such a one as has seldom fallen under our observation, here is a contest of two opposite experiences; of which the one destroys the other, as far as its force goes, and the superior can only operate on the mind by the force, which remains.” Yet we experience that very unusual events do in fact occur! Why must we, then, always doubt the testimony of others about

such events? Sense experiences are *signs* to be intellectually interpreted always in their contexts. The proper accidents of bread and wine naturally signify these substances, but for Catholic faith the context of the Eucharist established by God permits the appearance of bread and wine to signify without deception Christ's body and blood. Although this is not strictly a "miracle" (since the change is not evident to our senses and hence is extremely improbable as regards natural reason), as Aquinas shows, it is not impossible; and if the Catholic faith is credible, as apologetics seeks to show, reason demands that it be believed on the testimony of the Church. Similarly, the context of the Bible as read in the tradition of the Church (which one would suppose Tillotson accepted) permits it to signify the mind of God, not merely the intent of its human authors. Hume's argument amounts to declaring that he is determined to interpret his experiences in a way that will not disturb his "common sense" habits; but life is full of uncomfortable events.

54. See Robin George Collingwood, *The Idea of History* (1994).

Chapter 10 Goodness and Final Causality

1. Aquinas, *Summa theologiae* I-II, q. 19, a. 1, ad 1.

2. From Bacon's *The Advancement of Learning*, bk. 3, chap. 5, in James Spedding, R. L. Ellis and D. D. Heath, eds., *The Works of Francis Bacon* (1863), vol. 8, p. 473. Actually Bacon admits final causes in the functions of living things, but claims that their study pertains to metaphysics not to natural philosophy.

3. Here it is worth reminding the reader of the case of semiotics, where the role of objective formal causality as specificative (in contrast to exemplary) in the structuring of human experience perforce becomes a central theme; see chapter 8, note 76.

4. This is the import of the second part of Immanuel Kant, *The Critique of Judgment* (1790), "The Critique of Teleological Judgment." The first part deals in a similar fashion with "The Critique of Aesthetic Judgment."

5. See the following of my articles: "Research into the Intrinsic Final Causes of Physical Things" (1952), "Final Causality" (1967b), "Liberal Arts," (1967c), and "Teleology" (1967d). See also John Deely's discussion, "A Lair for Later Nonsense: From Teleology to Teleonomy," in *Four Ages of Understanding* (2001a), pp. 65–66.

6. Chapter 3, text and note 44.

7. This complete treatise, also known as *De Somniis*, is handily available in Richard P. McKeon, ed., *The Basic Works of Aristotle* (1941), pp. 618–25.

8. Aristotle, *Metaphysics* XII, chap. 7, 1072a1–3.

9. Aquinas, *Summa theologiae* I, q. 44, a. 1, ad 3; *Sententia super Metaphysicam* III, lect. 4, 375.

10. On this, see "How To Interpret Ultimate Potentiality," in John Deely, *The Four Ages of Understanding* (2001a), pp. 124–25, which

explains how in Neoplatonism matter is understood negatively and can be seen as the principle of evil.

11. Michael J. Buckley, S.J., *At the Origins of Modern Atheism* (1990), argues that the naïve, extrinsicist teleologism in apologetics of theologians like William Paley (1743–1805) paved the way for modern atheism when such apologetics were undermined by Darwinian evolution. In my opinion, it was the philosophical naiveté of these authors in confusing extrinsic and intrinsic finality, rather than what is now called “the argument from design,” that seemed to be overturned by Darwin.

12. Aristotle, *De Partibus Animalium* I, chap. 5, 644b24–645a36.

13. Hans Urs van Balthasar, *The Glory of the Lord* (1983), vol. 1, p. 18.

14. Alex Neill and Aaron Ridley, eds., *The Philosophy of Art* (1995), and *Arguing about Art* (2002), provide an introduction; reference material for the field can be found in David Cooper, et al., eds., *A Companion to Aesthetics* (1992), and Michael Kelly, ed., *Encyclopedia of Aesthetics* (1998).

15. The best textual study is Jordan Aumann, O.P., *De Pulchritudine* (1951); see also Umberto Eco, *The Aesthetics of Thomas Aquinas* (1988). For the three terms describing beauty, see Aquinas, *Summa theologiae* I, q. 39, a. 8, c, and II-II, q. 180, a. 2, ad 3.

16. Either of these considerations leads straight to the semiotic theory of Umwelt mentioned above (chapter 8, note 64).

17. Aquinas, *Summa theologiae* I, q. 27, a. 1, ad 3.

18. Kenneth M. Clark, *The Nude* (1953), pp. 297–311, examines the changing views of human physical beauty in history.

19. The theory of “aesthetic distance” probably originated with Immanuel Kant; but it became prominent through the work of E. Bullough, “Psychical Distance” (1912). It has been criticized as incompatible with the intensity and concentration involved in the aesthetic experience, since “distance” lessens rather than enhances these factors. Yet what Bullough meant was an attitude that concentrates on the beauty of the object rather than on practical involvement with the object. We do not appreciate the beautiful presentation of a dish if we are so hungry that we do not have time to really look at it.

20. This distinction was made current by Edmund Burke, *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1775), and taken up as “Critique of Aesthetic Judgment” in the first part of Kant’s *The Critique of Judgment* (1790).

21. See Aquinas, *Summa theologiae* I, q. 89, for the knowledge of the separated soul as resembling that of the angels who (I, q. 56, a. 1) knows its own essence by direct intuition. See also Aquinas, *Disputed Question on the Soul* (c. 1265–66), aa. 14–15.

22. For a recent development of this theme, very popular in the Middle Ages, see Pierrie-Marie Emonet, *God Seen in the Mirror of the World* (2000).

23. For this topic see E. H. Gombrich, *The Preference for the Primitive* (2002).

24. See Thomas Munro, *Oriental Aesthetics* (1995), and Mai-Mai Sze, ed., *Gai Mong, The Tao of Painting* (1679–1701).

25. In spite of the Judaic suspicion of visual art, there is a rich tradition exhibited in Gabrielle Sed-Rajna, *Jewish Art* (1997).

26. See Robert Hillenbrand, *Islamic Art and Architecture* (1999).

27. On the history of iconoclasm, see Mahmoud Zibawi, *The Icon* (1993), pp. 19–32; also Jaroslav Pelikan, *Imago Dei* (1990), and Leonid Ouspensky and Vladimir Losky, *The Meaning of Icons* (1982).

28. See Anthony Blunt, *Artistic Theory in Italy, 1450–1600* (1940), and C. Harbison, *The Mirror of the Artist* (1995).

29. For Plato's criticism of the fine arts as misleading, see the *Republic* III. For Aristotle, see the *Poetics* and *Politics* VIII (on education, probably incomplete). On the exaltation of the arts to a religious status, see Chris Baldick, "Romanticism" (1991). Baldick, in defining the Romanticism that swept Europe in the first half of the nineteenth century, writes, "Rejecting the ordered rationality of the Enlightenment as mechanical, impersonal, and artificial, the Romantics turned to the emotional directness of personal experience and to the boundlessness of individual imagination and aspiration. Increasingly independent of the declining system of aristocratic patronage, they saw themselves as free spirits expressing their own imaginative truths; several found admirers ready to hero-worship the artist as a genius or prophet. The restrained balance valued in 18th-century culture was abandoned in favour of emotional intensity, often taken to extremes of raptures, nostalgia (for childhood or the past), horror, melancholy, or sentimentality. . . . [A]lmost all showed a new interest in the irrational realms of dream and delirium or of folk superstition and legend. The creative imagination occupied the center of Romantic views of art, which replaced the 'mechanical' rules of conventional form with an 'organic' principle of natural growth and free development."

30. See the relevant sections of H. W. W. Janson and Anthony F.

Janson, *The History of Art* (2001), for the period up to 1850; for 1850 to the present, see H. Horvard Arnason, *History of Modern Art* (1998).

31. See David Hopkins, *After Modern Art, 1945–2000* (2000); Edward Lucie-Smith, *Artoday* (1995); and Uta Grosenick et al., eds., *Art at the Turn of the Millennium* (1999). The Spanish philosopher José Ortega y Gasset, in his *The Dehumanization of Art* (1948), pp. 3–56, raised important questions about modernism in art.

32. For example, the delightful thirty-one aquatint prints Picasso made in 1942 for an edition of Buffon's *Histoire Naturelle*; see the catalogue of an exhibit by Gerhard Wurzer Gallery in Houston, Texas.

33. Sartre's arguments for atheism were based on the notion that the *contingency* of our world implies that it is absurd, humanly meaningless. This is what he meant by saying that "existence [that is, the contingency of existence] precedes essence." Hence it is up to humans to give the existent meaning by responsible free decisions. It is, however, precisely the contingency of creation in which essences do not necessarily exist that is the basis of Aquinas's demonstration of God's existence.

34. These are the two arguments for atheism raised by Aquinas, *Summa theologiae* I, q. 2, obj. 1 and 2.

35. *Ibid.*

36. See R. C. Zaehner, *The Dawn and Twilight of Zoroastrianism* (1961), and Mary Boyce, *Zoroastrians* (1979).

37. See Remer Roukema, *Gnosis and Faith in Christianity* (1999), and PHEME PERKINS, *The Gnostic Dialogue* (1980).

38. This topic will be discussed more fully below, in chapters 12–13. Mary Baker Eddy's Christian Science is an example of a religion that considers all evil an illusion.

39. Moral relativism and the "emotivism" favored by some Analytic philosophers (since they reduce moral distinctions to purely subjective private or group preferences) cannot claim to be more than arbitrary.

40. On the question of evil, see Aquinas, *Summa theologiae* I, q. 49, aa. 1–3, with references to I, q. 22 a. 2, ad 2, and q. 48, a. 2, on the necessity of physical evil in a material universe. Worth reading is the two volume Thomistic study by Antonin Dominique Sertillanges, *La Probleme du Mal* (1948–51), of which the second, slim volume bears the title *La Solution* !

41. Yet it is possible that pure spirits who have chosen to oppose God have also played a role in the great physical evil manifested in the history of cosmic and biological evolution.

42. See Aquinas, *Summa theologiae* I, qq. 62 and 114, on the sin of angels (see also the little study by Jacques Maritain, *The Sin of the Angel* [1959b]); and I-II qq. 71 and 118, on human sin.

43. See Maritain's analysis of the free human act in his *Existence and the Existent* (1948).

44. Aquinas, *Summa theologiae* I, q. 20, a. 23; q. 49, aa. 2 and 3; q. 103, a. 8; III, Suppl., q. 99, discusses why God's permission of evil and his punishment of sin are not contrary to his mercy and will that all evil must end in a greater good. See further Jacques Maritain, *God and the Permission of Evil* (1966).

45. Aquinas, *Summa theologiae* I, q. 20, aa. 2–4.

46. In *Physics* II, chap. 9, 200a1–200b10, Aristotle shows that the determinism of natural processes is *hypothetical*, since it results in regular outcomes only when it is not frustrated by chance or freedom.

47. Stuart A. Kauffman, *At Home in the Universe* (1995). A current definition of the concept is provided by Scott Camazine, et al., *Self-organization in Biological Systems* (2001), chap. 1, p. 8: "Self-organization is a process in which pattern at the global level of a system emerges from numerous interactions among lower-level components of the system. Moreover, the rules specifying interactions among the system's components are executed using only local information, without reference to the global pattern." For a critique of this notion see Dean L. Overman, *A Case against Accident and Self-Organization* (1997). This definition seems question-begging, since it seems to claim that something causes itself. But see the remarks on antichance factors in evolution cited above (chapter 5, note 78) from John Deely, "The Philosophical Dimension of the Origin of Species" (1969a).

48. Aristotle devotes bks. 8–9 of the *Nicomachean Ethics* to the analysis of various kinds of friendship and their basis in virtuous self-love.

49. For a favorable reading of Nygren, see Gene H. Outka, *Agape: An Ethical Analysis* (1972). Critics of Nygren's position include Charles De Koninck, "In Defense of St. Thomas: A Reply to Eschmann's Attack on the Primacy of the Common Good" (1945); Maurice Nédoncelle, *Love and the Person* (1966); John Cowburn, S.J., *The Person and Love* (1969); and Josef Pieper, *About Love* (1974). See also Alan Soble, *The Structure of Love* (1990), pp. 4–12, where he insists that agapetic love not only recognizes value in the other but creates it.

50. Irving Singer, *The Nature of Love* (1987), vol. 2, pp. x–xiv and p. 29. Singer also shows (vol. 2, pp. 293–94) that Luther made an

important contribution to a more positive view of married love.

51. See Jacques Maritain, *The Person and the Common Good* (1947a). As I pointed out earlier, Maritain's view was criticized as inaccurate from a Thomistic point of view by Charles De-Koninck, "In Defense of St. Thomas" (1945).

52. This was the subject of the important controversy over Henri de Lubac's *Surnaturel* (1946), a controversy we will discuss further in the next chapter.

53. For an introduction to St. Bonaventure's thought, see Paula Jean Miller's commentary on St. Bonaventure's "Breviloquium," *Marriage* (1996). The symbol of marriage between God and the Church and each of its members expresses a mutuality that is not found in Neoplatonic linear hierarchy.

Chapter 11 Finality in the Special Sciences

1. So is it not ironic that it was practicing biologists who found it necessary, as John Deely's investigation in *Four Ages of Understanding* (2001a), pp. 65–66, showed, beginning with Pittendrigh in 1958 and followed by such major figures of evolutionary biology as George Gaylord Simpson and Ernst Mayr, to introduce into evolutionary discussion the term "teleonomy"—a synonym for "teleology," as we saw in chapter 2, at least in the original usage of Aristotle.

2. See Phillip P. Sloan, "The Question of Natural Purpose" (1985). Sloan refers on pp. 47–51 to Ernst Mayr, *The Growth of Biological Thought* (1982), as a chief advocate of the concept of "teleonomy."

3. See Jon Buell and Virginia Hearn, eds., *Darwinism: Science or Philosophy?* (1994), for a symposium in which the current debate was well represented. See also Richard Dawkins, *The Blind Watchmaker* (1986); Michael Denton, *Evolution: A Theory in Crisis* (1986); Anthony O'Hearn, *Beyond Evolution* (1997); Ernan McMullin, ed, *Evolution and Creation* (1985); and Phillip E. Johnson, *Darwin on Trial* (1993).

4. John Deely, in his analysis of "The Philosophical Dimension of the Origin of Species" (1969a), proposes an argument that moved Loren Eiseley to recommend Deely to be commissioned to write encyclopedia articles on Darwin and Wallace. Deely points out that modern Thomists have neglected Aquinas's thesis that prime matter has an "appetite" for the highest material forms possible, and hence the epigenetic teleology of the substantial forms of living things must play a major role in the explanation of evolutionary change toward more complex organisms. Cf. Deely's remarks on "John Dewey and the Influence of Darwinism on Philosophy" in his *Four Ages of Understanding* (2001a), pp. 507–9. See also his article "The Vision of Man in Teilhard de Chardin" (1966b).

5. See preceding note.

6. Steven Weinberg, *Dreams of a Final Theory* (1994), pp. 35–36.

7. See the discussion "Time and Space" in John Deely, *Four Ages of Understanding* (2001a), pp. 70–72.

8. The distinction between deontological or duty ethics and teleological or means-ends ethics has become confused in much ethical writing by identifying it with an entirely different kind of distinction, between systems of ethics that hold that certain kinds of actions are intrinsically wrong and *always* morally forbidden vs. those ethical theories that deny any kinds of actions are *intrinsically* right or wrong. Authors often identify the support of absolute norms against intrinsically immoral acts with deontology; but this view is common in teleological ethics as well (notably in Thomistic ethics), while some deontologists would deny absolute moral norms.

9. See A. J. Festugière, O.P., *Epicurus and His Gods* (1955), pp. 27–50, on Epicurean moral theory.

10. “The modern epicure can only feel cheated to discover that his namesake and model repudiated the epicurean way of life as commonly (mis)understood,” is how John Deely wryly puts it; see his discussion of “‘Epicure’ and Epicurism vs. ‘Epicurean’ and Epicureanism” in *Four Ages of Understanding* (2001a), pp. 101–2; but see also the discussion of “Metrodorus and the Belly” on the following page!

11. Eccl 9:7–10.

12. “In the area of public life or ‘practical knowledge’, the Stoic doctrine called for men to participate in the affairs of the state, to undertake brave and noble deeds, and to maintain simplicity of life even in the midst of riches. . . . By acting nobly and rightly, the Stoics held, a human being participates in the divine *logos*, and justifies the spark of divinity within, which we call ‘intellect’ or ‘reason’.” John Deely, *Four Ages of Understanding* (2001a), p. 97.

13. On this, see John M. Rist, *Stoic Philosophy* (1969), a book that deals principally with Stoic ethical theory.

14. See Pluto, *Timaeus* (c. 355–347 BCE), 42a–e.

15. This was one of the most serious of the consequences for Latin philosophy when the European peoples lost effective contact with the Aristotelian side of the Greek heritage beginning in about the fourth century CE. See the treatment of Neoplatonism in John Deely, *Four Ages of Understanding* (2001a), pp. 112–44, esp. “Neoplatonic Influences on the Latin Age,” pp. 129–40; and the whole of chap. 5 on “The Geography of the Latin Age,” esp. “The Separation of Roman Civilization into a Latin West and a Greek East,” pp. 165–74, and “The Mythical Donation of Constantine,” pp. 195–96.

16. Franciscan voluntarism has been much misrepresented. For better interpretations, see William A. Frank, ed., *Duns Scotus on the Will and Morality* (1997); Marilyn McCord Adams, “William of Ockham: Voluntarist or Naturalist?” (1987); and Francois-Xavier Putallaz, *Insolente Liberté* (1995) and *Figures Franciscaines* (1997).

17. Aquinas agreed that, in this life, the love of God has priority over

the knowledge of God. While we cannot love God unless we know something of him, in this life our knowledge of God always falls far short of the love of him that grace makes possible. Yet in eternal life, according to Aquinas, love is completed by the perfect knowledge of God given by the beatific vision, so that the union with God is perfected by knowledge and *in that sense* knowledge is superior to love as its source and goal, as knowledge is likewise superior to will as its source and goal. The Franciscans think that this too much demeans the love so much celebrated in the New Testament.

18. See Roger J. Sullivan, *An Introduction to Kant's Ethics* (1994).

19. An excellent discussion of the relation of Rousseau and Kant in ethics is given by Stephen Darwall in his course *History of Modern Ethics*, available at <http://www.la.utexas.edu/~pdl/histeth/histeth.lec22.html> (last accessed May 2005).

20. On Bentham, see Elie Halévy, *The Growth of Philosophical Radicalism* (1966); also see J. J. C. Smart and Bernard Williams, *Utilitarianism* (1973).

21. This, of course, was the very pragmatism, as we saw, that Peirce felt obliged to dissociate himself from in order to retain “a purified philosophy” compatible with “scholastic realism” and incompatible with every variety of nominalism: see “Pragmaticism Is Not Pragmatism,” in John Deely, *Four Ages of Understanding* (2001a), 616–25.

22. Aquinas, *Summa theologiae* I-II, q. 94, a. 2.

23. See the essay of Daniel T. Devereux, “Aristotle on the Essence of Happiness” (1981), in which, after a careful consideration of the various opinions, he concludes (p. 260) that “Aristotle’s god engages in this activity [contemplation] and is in no way handicapped if he lacks friends and moral virtue. It is not the activity of contemplation itself which presupposes other good but, rather, this activity as engaged in by human beings.”

24. Aquinas, *Summa theologiae* I, q. 89, aa. 1–8. It was on this basis that Aquinas also proposed the famous “Limbo” (threshold) theory that unbaptized children, innocent of personal sin yet deprived by original sin of the grace they would have inherited from the first parents of the human race, would enjoy only a state of natural happiness. This view is philosophically plausible but perhaps falls short theologically, since many theologians today hold that the grace of Christ is mediated to these souls by the prayers of the Church.

25. For the various views of the afterlife, see Harold Coward, ed., *After Death in World Religions* (1997).

26. 2 Pt 1:4.

27. See Henri de Lubac, S.J., *Surnaturel* (1946). A later, more nuanced statement made in view of criticisms received is his *A Brief Catechesis on Nature and Grace* (1984).

28. See William H. Marshner, *The Last End of Man According to de Lubac* (1991).

29. Aquinas, *Summa theologiae* I-II, q. 51, a. 4.

30. For a recent and very thorough treatment of this question, see Denis J. M. Bradley, *Aquinas on the Twofold Human Good* (1997). He is content to leave it as a “paradox.”

31. Aquinas, *Summa theologiae*, I-II, q. 51, a. 4. Here Aquinas argues that there can exist at the same time a natural virtue proportionate to the natural end of an individual and a corresponding infused virtue proportionate to that individual’s supernatural end.

32. In volume 1 of his two-volume *Theological Ethics* (1966), Theilicke treats of moral compromise at great length and with a great subtlety to which I cannot do justice in this brief reference.

33. Joseph Fletcher, *Situation Ethics* (1966).

34. On this, see Donald R. Kapitz, *Compromise and Regret* (1985).

35. Gérard Gilleman, S.J., *The Primacy of Charity in Moral Theology* (1959).

36. Karl Rahner, S.J., “On the Question of a Formal Existential Ethics” (1963). On this, see my article, “Fundamental Option and/or Commitment to Ultimate End” (1997b).

37. See Servais Pinckaers, O.P., *The Sources of Christian Ethics* (1995), pp. 82–86.

38. See Germain Grisez, *The Way of the Lord Jesus*, (1983), vol. 1.

39. His most recent explanation of this substantive/reflexive goods distinction is as follows: “How can reflection identify the basic human goods? The most direct way is by asking about actions that would, or do, carry out free choices: ‘Why should we do that?’ and ‘Why did you do that?’ and the like. Persisting with such questions eventually uncovers a small group of ultimate reasons for choosing. These reasons instantiate the basic human goods, toward each of which a primary principle of practical reason directs action.” The “sorts of basic goods I call ‘substantive’,” he tells us, are those that, “while they provide reasons for choosing, their instantiations do not themselves include choices. For example, a patient’s health provides a reason for a physician’s choices, but nobody’s health includes those choices.” By contrast, “among the basic goods are certain forms of harmony, whose instantiations necessarily include the choices by which one participates in them. I call

such goods 'reflexive' " (Germain Grisez, "Natural Law, God, Religion, and Human Fulfillment" [2001], p. 7).

40. Germain Grisez, *The Way of the Lord Jesus* (1983) vol. 2, p. 567; see also vol. 1, pp. 195f.

41. *Ibid.*, vol. 1, p. 5.

42. Cf. John Deely, "Evolution and Ethics" (1969b).

43. Thus Aquinas distinguishes between a *bonum honestum*, that is, a good per se regardless of whether it be end or means; a *bonum utile*, that is, a good that is such only as a means; and a *bonum delectabile*, which is only the pleasure accompanying the use of a means, be it appropriate or not to the end; see *Summa theologiae* I, q. 5, a. 6, and I-II, q. 99, a. 5.

44. Aquinas, *Summa theologiae* II-II, q. 188, a. 6, c.

45. Aquinas, *Summa theologiae* II-II, q. 48, a. 1, c.

46. See Joseph A. Selling, ed., *The Splendor of Accuracy* (1995), for denials by proportionalists that *Veritatis Splendor* correctly represents their position.

47. In Joseph Fuchs, S.J., "The Absoluteness of Moral Terms" (1971).

48. Fuchs's view was related to the effort of Peter Knauer, S.J., to reduce all moral decisions to the "principle of double effect" because of the ambiguity that such decisions always seem to involve both good and bad consequences. Three of the conditions of this principle require the good effects of an act be proportionate to the bad effects. Thus, simply by dropping the other condition of this principle that forbids the performance of intrinsically bad acts, one arrives at proportionalism. However, it is just this dropped condition that has always been considered fundamental to the whole principle. Knauer's influential article, "Das Prinzip der Doppelwirkung," is now available at <http://www.jesuiten.org/peter.knauer/03.html> (last accessed May 2005).

49. See the book of Job, and Jesus's own temptation by Satan in the desert (Mt 4:1–11 and parallels).

50. See chapter 7 above.

51. For texts, see Ramón García de Haro, *Marriage and the Family in the Documents of the Magisterium* (1993).

52. For Thomistic arguments on this point see Yves R. Simon, *A General Theory of Authority* (1962).

53. Quoted in Malkah T. Notman and Carol C. Nadelson, *Women and Men* (1991), p. 98. See also their chap. 8, "Ground Rules for Marriage: Perspectives on the Pattern of an Era," pp. 88–115.

54. For texts of Aquinas and commentary on this topic, see Charles

DeKoninck, "In Defense of St. Thomas" (1945).

55. Aristotle, *Politics* I, chaps. 4–7, 1253b22ff.

56. For the texts and a discussion of this problem, see my dissertation, *The Theory of Natural Slavery* (1951).

57. Aristotle, *Politics* I, chap. 4, 1254a15.

58. Aristotle, *Nicomachean Ethics* I, chap. 3, 1094b12–28.

59. For a survey of some of the issues, see Kenneth W. Irwin and Edmund D. Pellegrino, eds., *Preserving the Creation* (1994), and Michael S. Northcott, *The Environment and Christian Ethics* (1996).

60. For the debate over Peter Singer's views, see Dale Jamieson, ed., *Singer and His Critics* (1999).

61. See Linda Nochlin, *Realism* (1971), and my essay, "Significance of Non-Objective Art" (1965).

62. J. G. Davies, *Liturgical Dance* (1984), pp. 3–18, and Frank Boas, ed., *The Function of Dance in Human Society* (1972).

63. For documentation on the worldviews of these cultures, see the notes from chapter 4, section E, above.

64. See the bibliographical entry for *Bhagavad Gita*. It is translated with extensive commentary by A. C. Bhaktivedanta Swami Prahupada as *Bhagavad-Gita As It Is* (1983).

65. See chapter 4, section E.

66. It is translated by Hari Prasad Shastri, *The Ramayana of Valmiki* (1976); see also Aubrey Menen, ed., *The Ramayana* (1954).

Chapter 12 The Absolute and/or Nature

1. Wilhelm Schmidt, *The Origin and Growth of Religion* (1972), on the basis of extensive research in the anthropological literature argued for a primitive monotheism against theories that held that monotheism was a late development in a long history beginning with an original animism. This question is still debated by anthropologists; see Ernest Brandewie, *Wilhelm Schmidt and the Origin of the Idea of God* (1983).

2. See A. H. Coxon, *The Fragments of Parmenides* (1986).

3. See the information from NASA's Wilkinson Microwave Anisotropy Probe (WMAP) project, especially at http://map.gsfc.nasa.gov/m_uni/uni_101shape.html (last accessed May 2005).

4. Thus Frederick Engels, the co-worker with Marx most responsible for developing the ontological aspect of Marx's political theories, in his *Dialectics of Nature* (1883), pp. 1–26, argues that reality consists of an infinite number of purely material worlds, each unbounded in dimension, passing through endless cycles of evolution in which intelligent beings evolve again and again.

5. Quoted in Arnold Sommerfeld, "To Einstein's Seventieth Birthday" (1949), p.

103; see also pp. 659f. Ilse Rosenthal-Schneider, "Presuppositions and Anticipations of Einstein's Physics" (1949), pp. 144f., shows that Einstein, while granting it could not be proved, believed that this is the only possible universe, and hence that God was not free to create any other. This was the meaning of his famous dictum, "God does not play dice."

6. Whitehead's view is developed most completely in his *Process and Reality* (1929).

7. See the sections "God Is More Intimate to Created Beings than They Are to Themselves" and "After Creation, There Are More Beings but No More Being," in which these Thomistic theses are discussed in relation to St. Thomas himself, in John Deely, *Four Ages of Understanding* (2001a), pp. 284–90. The notion of "pantheism" is discussed on pp. 288–89.

8. G. S. Kirk, J. E. Raven, and M. Schofield, *The Pre-Socratic Philosophers* (1983), pp. 95–97.

9. Weston La Barre, "Amerindian Religions" (1974), p. 735.

10. For an account of some of these notions see Richard Woods, O.P., *The Occult Revolution* (1971).

11. See Bernhard Blankenhorn, O.P. "The Good As Self-Diffusive" (2002), who discusses the views of W. Norris Clarke and the late Norman Kretzmann, who, I agree with Blankenhorn, both mistakenly Platonize the thought of St. Thomas Aquinas.

12. See Porphyry, *Life of Plotinus* (c. 300 CE). M. L. West, *Early Greek Philosophy and the Orient* (1971), claims (see p. 239) that from c. 550–c. 480 BCE there were Indian and Persian influences on the early Greek philosophers, but sees less evidence after that time. Cf. John Deely, *Four Ages of Understanding* (2001a), pp. 13–14.

13. See T. Finan and V. Twomey, eds., *The Relationship between Neoplatonism and Christianity* (1992). See also John Deely, *Four Ages of Understanding* (2001a), "Neoplatonism," pp. 112–44, and esp. "Neoplatonic Influences on the Latin Age," pp. 129–40.

14. For a recent study see Sara Rappe, *Reading Neoplatonism: Non-discursive Thinking in the Texts of Plotinus, Proclus, and Damascius* (2000).

15. For an essay on this topic, see Kelley L. Ross "Baruch Spinoza (1632–1677)" (1999).

16. Cornelio Fabro, *God in Exile* (1968).

17. See the selections from Eknath Easwaran, trans., *The Upanishads* (1987). In one of the oldest, the *Bridharanyaka*, we read: "Everything confuses those who regard things as separate from the Self" (n. 4.6, p. 37), which is the essential position of spiritual monism.

18. See Henri de Lubac, *Aspects of Buddhism* (1953), pp. 15–52, on how "compassion" for the Buddhist is essentially not love but "detachment."

19. Brian Magee, *The Philosophy of Schopenhauer* (1997), considers Schopenhauer's influence on various writers (partly because of the excellence of his style) and other artists, in particular (pp. 359–70), Richard Wagner.

20. Thus Natalia Isayeva, *Shankara and Indian Philosophy* (1992), p. 2, says of Shankara that he is “the most brilliant personality in the history of Indian thought.” Her chap. 1, pp. 1–18, gives extensive bibliography on the influence of Indian thought on European culture.

21. This is the same morass into which twelfth-century Islam fell, as we have noted earlier (chapter 6, note 23; chapter 8, note 17 and text and note 38).

22. Charles Johnston, trans. and comm., *The Crest-Jewel of Wisdom and Other Writings of Śacuteankarâchârya* (1946), pp. 107–14, verses 269–98.

23. See John B. Carman, *The Theology of Ramanuja* (1974).

24. On Panikkar, see Joseph Prabhu, ed., *Intercultural Challenge of Raimon Panikkar* (1996); and for Michael von Brück, see his *The Unity of Reality* (1991).

25. 2 Pt 1:4.

26. See Raymond Brown, *Introduction to New Testament Christology* (1994), pp. 142–52, for a summing up of current discussion of “low” and “high” Christology.

27. Thus St. John of the Cross, the great Christian mystic, counsels his readers not to give importance to private visions and inner experiences, but to rely on faith in the revealed truth taught by the Church. See book 2, chap. 9, n. 1, p. 129, in his *The Ascent of Mount Carmel* (1578–88).

28. The early Christian theologian Origen, in his *On First Principles* (c. 230 CE), tried to incorporate a doctrine of reincarnation, but the Church rejected this and he did not follow it in later works.

29. Whence, as we noted earlier (see chapter 4, note 69; chapter 6, note 7), later Scholastics explained that substance as “absolute” being contrasted to “accidents” was yet itself a “transcendental relation” to the environment upon which its existence depends for continuation and to which it must be referred in order to be understood.

30. See Alfred North Whitehead, *Science and the Modern World* (1997), esp. pp. 1–18.

31. For example, *Metaphysics* III, 996b1, 996b30; XI, 1059b24; etc.

Chapter 13 The One Creating First Cause

1. See Hershel Shanks and Jack Meinhardt, eds., *Aspects of Monotheism* (1997), for essays on this question, including the topic of Akhenaton's monotheism and the development of Yahwehism in Israel. Regina M. Schwartz, *The Curse of Cain* (1997), argues that monotheism leads to religious intolerance. No doubt that can happen, but this danger does not prove it is false, anymore than the evils of Communism, as such, disprove atheism.

2. Sir David Ross, an important editor of the Aristotelian works, writes in his *Aristotle* (1995), p. 184: "If the question be asked whether Aristotle thinks of God as creator of the world, the answer must certainly be that he does not. For him matter is ungenerated, eternal; he expressly argues against a creation of the world." But he then adds, "This would not necessarily exclude the view that matter is throughout eternity maintained in existence by God, but there is no trace of such a doctrine in Aristotle." He then adds that also the celestial intelligences and the human soul are eternal, citing *De Caelo* 301b31 and 279a12ff. in regard to creation of the world, and *De Anima* 430a23 in regard to the human soul. Ross, however, fails to recognize that even if these arguments are taken as he takes them, they are not only consistent with the First Cause eternally maintaining the universe in existence (as he admits), but are also consistent with holding that God causes the very existence of the universe. The texts in question only show that it is impossible for God to do this by "generating" creatures through a physical process. "To create strictly" is to produce a being *ex nihilo* (Aquinas, *Summa theologiae* I, q. 44, a. 3 and q. 45, a. 1), while "to generate" requires a preexisting matter. Aristotle says nothing of the former possibility; but, as Aquinas argues, it is a doctrine that follows from his principles. On the texts Ross cites from *De Caelo*, compare the commentary by Aquinas, *Sententia super librum De caelo et mundo* III, chap. 2, lect. 8, n. 595; and I, chap. 10, lect. 22, n. 229, and lect. 29, n. 287, where he shows that there is no necessary contradiction with Christian faith in creation, because creation is not the "generation" Aristotle argues against. The meaning of the *De Anima* text Ross cites is very doubtful.

3. John F. X. Knasas, "Does Natural Philosophy Prove the Immaterial? An Answer to Mark Johnson" (1999).

4. Aquinas, *Summa contra Gentiles* I, chap. 108.

5. Aquinas, *Summa theologiae* I, q. 2, a. 3.

6. See John Deely's remarks in *Four Ages of Understanding* (2001a), pp. 266–72.

7. Annibale Fantoli, *Galileo: For Copernicanism and for the Church* (1994), says, in his otherwise excellent explanation of the pre-Galilean perspective (p. 5), "The First Cause could not move as an efficient cause (in Aristotelian physics *to every action of an efficient cause there is a corresponding reaction on it by the body which is moved and this implies an inevitable passivity in the very agent himself*) [italics added]. The First Cause must, therefore, act as the *final* cause of motion, that is, as the object desired, the object 'loved.'" Therefore, Fantoli asserts, there had to be separated intelligences to move bodies efficiently, and he concludes (p. 5), "This is undoubtedly a grandiose cosmological synthesis which can explain why Aristotle will exercise such a fascination, as we shall see, in Arabic and medieval Christian thought, and even up to the time of Galileo." On the contrary, while for Aristotle the italicized premise above is true for every moved mover, it is not true for the unmoved mover. That is the very essence of the demonstration of the existence of an

unmoved mover. Hence Fantoli is mistaken in concluding that the Thomist Aristotelians thought the First Cause was only a final cause, and that this was the reason that the separated intelligences existed.

8. On this see Allan Wolter, O.F.M., “Duns Scotus, John” (1967), esp. pp. 429–30. Of course, if the validity of metaphysics as an independent discipline presupposes the proof of the reality of immaterial being from within physics, a strictly metaphysical proof of that same immaterial reality could only be a begging of the question for either Aristotle or Aquinas, as John Deely pointed out in the summary text I cited in chapter 5, note 69.

9. The original title of Maritain’s great work was *Distinguer pour unir: ou, les degrés du savoir*, translated under the supervision of Gerald B. Phelan with the title *The Degrees of Knowledge* (1959a).

10. See “The Divine Names and Negative Theology” in John Deely, *Four Ages of Understanding* (2001a), pp. 272–84.

11. Aquinas, *Summa theologiae* I, q. 5, a. 4, c; I-II, q. 1, a. 2, c.

12. For example, in chaps. 29–36, a discussion of the likeness of creatures to the First Cause, and the analogical names of the First Cause, etc., intervenes.

13. Brian J. Shanley, O.P., “St. Thomas Aquinas, Onto-Theology, and Marion” (1996), shows how Jean-Luc Marion, in his *God without Being* (1991), argued very effectively that Catholic theology should abandon its commitment to “onto-theology” so well exposed by Martin Heidegger; but Marion has now, after greater study of Aquinas, perceived that at least the Angelic Doctor was not guilty of this error.

14. Norman Kretzman, *The Metaphysics of Creation* (2001), pp. 132–36.

15. Heidegger wrote his *Habilitationsschrift* in 1915 on “The Doctrine of Categories and Signification in Duns Scotus”; but, ironically, long after he had completed his degree, the text of Scotus on which he mainly based his work was shown not to be authored by Scotus at all!

16. Aquinas says, in *Summa theologiae* I, q. 30, a. 1, ad 3: “Because of his perfect unity and simplicity all talk of plurality is absolutely excluded from [speaking about] The First Cause but not all plurality of relationship, because relation is predicated of something as it is related to another and thus implies no composition in that of which it is predicated, as Boethius says [in his work *De Trinitate*, chap. 3].” This follows from the notion of relation given in chapter 3 above, provided that the term “relation” be taken analogically and understood, as John Deely’s work on the *Four Ages of Understanding* (2001a) emphasizes throughout, suprasubjectively.

17. See John Deely, *Four Ages of Understanding* (2001a), pp. 277–78: “insofar as theology employs discourse it draws upon the resources proper to philosophy and which philosophy alone can provide. . . . What

faith believes thus has or can have a twofold aspect respecting human understanding. Sometimes reason can also demonstrate what faith believes [as that God exists], and other times faith believes what reason can only show to be free from internal contradiction, to be 'not impossible' [as that there are three persons in one God]. Dogmas of faith can sometimes be, under other auspices, doctrines of philosophy. But doctrines of philosophy *as such* can never be dogmas of faith, and there are dogmas of faith which can never be doctrines of philosophy, namely, when what is claimed as revealed exceeds what it is possible for human understanding to demonstrate on the grounds of experience. But, even then, philosophy has the right to examine whether what is claimed to be revealed is impossible with what experience does truly show, that is to say, with what philosophy can actually demonstrate from experience; and, were the answer to be affirmative, St. Thomas would say that either there has been a mistake in the understanding of the revelation, or the revelation is falsely so-called." See also p. 260: "Never forget that, for Aquinas, reason, human understanding, is free only in the line of truth; so that, if there can be confessional abuses imposed on reason, indeed, this does not mean that reason is 'free' to abuse confessions of faith in its turn: 'For just as matters of religious belief cannot be demonstratively proven, so too opinions contrary to religious belief cannot be demonstratively shown to be false, but they can be shown to be unnecessary' (Aquinas, *De Trinitate*, Q. 2, art. 3c); whence their categorical assertion 'belongs not to philosophy but to an abuse of philosophy.'"

18. Note the important difference between an extrinsic formal cause as exemplar and an extrinsic formal cause as specificative: the former concerns creation (by God *ex nihilo* or by humans in fashioning artifacts), a plan to be embodied; the latter concerns finite knowing and expresses the dependency that knowledge as such has upon the object known. See John Deely, "How Do Signs Work?" in his *New Beginnings* (1994b), esp. pp. 160–62.

19. "The 'esse divinum' cannot be expressed in human language according as it is apart from its creation, but only as it is above its creation as source and exemplar thereof. But as exemplar it is diversified in *rationales*, that is to say, 'possible essences'; in itself there is no diversity, only a single 'essence' which *is* existence. 'Being' is said *from* the act of existence, but from the actual existence of finite things of experience, 'beings' in whom to be is something more than what they are. But in God, to be is not something more than what he is; for what he is and to be are the same. So, of our names for God, being is the first

and the most proper, insofar as it is the name most closely derived from and associated with the experience of existence; yet God remains beyond our experience of existence because there is no ‘what’ in the case of God that can be known apart from the fact that he is” (John Deely, *Four Ages of Understanding* [2001a], pp. 278–79).

20. Process philosophers are troubled by Aquinas’s contention that the creation is related to God and not God to the world. This, however, does not in any way deny God’s immanence in the world, but only that he is causally dependent on the world in any way. Whitehead and Hartshorne, by their doctrine of the “consequent nature” of God, make him dependent on what happens in creation for all his own thought and happiness, which reduces God to a mere item within the universe—onto-theology at its most extreme.

21. Aquinas, *Summa theologiae* I, q. 8.

22. See the discussion of the point by John Deely, *Four Ages of Understanding* (2001a), pp. 277–78 and 304–5; and see above, note 17, in this chapter.

23. See Ceslaus Velecky, O.P., “Reason and Trinity” (1965). See also John Edward Sullivan, O.P., *The Image of God* (1963). Aquinas follows Augustine in treating of the Trinity by analogy to the human soul because that is the highest reality directly known to us. Such analogies cannot be positively demonstrative, but can show that there is no contradiction in an article of faith.

24. See my *Justice in the Church* (1996).

25. Aristotle, *Metaphysics* XII, chap. 7, 1072b19.

26. Aquinas, *Sententia super Metaphysicam* XII, lect. 11, n. 2615.

27. *Ibid.*, n. 2614.

28. On Scotus’s reasons, see Allan B. Wolter, O.F.M., “Duns Scotus, John” (1967), pp. 433–35. For Scotus, the freedom of the will is unique and not derived from intelligence. It is this unique freedom that makes it possible for one to love others and not just oneself. Scotus did not accept Aquinas’s view that we love others as participants with us in a common good, but demanded that this love be wholly gratuitous, somewhat as Kant was later to do.

29. *Summa theologiae* I-II, q. 3, a. 4, c.

30. *Ibid.*, I-II, q. 9, a. 1; II-II, q. 47, a. 8, c.

31. *Ibid.*, II-II, q. 27, a. 2, c.

32. See the discussion around Nygren’s work in chapter 10 above.

33. Alfred North Whitehead, *Process and Reality* (1929), part 5, chap. 2, pp. 403ff.

34. On this, see John S. O’Donnell, S.J., *Hans Urs Von Balthasar*

(1992), pp. 88–90.

35. *Summa theologiae* I, q. 24, a. 4, c.

36. *Ibid.*, q. 64, a. 2, c.

37. See Martin Luther, *The Bondage of the Will* (1525). On this work of Luther, see Harry J. McSorley, *Luther: Right or Wrong?* (1969).

38. Aquinas, *Summa theologiae* I, q. 105, aa. 4–5.

39. And see the further advances in this controversy proposed by Jacques Maritain in his *God and the Permission of Evil* (1966).

40. Cf. John Edward Sullivan, O.P., *Prophets of the West* (1970).

41. Cf. John Deely, *Four Ages of Understanding* (2001a), p. 256: “Only with these Latins of the ‘high middle ages’, Thomas Aquinas in particular, is the relation of the universe to its ‘Creative Source’ decisively clarified according to its most radical philosophical intelligibility: as the making of something where before (to speak through a spatial metaphor) there was nothing at all, *creatio ex nihilo*, ‘creation out of nothing’—the realization that God in giving to creatures an existence in their own right presupposes nothing whatever on the side of the creature as *that upon which* He acts; so that the creation depends in the whole of its being upon the divine existence which, in turn, depends upon nothing at all. There is God, the infinite perfection of existence, which can be participated in finite ways.

“The rendering actual of that participability as extrinsic to God is the act of creation, and the sustaining of such participation is of a piece with creation. But the participability and the participation are simultaneous in and with the creative act. ‘Participability’, thus (despite the grammatical form of the ‘-ability’ suffix to the noun-form signifying ‘able to be participated’), is not a potentiality properly speaking; for it has no existence *in God*, and no existence *outside of God*. ‘Participability’, the ‘potency’, exists only as *actualized*. That is to say, ‘participability’, or ‘imitability’, has ‘being’ *only* as intrinsic to and specificative of an *actual creature*, something that exists ‘in fact’. The world, thus, is really related to God as dependent upon the divine existence, but God has no relation of dependency at all upon the world to which the divine existence gives being according to the intrinsic limitations and specificities which make of the creation a plurality of beings.”

See also *ibid.*, p. 256, n. 17: “This is why contradictory notes cannot constitute an essence: it is not because God is not omnipotent that a square circle cannot exist, but because the pure intelligibility of being cannot be realized in a finite mode which negates itself. It is a limitation neither *in God* nor *outside of God*, except in the creation itself which requires to be intelligible in order to participate in limited ways with the

unlimited understanding of the divine life.”

42. Aquinas, *Summa theologiae* I, q. 2, a. 3. c.

43. Aquinas, *Summa contra Gentiles* I, chap. 17.

44. The use of “Word” (*Logos*) in the Gospel of John, chap. 1, is not intended to speak of God in the Stoic sense of a World Soul, but in a Trinitarian sense of a Divine Person.

45. See, in this chapter, note 41.

46. See the well-known book of Cornelio Fabro, *La nozione metafisica di partecipazione secondo S. Tommaso d’Aquino* (1950), unfortunately never translated into English.

47. See Sister Paula Jean Miller, *Marriage* (1996). Since St. Bonaventure’s theology is symbolic, and for him marriage is a key symbol of the relation of Christ and the cosmos, this commentary serves as an excellent introduction to his whole thought.

48. Genesis 1:26. See John Sullivan, *The Image of God* (1963).

49. *Summa theologiae* I, q. 47, a. 1.

50. The first definition in Spinoza’s *Ethics* (1662–76) reads: “By that which is self-caused, I mean that of which the essence involves existence, or that of which the nature is only conceivable as existent.”

51. Proverbs 8:30–31.

52. Aquinas, *Summa theologiae* I, q. 7, a. 2, ad 1. See also Olivia Blanchette, *The Perfection of the Universe according to Aquinas* (1992).

53. See above, note 41, in this chapter.

54. Aquinas shows that there appears to be no contradiction in saying that one Divine Person could assume more than one human nature: *Summa theologiae* III, q. 3, a. 7.

55. In *De Caelo* I, chaps. 8 and 9, 276a18ff., Aristotle argues that there is only one universe and that it is finite. This means, however, that there is only one that we can naturally know about. Aristotle does not discuss whether it is metascientifically impossible for God to create more than one.

56. See my article, “Cosmic Community in Plotinus, Aquinas, and Whitehead” (1995b).

57. Aquinas, *Summa theologiae* I, q. 78, a. 4.

58. See *Compendium Theologiae*, chap. 151, in which Aquinas makes the distinction that, while in the state of pure nature the soul would have a natural desire for its body, once death had resulted from sin there is no way that this desire could be naturally satisfied.

59. *Ibid.*, Prologue.

Chapter 14 The Way toward Wisdom

1. For views based on Aquinas's thought, see Jacques Maritain, *Education at the Crossroads* (1943a); Pierre Conway, O.P., *Principles of Education* (1960); Anthony D. Gulley, *The Educational Philosophy of Saint Thomas Aquinas* (1965); Sister Mary Michael Spangler, O.P., *Principles of Education* (1983); and Daniel J. McInerney, ed., *The Common Things* (1999).

2. See Morris Zelditch, Jr., "Cross-Culture Analysis of Family Structure" (1964).

3. Jean Piaget, *The Construction of Reality in the Child* (1954). Subsequent research has somewhat modified Piaget's stages of development. See Peter Sutherland, *Cognitive Development Today* (1992), and Carol Garhart Mooney, *Theories of Childhood* (2000).

4. In his article "Animal Intelligence and Concept-Formation" (1971), by a careful analysis of the texts in Aquinas, John Deely was able to demonstrate just how much richer animal experience is in relation to intellectual concept formation than Neo-Thomists generally were accustomed to recognize. This line of realization, he points out to me, is profoundly deepened within semiotics with its postmodern development of the notion of Umwelt, as mentioned above in chapter 2 and again in chapter 8 (esp. note 64), and briefly in chapter 10, note 16.

5. For recent research, see Steven Pinker, *The Language Instinct* (2000). See also Terrence W. Deacon, *The Symbolic Species* (1997).

6. See Hartmut Scharfe, *Education in Ancient India* (2002); William Cenkner, O.P., *The Hindu Personality in Education* (1994); Michael Nylan, *The Five "Confucian" Classics* (2001); and Henri I. Marrou, *A History of Education in Antiquity* (1982).

7. Plato, *Republic* V, 471c–474b.

8. Aristotle, *Politics* VII, chap. 3, 1325a17ff.

9. Paulo Freire, *Pedagogy of the Oppressed* (1970), deals with the problem of motivating the poor to study, and Jürgen Habermas, *Toward a Rational Society* (1990), treats of the problem of effective civil discourse.

10. This criticism became especially vocal from 1930 on, and its dire predictions seem now to be fulfilled. See, for example, Robert Maynard Hutchins, *The Higher Learning in America* (1936), *No Friendly Voice* (1938), *Education for Freedom* (1943), and *The Great Conversation* (1952). See also John U. Nef, *The Universities Look for Unity* (1943); C. S. Lewis, *The Abolition of Man* (1944); Christopher Dawson, *The Crisis of Western Education* (1989), with specific programs for the study of Christian culture by John J. Malloy; Christopher Derrick, *Escape from Scepticism* (2001); Richard John Neuhaus, ed., *Democracy and the Renewal of Public Education* (1987); and Alan D. Bloom, *The Closing of the American Mind* (1987).

11. Paul C. Vitz, *Censorship* (1986), showed how biased our elementary textbooks often are.

12. For a concise picture of the specifically medieval origins of "education in the liberal arts," see John Deely, *Four Ages of*

Understanding (2001a), pp. 183–86. For more details of the history, see Paul Abelson, *The Seven Liberal Arts* (1965); John Edward Wise, *The Nature of the Liberal Arts* (1947); Pierre Conway, O.P., and Benedict M. Ashley, O.P., *The Liberal Arts in St. Thomas* (1960); my articles “Education, II (Philosophy of) Historical Development, Ancient and Medieval” (1967a), and “Liberal Arts” (1967c); David Wagner, ed., *The Seven Liberal Arts in the Middle Ages* (1983); J. F. M. Maartens et al., eds. *Arts libéraux et philosophie au Moyen Age* (1969); Josef Koch, *Artes Liberales von der Antiken Bildung zur Wissenschaft des Mittelalters* (1959); William H. Stahl, Richard Johnson, E. L. Burge, eds. *Martianus Capella and the Seven Liberal Arts*, vol. 1, *The Quadrivium* (1991), vol. 2, *The Marriage of Philology and Mercury* (1992; see “Liberal Arts” in index); and Marcia L. Colish, *Medieval Foundations of the Western Intellectual Tradition, 400–1400* (1999; see index under “Liberal Arts”). For a textbook on the liberal arts at the high school level taught through English and math courses, see my *The Arts of Learning and Communication* (1957).

13. See Michael Nylan, *The Five “Confucian” Classics* (2001), for an analysis; and see William Theodore de Bary, Irene Bloom, and Joseph Adler, eds., *Sources of Chinese Tradition* (1999).

14. “Hence poetry is something more philosophic and of graver import than history, since its statements are of the nature rather of universals, whereas those of history are singulars” (Aristotle, *Poetics*, chap. 9, 1451b5).

15. See William H. Nienhauser et al., eds., *The Indiana Companion to Traditional Chinese Literature* (1998), which provides rich resources on both these cultures.

16. For examples of dialectics, see Aristotle, *Physics* I, chaps. 2–4; *De Caelo* III, chap. 1; *De Anima* I, chaps. 2–5; *Politics* II, throughout.

17. As Avrum Stroll shows in his *Twentieth-Century Analytic Philosophy* (2000), it is difficult fairly to characterize so varied a group of thinkers. Michael Dummett, in his *Origins of Analytic Philosophy* (1993), contrasts the British and the American varieties of Analysis, but concludes that they share the emphasis on the *intentionality* of thought, that is, a certain epistemological realism. Yet even this conclusion is misleading; for the “realism” at issue here is of a rather thin sort, what can only be considered naive in any context of Aristotelian or Thomistic epistemology. That this was true from the very beginnings of both phenomenology (with which the notion of “intentionality” is more centrally associated), in the work of Brentano and Husserl, and in Analytic

Philosophy, in the work of Frege, Russell, and Wittgenstein, can be seen in John Deely, "Reference to the Non-Existent" (1975).

18. Augustine trans. as *On Christian Teaching* (397/426 CE).

19. See Marshal McLuhan, *Understanding Media* (1994).

20. See "What Is Changing in Math Education?" (2002).

21. C. P. Snow, *The Two Cultures* (1964); similar points have been made by Evandro Agazzi, "Science and the Humanities in the New Paideia" (2001).

22. See J. Thomas Butler, *Principles of Health Education and Health Promotion* (2001).

23. Yves Bertrand, *Contemporary Theories and Practice in Education* (1995), discusses the following aims for education: Spiritualistic, Personalist, Psychocognitive, Technological, Social Cognitive, Social, and Academic. He opts for what he calls Eco-Social as best, that is, education that will lead to ecological and social justice reforms, although he also favors a spiritualistic element of openness to inner experiences. But how can we find justice or judge what should be the relation of humans to environment unless we attain the truth about man in the universe that metaphysics seeks? Bertrand, however, seems to group this view of education with Academic theories whose value he minimizes.

24. For an introduction to the breadth of this field, see Dennis J. Sporre, *The Creative Impulse* (1996).

25. See Barry J. Fraser and Kenneth G. Tobin, eds., *International Handbook of Science Education* (1998).

26. This was exactly the task that St. Thomas Aquinas saw as fundamental to the sound development of Christian theology, as becomes clear from the context within which his commentaries on Aristotle were written, as we noted above (see chapter 2, note 54).

27. John Deely has called the symbiosis of modern science and philosophy in this particular "The Strange Case of Dr. Jekyll and Mr. Hyde"; see, in particular, chap. 13 of his *Four Ages of Understanding* (2001a).

28. See Aquinas, *Summa theologiae* I-II, q. 65, a. 2, and the whole treatise on prudence, II-II, qq. 47–56. See also Josef Pieper, *The Four Cardinal Virtues* (1965), chap. 1, pp. 3–42.

29. On economics as an architectonic regulating all the technologies, see chapter 11, section C.3.

30. From a Thomistic point of view, the social sciences necessarily involve values. Though humans are naturally social, their social behavior is in part free and hence can only be understood in practical terms.

Modern critical theory comes to the same conclusion for a different reason, namely, that no one can talk politics without involving a partisan point of view.

31. See chapter 9, section E for a discussion of the nature of historical truth.

32. For an argument that in universities “religious studies” must be separated from any religious commitment, see Donald Wiebe, *The Politics of Religious Studies* (1998). Would not the “hermeneutic of suspicion” suggest that such programs will always tend to be taught by secularists? Theology, by contrast, is precisely a *confessionally committed* use of reason, distinct from philosophy and science alike. The history of this question, particularly in and after the time of Aquinas, desperately needs to be better understood. Consult the index entry “theology” in John Deely, *Four Ages of Understanding* (2001a), p. 1003; and consider the following (ibid., pp. 297–98): “Theology in the cultural milieu shaped by Aquinas was a pressing need, and what was pressing about it was quite specific to the cultural situation defining the end of the so-called ‘dark ages’. . . . [A]t the turn of the thirteenth century in central Europe, the arrival in Latin dress of Aristotle surrounded by a phalanx of Arabic commentators impelled Christian thinkers to try their hand at assimilating Greek science and metaphysics. Scriptural authority was little help, for the Arabs had their own scriptures, and Aristotle was invulnerable to such an appeal, being both long dead and older than either the Christian or the Islamic scriptures (as least the ones specifically so). Christian thinkers were forced, in such a cultural situation, either to abdicate or to use the language and tools of reason. In other words, they were forced to develop a theology, as distinct from exegesis, patristics, or anything we would today call ‘religious studies’. And form a theology they did.

“It is not that there was no theological reasoning before Aquinas’s century. Of course there was. Indeed, more than one of the early patristic writers were skilled practitioners of Greek philosophical concepts, to mention nothing of the speculative genius displayed by Augustine in his *De Trinitate* of the early fifth century. But these writings without practical exception were of an apologetic and pastoral bent, which presupposed the Christian standpoint in such a way and to such an extent as virtually to deny philosophy any proper autonomy outside the sphere of religious orientation. They were imbued through and through with the spirit of *parti pris*. Taking sides was the name of the game; partisan spirit its élan. Below the intellectual vigor of these writings were the array of ‘practical’ or ‘pastoral’ writings of a strictly

ecclesial, liturgical, or sacramental orientation.

“With Aquinas, religious thinking becomes something more than a mere partisan expression and appropriation of ‘pagan philosophy’. Religious thinking, to begin with, was made to respect thinking simply so called; for human understanding was recognized by Aquinas to have a proper autonomy and sphere of exercise, which, if not neutral respecting divine revelation (for Aquinas considered that all truth pointed in the direction of the divine origin of thought and being), was nonetheless not subject to mere dictates of authority either, but only to evidence in the light of which even authority could be countered as abusive. Recognition of and the demanding of respect for the ‘rights of reason’ were what distinguished the religious thinking of Aquinas and made his theology, even though based on and presuppositive of Christian revelation, a ‘science’ which could draw on without distorting the achievements of human understanding in the speculative and practical spheres alike. By distinguishing the proper spheres of religious belief and philosophical understanding, Aquinas was able to erect a framework for systematic thinking within which reason would keep its due, and hence within which intellectual dialogue would in principle be possible between faiths and across cultures. In time, the delicate plants of [ideoscopic] science, distinct from philosophy and theology alike, for the seeds of which Aquinas’s main teacher Albert showed such keen sensitivity, would find room for their normal development within Aquinas’s synthesis of philosophical doctrine and Christian religious dogma. That grace presupposes and perfects nature was Aquinas’s motto across the boards, and nowhere more than in the affairs of the intellect.”

33. See James T. Burtchaell, C.S.C., *The Dying of the Light* (1998).

34. See Odd Langholm, *Economics in the Medieval Schools* (1992), pp. 1–36 and *passim*.

35. See Kenneth C. Gray and Edwin L. Herr, *Workforce Education* (1998).

36. The supply of unskilled workers in the United States and in many European countries steadily decreases and is resupplied by immigration.

37. See Marilyn R. Peterson, *At Personal Risk* (1982), and Howard Gardner, Mihaly Csikszentmihalyi, and William Damon, eds., *Good Work* (2001).

38. Aristotle, *Metaphysics* I, chap. 2, 982a5.

39. Aristotle, *Nicomachean Ethics* VI, chap. 3, 1095a4–9; Aquinas, *Sententia Libri Ethicorum* VI, lect. 7. See the Maurer translation of *The Division and Methods of the Sciences* (1958), p. 101, n. 5.

40. For how this tends to a “devaluation of values” in our society,

see William J. Bennett, *The De-Valuing of America* (1994).

41. For a fuller discussion, see my *Choosing a Worldview and Value System* (2000).

Bibliography

Since the aim of this book is primarily philosophical and not historical or exegetical, I have limited documentation to necessary citations and other information and to English works when available. This is the case even for Aristotle and St. Thomas Aquinas whose thought is basic for my inquiry. Readers who want detailed exegesis of Aquinas's metaphysical works are directed to two recent scholarly works: Leo J. Elders, S.V.D., *The Metaphysics of Being of St. Thomas Aquinas in a Historical Perspective* (1993), and John F. Wippel, *The Metaphysical Thought of St. Thomas Aquinas: From Finite Being to Uncreated Being* (2000). For text and translation of Aristotle's works see the Loeb Classical Library, Harvard University Press, and also the standard Oxford translation of the complete works published by the Clarendon Press of Oxford University, now updated by Princeton. But all my citations are handy in *The Basic Works of Aristotle*, edited with an introduction and outlines by Richard P. McKeon (1941). For the *Metaphysics*, I also recommend the translation of Hippocrates Apostle (1979) for its fidelity to the Greek and its excellent commentary and glossary of Greek and English terms. An up-to-date bibliography of standard Latin texts, translations, and critical chronology of St. Thomas Aquinas can be found in Jean-Pierre Torrell, O.P., *St. Thomas Aquinas* (1996), vol. 1, *The Person and His Work*. A Latin version of Aquinas's *Opera omnia*, edited by Enrique Alarcón, University of Navarre, 2004, is available at <http://www.corpusthomicum.org/iopera.html>.

In chapter 2, I present a typology of philosophers who have made especially significant contributions to the study of metaphysics, but I have restricted references to conveniently available studies that supply detailed information on primary and secondary sources and give a fairer representation of the thought of these authors than is possible in my brief summaries of their typical positions. In short, my aim is to achieve a prospective postmodern metascience rather than a retrospective historical metaphysics.

Finally, the reader should note that some bibliographic entries contain two dates. When a second date is given following the publisher information, this implies either a reprint edition or a specific edition used by the author.

- Abelson, Paul.
1965. *The Seven Liberal Arts: A Study in Medieval Culture* (New York: Russell & Russell).
- Adamczyk, Stanislaw.
1933. *De Objectio Formali Intellectus Nostri Secundum Doctrinam S. Thomae Aquinatis* (Rome: Gregorian University).
- Adams, Marilyn McCord.
1987. "William of Ockham: Voluntarist or Naturalist?" in John F. Wippel, ed. (1987), pp. 219–48.
- Adler, Mortimer J.
1940. *Problems for Thomists: The Problem of Species* (New York: Sheed and Ward).
1941. "Solution of the Problem of Species," *The Thomist* 3 (April), 279–379.
1952. "The Hierarchy of Essences," *The Review of Metaphysics*, 6.1 (September), 3–30.
- Aertsen, Jan.
1996. *Medieval Philosophy and the Transcendentals: The Case of Thomas Aquinas* (Leiden: E. J. Brill).
- Agazzi, Evandro.
2001. "Science and the Humanities in the New Paideia," in Tian Yu Cao, ed., (2001), pp. 223–34.
- Agazzi, Evandro, and Jan Faye, eds.
2001. *The Problem of the Unity of Science: Proceedings of the Annual Meeting of the International Academy of the Philosophy of Science, Copenhagen-Aarhus* (Denmark, 31 May–3 June 2000; Singapore: World Scientific Publishers).
- Al-Ghazali.
c.1095. *The incoherence of the philosophers = Tahāfut al-falāsifah*, a parallel English-Arabic text trans., introduced, and annotated by Michael E. Marmura (2nd ed.; Provo, UT: Brigham Young University Press, 2000).
- Allen, R. E., ed.
1991. *Greek Philosophy: Thales to Aristotle* (3rd ed., rev. and expanded; New York: The Free Press).
- Allison, Henry E.
1996. *Idealism and Freedom: Essays on Kant's Theoretical and Practical Philosophy* (Cambridge: Cambridge University Press).
- Anderson, F. H.
1948. *The Philosophy of Francis Bacon* (Chicago: Chicago University Press).
- Annas, Julia, and Jonathan Barnes.
1985. *The Modes of Scepticism: Ancient Texts and Modern Interpretations* (New York: Cambridge University Press).
- Apostle, Hippocrates.
1952. *Aristotle's Philosophy of Mathematics* (Chicago: University of Chicago).
1976. "Ackril on Aristotle's Categories," *The New Scholasticism* 50.2 (Spring), 204–11.

1979. *Aristotle's Metaphysics* (Grinnell, IA: The Peripatetic Press).
1981. *Aristotle's On the Soul (De Anima)* (Grinnell, IA: The Peripatetic Press).
- Aquinas, Thomas. (See also the bibliographical note.)
- c.1265–66. *Disputed Question on the Soul*, aa. 14 and 15, in *The Soul*, trans. John Patrick Rowan (St. Louis: Herder, 1949), pp. 181–83 and 194–201, respectively.
1270. *Aquinas against the Averroists: On There Being Only One Intellect*, bilingual ed. by Ralph McInerney (West Lafayette, IN: Purdue University Press, 1993).
- Arintero, John (Juan) J., O.P.
1979. *The Mystical Evolution*, trans. Jordan Aumann, O.P. (Rockford, IL: Tan Books).
- Aristotle. (See the bibliographical note.)
- A. H. Armstrong, trans.
1988. *The Enneads*, 7 vols. (Cambridge, MA: Harvard University Press).
- Arnason, H. Horvard.
1998. *History of Modern Art: Painting, Sculpture, Architecture, Photography* (4th ed. rev. by Maria Prather; New York: Harry Abrams).
- Arraj, James.
1993. *On the Road to the Spiritual Unconscious: Mysticism, Metaphysics and Maritain* (Chiloquin, OR: Inner Growth Books).
1996. *The Mystery of Matter: Non-Locality, Morphic Resonance, Synchronicity and the Philosophy of Nature of Thomas Aquinas* (Chiloquin, OR: Inner Growth Books).
- Ashley, Benedict M., O.P.
1951. *The Theory of Natural Slavery* (Ph.D. dissertation, University of Notre Dame).
1952. "Research into the Intrinsic Final Causes of Physical Things," published under the heading "Problem: The Relation of Physical Activity to Essence and End," with a comment by Robert J. McCall, S.J., in the *American Catholic Philosophical Association Proceedings* (April 16), 185–97.
1957. *The Arts of Learning and Communication: A Handbook of the Liberal Arts* (Chicago: Priory Press). Also available at <http://www.op.org/domcentral/study/ashley/arts/default.htm> (last accessed May 2005).
1958. *Aristotle's Sluggish Earth* (River Forest, IL: Albertus Magnus Lyceum); originally in *The New Scholasticism* 32 (1958): Part 1, "Problematics of the *De Caelo*," 1–31; Part 2, "Media of Demonstration," 202–34.
1961. "Does Natural Science Attain Nature or Only the Phenomena?" in Vincent E. Smith, ed., *The Philosophy of Physics* (Jamaica, NY: St. John's University Press), pp. 63–82.
1965. "Significance of Non-Objective Art," *Proceedings of the American Catholic Philosophical Association*, 156–65.
- 1967a. "Education, II (Philosophy of) Historical Development, Ancient and Medieval," *The New Catholic Encyclopedia* (New York: McGraw-Hill)

5:162–66.

- 1967b. "Final Causality," *ibid.*, 5:915–19
- 1967c. "Liberal Arts," *ibid.*, 8:646–99
- 1967d. "Teleology," *ibid.* 13:979–81.
1972. "Causality and Evolution," *The Thomist* 26 (April), 199–230.
1973. "Change and Process," in John N. Deely and Raymond J. Nogar, eds., *The Problem of Evolution* (Indianapolis, IN: Hackett), pp. 265–94.
1985. *Theologies of the Body: Humanist and Christian* (St. Louis: Pope John Center). A 2nd edition, with a new introductory chapter, has been published by the Pope John Center (Braintree, MA, 1996, now National Catholic Bioethics Center, Boston).
1991. "The River Forest School of Natural Philosophy," in R. James Long, ed., *Philosophy and the God of Abraham: Essays in Memory of James A. Weisheipl* (Toronto: Pontifical Institute of Medieval Philosophy), pp. 1–16.
1992. "Thomism and the Transition from the Classical World-View to Historical-Mindedness," in Deal W. Hudson and Dennis Wm. Moran, eds., *The Future of Thomism* (Notre Dame, IN: American Maritain Association, University of Notre Dame Press), pp. 109–22
1993. "Truth and Technology," in *The Importance of Truth, American Catholic Philosophical Association Proceedings* 68, 27–40.
1994. "What Is the End of the Human Person: The Vision of God and Integral Human Fulfillment," in Luke Gormally, ed. (1994), pp.68–96.
- 1995a. "The Loss of Theological Unity: Pluralism, Thomism, and Catholic Morality," in Mary Jo Weaver and R. Scott Appleby, eds., *Being Right: Conservative Catholics in America*. (Bloomington: Indiana University Press), pp. 63–87.
- 1995b. "Cosmic Community in Plotinus, Aquinas, and Whitehead," *Cultura y Vida (XX Semana Tomista)*, (Buenos Aires: Sociedad Tomista Argentina), pp. 1–27.
1996. *Justice in the Church: Gender and Participation* (The McGivney Lectures, 1992; Washington, DC: The Catholic University of America Press).
- 1997a. "The End of Philosophy and the End of Physics: A Dead End," in Roman T. Ciapalo, ed., *Postmodernism and Christian Philosophy* (American Maritain Association; Washington, DC: Catholic University of America Press), pp. 12–22.
- 1997b. "Fundamental Option and/or Commitment to Ultimate End," *Philosophy and Theology* 10.1 (January), 113–41; originally presented as a paper for a symposium of the Karl Rahner Society at the national convention of the Catholic Theological Society of America, June 1996.
1999. "Introduction" to Daniel McInerney, ed., (1999), pp. 1–18.
2000. *Choosing a Worldview and Value System: An Ecumenical Apologetics* (Staten Island, NY: Alba House).
2001. "The Validity of Metaphysics: The Need for a Solidly Grounded Metaphysics," in Timothy L. Smith, ed., *Faith and Reason: The Notre Dame Symposium, 1999* (South Bend, IN: St. Augustine's Press),

pp.67–89.

Ashley, Benedict M., O.P., and Albert Moraczewski, O.P.

2001. "Cloning, Aquinas, and the Embryonic Person," *The National Catholic Bioethics Quarterly* 1.2, 189–202.

Ashley, Benedict M., O.P., and Eric Reitan.

1997. Review of William A. Wallace, O.P., *The Modeling of Nature: Philosophy of Science and Philosophy of Nature in Synthesis*, *The Thomist*, 64.1 (October), 625–40.

Augustine.

386 CE. *Against the Academicians*, trans. Peter King (Indianapolis, IN: Hackett, 1995).

389 CE. *The Teacher*, trans. Peter King (Indianapolis, IN: Hackett, 1995).

397/426 CE. *On Christian Teaching*, trans. R. P. H. Green (New York: Oxford University Press, 1999).

Aumann, Jordan, O.P.

1951. *De Pulchritudine: Inquisitio Philosophico-Theologica* (Valencia: University of Salamanca).

Avicenna (Ibn Sina).

1020–27. *Avicenne: La Metaphysique du Shifa*, ed. and trans. Georges C. Anawati, O.P., 2 vols. (Paris: J. Vrin, 1978).

Ayer, A. J.

1980. *Hume* (New York: Oxford University Press).

Ayers, Michael R.

1999. "The Foundations of Knowledge and the Logic of Substance: The Structure of Locke's General Philosophy," in Margaret Atherton, ed., *The Empiricists: Critical Essays on Locke, Berkeley, and Hume* (Lanham, MD: Rowman & Littlefield), pp.19–45.

Bacon, Francis.

1605. *The Advancement of Learning*, in James Spedding, Robert L. Ellis, and Douglas D. Heath, eds., *The Works of Francis Bacon* (Cambridge: Riverside Press, 1863).

Baird, Robert D.

1971. *Category Formation and the History of Religions* (1st ed.; The Hague: Mouton).

Baisnée, Jules A.

1945. "Two Catholic Critiques of Personalism," *The Modern Schoolman* 22 (January), 58–75.

Baldick, Chris.

1992. "Romanticism," in *The Concise Oxford Dictionary of Literary Terms* (New York: Oxford University Press), pp. 193–95.

Balthasar, Han Urs von.

1983. *The Glory of the Lord: A Theological Aesthetics*, vol. 1a, *Seeing the Form* (San Francisco: Ignatius Press).

Banfield, Ann.

2000. *The Phantom Table: Wolff, Fry, Russell, and the Epistemology of*

Modernism (Cambridge: Cambridge University Press).

Barbour, Ian G.

1997. *Religion and Science: Historical and Contemporary Issues* (rev. ed.; San Francisco: Harper-Collins).

Barnes, J., M. Schofield, and R. Sorabji.

1995. "Bibliography," in J. Barnes, ed., *The Cambridge Companion to Aristotle* (Cambridge: Cambridge University Press), 295–384.

Barrow, John D., and Frank J. Tipler.

1986. *The Anthropic Cosmological Principle* (New York: Oxford University Press).

Bary, William Theodore de, Irene Bloom, and Joseph Adler, eds.

1999. *Sources of Chinese Tradition* (2nd ed.; New York: Columbia University Press).

Basham, A. L.

1991. *The Origins and Development of Classical Hinduism*, ed. and completed by Kenneth G. Zysk (New York: Oxford University Press).

Beauchamp, Tom L., and Alexander Rosenberg.

1981. *Hume and the Problem of Causation* (New York: Oxford University Press).

Bechert, Heinz.

1996. "The Historic Buddha: His Teaching as a Way of Redemption," in Hans Küng et al., eds. (1996), pp. 291–339.

Beck, Lewis White.

1969. *Early German Philosophy: Kant and His Predecessors* (Cambridge, MA: The Belknap Press of Harvard University Press).

1978. *Essays on Kant and Hume* (New Haven, CT: Yale University Press).

Behe, Michael J.

1996. *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: The Free Press).

Beistegui, Miguel de.

1998. *Heidegger and the Political: Dystopias* (London: Routledge).

Bell, J.

1981. "Category Theory and the Foundations of Mathematics," *British Journal for the Philosophy of Science* 32, 349–58.

Benacerraf, Paul, and Hilary Putnam, eds.

1964. *Philosophy of Mathematics: Selected Readings* (Englewood Cliffs, NJ: Prentice-Hall).

Bennett, Jonathan F.

1971. *Locke, Berkeley, Hume: Central Themes* (Oxford: Clarendon Press).

Bennett, William J.

1994. *The De-Valuing of America: The Fight for Our Culture and Our Children* (New York: Simon and Schuster).

2001. *The Broken Hearth: Reversing the Moral Collapse of the American Family* (New York: Doubleday).

- Berggren, J. L.
1986. *Episodes in the Mathematics of Islam* (New York: Springer-Verlag).
- Berggren, J. L., et al.
1974. "The History of Mathematics," *Encyclopedia Britannica*, 15th ed., vol. 23, pp. 575–612.
- Bergson, Henri.
1911. *Creative Evolution* (New York: Henry Holt).
- Berlin, Isaiah.
1999. *The Roots of Romanticism*, ed. Henry Hardy (Princeton, NJ: Princeton University Press).
- Bernstein, Richard J., ed.
1980. *Perspectives on Peirce: Critical Essays* (Westport, CT: Greenwood).
- Bertalanffy, Ludwig.
1968. *General Systems Theory: Foundations, Development, Applications* (rev. ed.; New York: George Braziller).
- Berti, Enrico.
1996. "Does Aristotle's Conception of Dialectic Develop?" in William Wians, ed. (1996), pp. 105–30.
- Bertrand, Yves.
1995. *Contemporary Theories and Practice in Education*, trans. J. M. Poisson (Madison, WI: Atwood).
- Beuchot, Mauricio, and John Deely.
1995. "Common Sources for the Semiotic of Charles Peirce and John Poinsot," *The Review of Metaphysics* 48.3 (March), 539–66.
- Beyer, Stephan.
1974. *The Buddhist Experience: Sources and Interpretations* (Encino, CA: Dickenson Publishing Co.).
- Bhagavad Gita*, "The Song of God," a work of collective authorship.
499–199 BCE. The most popular Hindu religious text from the Smriti, the writings that comment upon the revealed truths of Hindu faith recorded in the Sruti (the Scriptures proper, to wit, the Upanishads), English trans. by Swami Prabhavanananda and Christopher Isherwood (New York: Mentor Books, 1954). See also *Bhagavad-Gita As It Is*, with commentary by A. C. Bhaktivedanta Swami Prahupada (Los Angeles: The Bhaktivedanta Book Trust, 1983).
- Bickers, Brian, ed.
1996. *Francis Bacon* (New York: Oxford University Press).
- Blackwell, Richard J.
1961. "The Structure of Wolffian Philosophy," *The Modern Schoolman* 38, 203–18.
- Blankenhorn, Bernhard, O.P.
2002. "The Good as Self-Diffusive," *Angelicum* 79, 803–37. Also available at www.opwest.org/Archive/2004/20042/The_Good_as_Self-Diffusive_01.htm (last accessed May 2005).
- Blanchette, Oliva.

1992. *The Perfection of the Universe according to Aquinas: A Teleological Cosmology* (University Park: The Pennsylvania State University Press).
- Bloom, Alan D.
1987. *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students* (New York: Simon and Schuster).
- Blunt, Anthony.
1940. *Artistic Theory in Italy, 1450–1600* (reprint; Oxford: Oxford University Press, 1994).
- Boas, Frank, ed.
1972. *The Function of Dance in Human Society* (New York: Dance Horizons).
- Bochenski, I. M.
1970. *A History of Formal Logic*, trans. and ed. "with the author's full concurrence" by Ivo Thomas (2nd corrected ed.; New York: Chelsea Publishing Company) from *Formale Logik* (Freiburg: Verlag Karl Alber, 1956).
- Boerger, Egan, Erich Gradel, and Yuri Gurevich.
1997. *The Classical Decision Problem* (New York: Springer).
- Booth, Edward, O.P.
1983. *Aristotelian Aporetic Ontology in Islamic and Christian Thinkers* (Cambridge: Cambridge University Press).
- Bos, Abraham P.
1989. *Cosmic and Meta-cosmic Theology in Aristotle's Lost Dialogues* (Leiden: E. J. Brill; orig. in Italian, Milan: Vita e Pensiero).
- Bouwsma, William J.
1988. *John Calvin: A Sixteenth-Century Portrait* (New York: Oxford University Press).
- Boyce, Mary.
1979. *Zoroastrians: Their Religious Beliefs and Practices* (London: Routledge and Kegan Paul).
- Boyer, Carl Benjamin.
1989. *A History of Mathematics*, 2nd ed. rev. by Uta C. Merzbach (New York: Wiley).
- Bradley, Denis J.
1997. *Aquinas on the Twofold Human Good: Reason and Human Happiness in Aquinas' Moral Science* (Washington, DC: Catholic University of America Press).
- Brandewie, Ernest.
1983. *Wilhelm Schmidt and the Origin of the Idea of God* (Lanham, MD: University Press of America).
- Braumbaugh, Renford.
1967. "Demiurge," in Paul Edwards, ed. (1967), vol. 2, pp. 337–38.
- Brezik, Victor B.
1981. *One Hundred Years of Thomism: Aeterni Patris and Afterwards; A Symposium* (Houston, TX: Center for Thomistic Studies, University of St.

- Thomas).
- Brouwer, L. E. J.
1964. "Intuitionism and Formalism" and "Consciousness, Philosophy, and Mathematics," in Paul Benacerraf and Hilary Putnam, eds. (1964), pp. 77–89 and 90–96.
- Brown, Raymond.
1994. *Introduction to New Testament Christology* (New York: Paulist).
- Brown, Stuart, ed.
1996. *British Philosophy and the Age of Enlightenment*, vol. 5 of the *Routledge History of Philosophy* (London: Routledge).
- Brück, Michael von.
1991. *The Unity of Reality: God, God-Experience, and Meditation in the Hindu-Christian Dialogue*, trans. James V. Zeitz (New York: Paulist Press).
- Brumbaugh, Robert S.
1981. *The Philosophers of Greece* (Albany: State University of New York Press).
- Bruning, Jacqueline, and Paul Forster, eds.
1996. *The Rule of Reason: The Philosophy of Charles Sanders Peirce* (Toronto: Toronto University Press).
- Buckley, Michael J., S.J.
1990. *At the Origins of Modern Atheism* (New Haven, CT: Yale University Press).
- Buell, Jon, and Virginia Hearn, eds.
1994. *Darwinism: Science or Philosophy?* (Dallas, TX: Foundation for Thought and Ethics).
- Bullough, E.
1912. "Psychical Distance." Reprinted in Alex Neill and Aaron Ridley, eds. (1995), pp. 297–311.
- Burke, Edmund.
1775. *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful* (Notre Dame, IN: Notre Dame University Press, 1990).
- Burns, John V.
1966. *Dynamism in the Cosmology of Christian Wolff* (New York: Exposition Press).
- Burnyeat, Myles, and Michael Frede, eds.
1997. *The Original Sceptics: A Controversy* (Indianapolis, IN: Hackett).
- Burrell, David B.
1973. *Analogy and Philosophical Language* (New Haven, CT: Yale University Press).
- Burtchaell, James T., C.S.C.
1998. *The Dying of the Light: The Disengagement of Colleges and Universities from Their Christian Churches* (Grand Rapids, MI: Eerdmans).

- Burt, Edwin A.
1924. *The Metaphysical Foundations of Modern Physical Science* (rev. ed.; Atlantic Humanities Press, 1980).
- Butler, J. Thomas.
2001. *Principles of Health Education and Health Promotion* (3rd ed.; Belmont, CA: Wadsworth).
- Buttiglione, Rocco
1997. *Karol Wojtyla: The Thought of the Man Who Became Pope John Paul II*, trans. Paolo Guietti and Francesca Murphy (Grand Rapids, MI: Eerdmans).
- Cahalan, John C.
1985. *Causal Realism: An Essay on Philosophical Method and the Foundations of Knowledge*, Sources in Semiotics 2 (Lanham, MD: University Press of America).
- Cajetan, Thomas de Vio.
1498. *De Nominum Analogia et De Conceptu Entis*, ed. P. N. Zammit (Rome: Angelicum, 1935); Edward A. Bushinski and Henry J. Koren, trans., *The Analogy of Names and the Concept of Being* (Pittsburgh: Duquesne University, 1953).
- Camazine, Scott, et al.
2001. *Self-organization in Biological Systems* (Princeton, NJ: Princeton University Press).
- Canfield, John V., ed.
1997. *Philosophy of Meaning, Knowledge, and Value in the Twentieth Century*, vol. 10 of the *Routledge History of Philosophy* (London: Routledge).
- Cao, Tian Yu, ed.
2001. *The Proceedings of the Twentieth World Congress of Philosophy*, vol. 10, *Philosophy of Science* (Bowling Green, OH: Bowling Green State University, Philosophy Documentation Center).
- Capra, Fritjof.
1975. *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism* (Berkeley, CA: Shambhala).
- Caputo, John D.
1987. *Radical Hermeneutics: Repetition, Deconstruction, and the Hermeneutic Project* (Bloomington: Indiana University Press).
1997. *Deconstruction in a Nutshell: A Conversation with Jacques Derrida* (New York: Fordham University Press).
- Carman, John B.
1974. *The Theology of Ramanuja: An Essay in Interreligious Understanding* (New Haven, CT: Yale University Press).
- Carman, Taylor, and Bryan Van Norden
1997. "Being-In-the Way," a review of *Heidegger and Asian Thought*, ed. Graham Parkes (Honolulu: University of Hawaii Press, 1987). Review available at <http://vassun.vassar.edu/~brvannor/heidegger.html> (last

accessed May 2005).

Carroll, Lewis.

1871. *Through the Looking Glass, in Lewis Carroll: The Complete Illustrated Works* (New York: Gramercy Press, 1995).

Carroll, Noel.

1999. *Philosophy of Art: A Contemporary Introduction* (New York: Routledge).

Catan, John R., ed.

1980. *St. Thomas Aquinas on the Existence of God: Collected Papers of Joseph Owens* (Albany: State University of New York Press).

Catechism of the Catholic Church.

1997. 2nd ed (Rome: Libreria Editrici Vaticana).

Cenkner, William, O.P.

1983. *A Tradition of Teachers: Sankara and the Jagadgurus Today* (Delhi: Motilal Banarsidass).

1994. *The Hindu Personality in Education: Tagore, Gandhi, Aurobindo* (Columbia, MO: South Asia Books).

Cessario, Romanus, O.P.

1999. *Le Thomisme et les Thomistes* (Paris: Editions du Cerf).

2005. *A Short History of Thomism* (Washington, DC: The Catholic University of America Press).

Chandler, Daniel.

2002. "The Sapir-Whorf Hypothesis," available at <http://www.aber.ac.uk/media/Documents/short/whorf.html> (last accessed May 2005).

Chappell, Vere.

1994. "Locke's Theory of Ideas," in Vere Chappell, ed. (1994), pp. 26–55.

Chappel, Vere, ed.

1994. *The Cambridge Companion to Locke* (New York: Cambridge University Press).

Christenson, Harold T., ed.

1964. *Handbook of Marriage and the Family* (New York: Rand McNally).

Christopher, William.

1999. *A Cultivated Reason: An Essay on Hume and Humeanism* (University Park: Pennsylvania State University Press).

Cicero, Marcus Tullius.

c. 47 BCE. *Academica*, trans. H. Rackham, in *On the Nature of the Gods (De Natura Deorum), Cicero's Philosophical Treatises*, Loeb Classical Library (Cicero XIX) (Cambridge, MA: Harvard University Press, 1933).

Clark, Kenneth M.

1953. *The Nude: A Study in Ideal Form* (Princeton, NJ: Princeton University Press, 1972).

Clarke, Desmond M.

1982. *Descartes' Philosophy of Science* (University Park: Pennsylvania State University Press).

- Clarke, W. Norris, S.J.
 1979. *The Philosophical Approach to God: A Neo-Thomist Perspective*, ed. by William E. Ray (Winston-Salem, NC: Wake Forest University).
 2001. *The One and the Many: A Contemporary Thomistic Metaphysics* (Notre Dame, IN: University of Notre Dame Press).
- Cleary, John J.
 1996. "Mathematics and Cosmology in Aristotle's Philosophical Development," in William Wians, ed. (1996), pp. 193–228.
- Coe, Shoki, and Aharon Sapsejian.
 1972. "Ministry and Context," annual report of the Theological Education Fund.
- Cogan, Barry S.
 1988. "The Problem of Creation in Late Medieval Jewish Philosophy," in Ruth Link-Salinger et al., eds, *A Straight Path: Studies in Medieval Philosophy and Culture; Essays in Honor of Arthur Hyman* (Washington, DC: Catholic University of America Press), pp. 159–73.
- Cohen, H. Floris.
 1994. *The Scientific Revolution: An Historiographical Inquiry* (Chicago: University of Chicago Press).
- Colish, Marcia L.
 1999. *Medieval Foundations of the Western Intellectual Tradition, 400–1400* (New Haven, CT: Yale University Press).
- Collingwood, Robin George (1889–1943).
 1946. *The Idea of History*, ed. Jan Van der Dussen (rev. ed. with lectures, 1926–1928; Oxford University Press, 1994).
- Confucius.
 1938. *The Analects of Confucius*, trans. and annotated by Arthur Waley (New York: Vintage Books).
- Conimbricenses.
 1607. "De Signis," being chapter 1 of their commentary on Aristotle's *De Interpretatione*, in *Commentarii Collegii Conimbricensis et Societatis Jesu, in Universam Dialecticam Aristotelis Stagiritae, Secunda Pars* (Lyons: Sumptibus Horatii Cardon, 1607), pp. 4–67. An earlier edition minus the Greek text of Aristotle was published at Coimbra itself in 1606. This work has just been translated into English and published in a bilingual critical edition; see John Doyle, ed. and trans. (2001).
- Conway, Pierre, O.P.
 1960. *Principles of Education: A Thomistic Approach*, with exercises and annotated bibliography by Mary Michael Spangler (Washington, DC: The Thomist Press).
- Conway, Pierre, O.P., and Benedict M. Ashley, O.P.
 1959. *The Liberal Arts in St. Thomas Aquinas* (Washington, DC: The Thomist Press).
- Cook, John W.
 2000. *Wittgenstein, Empiricism, and Language* (New York: Oxford University

- Press).
- Cooper, David, et al., eds.
1992. *A Companion to Aesthetics* (Oxford: Blackwell).
- Copleston, Frederick, S.J.
1946. *History of Philosophy*, 9 vols (Westminster, MD: Newman Bookshop).
- Cottingham, John, ed.
1992. *The Cambridge Companion to Descartes* (Cambridge: Cambridge University Press).
- Cottingham, John, Robert Stoothoff, and Dugald Murdoch, trans. and eds.
1984–91. *The Philosophical Writings of Descartes* (Cambridge: Cambridge University Press).
- Coughlan, G. D., and J. E. Dodd.
1991. *The Ideas of Particle Physics: An Introduction for Scientists* (2nd ed.; Cambridge: Cambridge University Press).
- Couissin, P.
1983. "The Stoicism of the New Academy," in Myles Burnyeat, ed., *The Skeptical Tradition* (Berkeley: University of California Press), pp. 31–64.
- Courant, Richard, and Herbert Robbins.
1941. *What Is Mathematics: An Elementary Approach to Ideas and Methods* (New York: Oxford University Press).
- Coward, Harold, ed.
1997. *Life after Death in World Religions* (Maryknoll, NY: Orbis Books).
- Cowburn, John, S.J.
1967. *The Person and Love: Philosophy and Theology* (Staten Island, NY: Alba House).
- Coxon, A. H.
1986. *The Fragments of Parmenides: A Critical Text with Introduction, Translation, the Ancient Testimonia and a Commentary* (Assen: Van Gorcum).
- Cross, Richard.
1998. *The Physics of Duns Scotus: The Scientific Context of a Theological Vision* (Oxford: Clarendon Press).
- Crowe, Michael J.
1985. "Ten Misconceptions about Mathematics and Its History," in William Aspray and Philip Kircher, eds., *History and Philosophy of Modern Mathematics*, Minnesota Studies in Philosophy of Science 11; (Minneapolis: University of Minnesota Press), 260–71.
- Crowley, Charles B., O.P.
1980. *Universal Mathematics in Aristotelian-Thomistic Philosophy* (Washington, DC: University Press of America).
- Curd, Patricia.
1998. *The Legacy of Parmenides: Eleatic Monism and Later Presocratic Thought* (Princeton, NJ: Princeton University Press).
- Curley, Edwin, ed. and trans.

1985. *The Collected Works of Spinoza*, vol. 1 (Princeton, NJ: Princeton University Press).
- Dancy, Jonathan.
1985. *Introduction to Contemporary Epistemology* (Oxford: Blackwell).
- Danesi, Marcel.
1999. *Cool: The Signs and Meanings of Adolescence* (Toronto: University of Toronto Press).
- Dasgupta, Surendranath.
1922–55. *A History of Indian Philosophy*, 5 vols (Cambridge: Cambridge University Press).
- Datta, Bibhutibhusan, and Avadhesh Narayan Singh.
1935. *History of Hindu Mathematics*, 2 vols. in 1 (New York: Asia Publishing House, 1962).
- Davidson, Herbert A.
1992. *Alfarabi, Avicenna, and Averroes on Intellect: Their Cosmologies, Theories of the Active Intellect, and Theories of Human Intellect* (New York: Oxford University Press).
- Davies, J. G.
1984. *Liturgical Dance: An Historical, Theological, and Practical Handbook* (London: SMC Press).
- Dawkins, Richard.
1976. *The Selfish Gene* (New York: Oxford University Press).
1986. *The Blind Watchmaker* (New York: W. W. Norton).
- Dawson, Christopher.
1989. *The Crisis of Western Education*. (reprint; Steubenville, OH: Franciscan University Press).
- Deacon, Terrence W.
1997. *The Symbolic Species: The Co-evolution of Language and the Brain* (New York: W. W. Norton).
- Debrock, Guy, and Menno Hulswit, eds.
1994. *Living Doubt: Essays concerning the Epistemology of Charles Sanders Peirce* (Dordrecht: Kluwer Academic Publishers).
- De Dijn, Herman.
1996. *Spinoza: The Way to Wisdom* (West Lafayette, IN: Purdue University Press).
- Deely, John.
1966a. "The Emergence of Man: An Inquiry into the Role of Natural Selection in the Making of Man," *The New Scholasticism* 40.2, 141–76.
1966b. "The Vision of Man in Teilhard de Chardin," *Listening* 1, no. 3 (Autumn), 201–9.
1967. "Finitude, Negativity, and Transcendence: The Problematic of Metaphysical Knowledge," *Philosophy Today* 11 (Fall), 184–206.
1968. "The Immateriality of the Intentional As Such," *The New Scholasticism* 42.3, 293–306.
1969a. "The Philosophical Dimensions of the Origin of Species," *The Thomist*

- 33 (January and April), part I, 75–149; part II, 251–342.
- 1969b. “Evolution and Ethics,” *Proceedings and Addresses of the American Philosophical Association* 43, 171–184; reprinted in John N. Deely and Raymond J. Nogar (1973), pp. 187–209.
1971. “Animal Intelligence and Concept-Formation,” *The Thomist* 35 (January), 43–93.
1975. “Reference to the Non-Existent,” *The Thomist* 39 (April), 253–308; previously published in Italian trans. of Ignazio Venzano, “Il riferimento del linguaggio al nonesistente,” *Renovatio* 9, nos. 2–3 (aprile–settembre 1974), 155–175 and 183–310.
1982. *Introducing Semiotics: Its History and Doctrine*. (Bloomington: Indiana University Press).
- 1985a. Editorial afterword, commentary, and notes to John Poinset, O.P. (1632).
- 1985b. “Semiotic and the Liberal Arts,” *The New Scholasticism* 59.3, 296–322.
1986. “Semiotic in the Thought of Jacques Maritain,” *Recherche Sémiotique/Semiotic Inquiry* 6.2, 1–30.
- 1987a. “A Maxim for Semiotics,” in John Deely, ed., *Semiotics 1987*, (Lanham, MD: University Press of America, 1988), pp. iii–vi.
- 1987b. “On the Problem of Interpreting the Term ‘First’ in the Expression ‘First Philosophy,’” in John Deely, ed., *Semiotics 1987* (Lanham, MD: University Press of America, 1988), pp. 3–14.
1988. “Semiotics and First Philosophy,” *American Catholic Philosophical Association Proceedings* 62, 136–46.
- 1990a. *Basics of Semiotics* (Bloomington: Indiana University Press).
- 1990b. “Logic Within Semiotics,” in Jeff Bernard, John Deely, Terry Prewitt, Vilmos Voigt, and Gloria Withalm, eds., “Symbolicity,” pp. 77–86. This volume is bound together with Karen Haworth, John Deely, and Terry Prewitt, eds., *Semiotics 1990* (Lanham, MD: University Press of America, 1993).
1992. “The Supplement of the Copula,” *The Review of Metaphysics* 46.2 (December), 251–77.
- 1994a. *The Human Use of Signs: Or Elements of Anthroposemiosis* (Lanham, MD: Rowman & Littlefield).
- 1994b. *New Beginnings: Early Modern Philosophy and Postmodern Thought* (Toronto: University of Toronto Press).
- 2001a. *Four Ages of Understanding: The First Postmodern Survey of Philosophy from Ancient Times to the Turn of the Twenty-first Century* (Toronto: University of Toronto Press).
- 2001b. “A Sign Is What?” *Sign Systems Studies* 29.2, 705–43.
- 2002a. *What Distinguishes Human Understanding?* (South Bend, IN: St. Augustine’s Press).
- 2002b. “The Absence of Analogy,” *Review of Metaphysics* 55.3 (March), 521–50.
2003. *The Impact on Philosophy of Semiotics: The Quasi-Error of the External World with a Dialogue between a ‘Semiotist’ and a ‘Realist’* (South Bend, IN: St. Augustine’s Press).

- Deely, John, and Raymond J. Nogar.
1973. *The Problem of Evolution: A Study of the Philosophical Repercussions of Evolutionary Science* (New York: Appleton-Century-Crofts).
- Deely, John, Brooke Williams, and Felicia E. Kruse, eds.
1986. *Frontiers in Semiotics* (Bloomington: Indiana University Press).
- De Koninck, Charles.
1943. *De la Primauté du Bien Commun contre les Personnalistes* (Quebec: Editions de L'Université Laval).
1945. "In Defense of St. Thomas: A Reply to Eschmann's Attack on the Primacy of the Common Good," *Laval Théologique et Philosophique* 1.2, 1–103.
1950. "Sedeo ergo sum," *Laval Théologique et Philosophique* 5, 343–48.
1964. *The Hollow Universe* (Québec: Les Presses de l'Université Laval).
1968. "The Unity and Diversity of Natural Science," in *Mélanges à la Mémoire de Charles De Koninck* (Québec: Les Presses de l'Université Laval), pp. 5–25.
- de Lubac, Henri, S.J.
1946. *Surnaturel: études historiques* (Paris: Aubier).
1953. *Aspects of Buddhism*, trans. George Lamb (London: Sheed and Ward).
1984. *A Brief Catechesis on Nature and Grace*, trans. Richard Armandez (San Francisco: Ignatius Press).
- Dembski, William A.
1998. *The Design Inference: Eliminating Chance through Small Probabilities* (Cambridge: Cambridge University Press).
- Dennett, Daniel C.
1995. *Darwin's Dangerous Idea* (New York: Simon and Schuster).
- Denton, Michael.
1986. *Evolution: A Theory in Crisis* (Bethesda, MD: Adler and Adler).
- Derr, Mark.
2001. "Brainy Dolphins Pass the Human 'Mirror' Test," *New York Times*, May 1, section D, p. 3.
- Derrick, Christopher.
2001. *Escape from Scepticism: Liberal Education As if Truth Mattered* (reprint; San Francisco: Ignatius Press).
- Devereux, Daniel T.
1981. "Aristotle on the Essence of Happiness," in Dominic J. O'Meara, ed. (1981), pp. 247–60.
- De Vleeschauer, H. J.
1962. *The Development of Kantian Thought: The History of a Doctrine*, trans. A. R. C. Duncan (London: T. Nelson).
- Dewan, Lawrence, O.P.
1997. "St. Thomas, Physics, and the Principle of Metaphysics," *The Thomist* 61 (October), 549–66.
- Dewey, John.
1934a. *Art As Experience* (Berkeley, CA: Berkley Publishing Group, 1972).

- 1934b. *A Common Faith* (New Haven, CT: Yale University Press, 1991).
- Dillon, John.
1977. *The Middle Platonists: 80 B.C. to A.D. 220* (Ithaca, NY: Cornell University Press).
- Dillon, John, and Lloyd Gerson, eds.
2004. *Neoplatonic Philosophy: Introductory Readings* (Indianapolis, IN: Hackett).
- DiNoia, J. A., O.P.
1992. *The Diversity of Religions: A Christian Perspective* (Washington, DC: Catholic University of America Press).
- Diogenes Laertius.
c. 220 CE. *Lives and Opinions of Eminent Philosophers*, facing Greek with English trans. by R. D. Hicks in 2 vols. (rev. reprint; Cambridge, MA: Harvard University Press, 1925).
- Doig, James C.
1972. *Aquinas on Metaphysics: A Historico-doctrinal Study of the Commentary on the Metaphysics* (The Hague: Martinus Nijhoff).
- Donceel, Joseph, ed. and trans.
1970. *A Maréchal Reader* (New York: Herder and Herder).
- Doyle, John P.
1984. "The Conimbricenses on the Relations Involved in Signs," in John Deely, ed., *Semiotics 1984*, proceedings of the Ninth Annual Meeting of the Semiotic Society of America (Lanham, MD: University Press of America, 1985), 567–76.
1994. "Poinsot on the Knowability of Beings of Reason," in *American Catholic Philosophical Quarterly* 68.3 (Summer), 337–62.
1995. "Another God, Chimerae, Goat-Stags, and Man-Lions: A Seventeenth-Century Debate about Impossible Objects," *The Review of Metaphysics*, 48.4 (June), 771–808.
1997. "Between Transcendental and Transcendental: The Missing Link," *The Review of Metaphysics*, 50.4 (June), 793–815.
- Doyle, John P., ed. and trans.
2001. *The Conimbricenses: Some Questions on Signs*, bilingual critical edition of Conimbricenses (1607). (Milwaukee, WI: Marquette University Press).
- Drees, Willem B.
1990. *Beyond the Big Bang: Quantum Cosmologies and God* (LaSalle, IL: Open Court).
- Dreyfus, Hubert L., and Paul Robinow.
1983. *Michel Foucault: Beyond Structuralism and Hermeneutics* (2nd ed.; Chicago: University of Chicago Press).
- Duhem, Pierre.
1913–59. *Le Système du Monde: Histoire des Doctrines Cosmologiques de Platon à Copernic*, 10 vols. (Paris: A. Hermann, 1954–59).
- Dulles, Avery, S.J.
1999. *A History of Apologetics* (reprint; Eugene, OR: Wipf & Stock).

2001. *Dialogue, Truth, and Communion* (New York: National Pastoral Life Center).
- Dumitriu, Anton.
1977. *History of Logic*, 4 vols (Tunbridge Wells: Abacus Press).
- Dummett, Michael.
1993. *Origins of Analytic Philosophy* (Cambridge, MA: Harvard University Press).
- Dumoulin, Bertrand.
1986. *Analyse Génétique de la Métaphysique d'Aristote* (Montreal: Bellarmine).
- Durbin, Paul T.
1998. "Advances in Philosophy of Technology? Comparative Perspectives," *Techne: Journal for the Society of Philosophy and Technology* 4.1 (Fall), pp. 6–25.
- Easwaran, Eknath, trans.
1987. *The Upanishads* (Petaluma, CA: Nilgiri Press).
- Eco, Umberto.
1988. *The Aesthetics of Thomas Aquinas*, trans. by Hugh Bordein (Cambridge, MA: Harvard University Press).
- Edwards, C. H.
1979. *The Historical Development of the Calculus* (New York: Springer-Verlag).
- Edwards, Paul, ed.
1967. *The Encyclopedia of Philosophy*, 8 vols. (New York: Macmillan).
- Effler, Roy.
1962. *John Duns Scotus and the Principle 'Omne quod movetur ab alio movetur'* (St. Bonaventure, NY: Franciscan Institute).
- Einstein, Albert.
1931. "Response to Symposium," in *Living Philosophies* (New York: Simon and Schuster), pp. 3–7.
1934. *Essays in Science*, trans. Alan Harris (New York: Philosophical Library).
- Elders, Leo J., S.V.D.
1961. *Aristotle's Theory of the One: A Commentary on Book X of the Metaphysics* (Assen: Van Gorcum).
1965. *Aristotle's Cosmology: A Commentary on the De Caelo* (Assen: Van Gorcum).
1972. *Aristotle's Theology: A Commentary on Book Lambda of the Metaphysics* (Assen: Van Gorcum), Introduction, pp. 1–68.
1974. *Faith and Science: An Introduction to St. Thomas' "Expositio in Boethii De Trinitate"* (Roma: Herder).
1993. *The Metaphysics of Being of St. Thomas Aquinas in its Historical Perspective* (Leiden: E. J. Brill).
1997. *The Philosophy of Nature of St. Thomas Aquinas: Nature, the Universe, and Man* (New York: Peter Lang).
- Eldredge, Niles.

1995. *Reinventing Darwin: The Great Debate at the High Table of Evolutionary Theory* (New York: Wiley).
- Eliade, Mircea.
 1963. *Myth and Reality*, trans. Willard R. Trask (New York: Harper and Row).
 1969. *Yoga: Immortality and Freedom*, trans. W. R. Trask, Bollingen Series 56 (2nd ed., Princeton, NJ: Princeton University Press).
- Embree, Ainslee T., ed.
 1972. *The Hindu Tradition* (New York: Modern Library).
- Emonet, Pierrie-Marie.
 2000. *God Seen in the Mirror of the World: An Introduction to the Philosophy of God*, trans. Robert R. Barr (New York: Crossroad Pub.).
- Engels, Frederick.
 1883. *Dialecture*, trans. and ed. Clemens Dutt; notes and preface (pp. 1–26) by J. B. S. Haldane (New York: International Publishers, 1940).
- Eschmann, I. Th., O.P.
 1945. "A Defense of Jacques Maritain," *Modern Schoolman* 23 (May), 183–208.
- Esposito, John L.
 1998. *Islam: The Straight Path* (3rd ed.; New York: Oxford University Press).
- Etzkorn, Girard J., and Allan B. Wolter, trans.
 1997–98. *Questions on the Metaphysics of Aristotle by John Duns Scotus*, 2 vols. (St. Bonaventure, NY: Franciscan Institute).
- Evans, Joseph W., ed.
 1963. *Jacques Maritain: The Man and His Achievements* (New York: Sheed and Ward).
- Evans-Pritchard, E. E.
 1965. *Theories of Primitive Religion* (Oxford: Clarendon Press).
- Fabro, Cornelio.
 1950. *La nozione metafisica di partecipazione secondo S. Tommaso d'Aquino* (2nd ed. rev.; Torino: Società Editrice Internazionale).
 1961. *Participation et causalité selon S. Thomas d'Aquin*. (Louvain: Publications Universitaires de Louvain).
 1968. *God in Exile: Modern Atheism* (Westminster, MD: Newman Press).
- Fantoli, Annibale.
 1994. *Galileo: For Copernicanism and for the Church*, trans. George V. Coyne (Notre Dame, IN: Notre Dame University).
- Feng, Youlan.
 1952–53. *A History of Chinese Philosophy*, trans. Derk Bodde, 2 vols. (Princeton, NJ: Princeton University).
- Festugière, A. J., O.P.
 1932. "La place du *De Anima* dans le système Aristotélicienne d'après S. Thomas," *Archives d'histoire doctrinale et littéraire du moyen age*, Sixième année 31, pp. 25–47.
 1955. *Epicurus and His Gods*, trans. C. W. Chilton (Oxford: Blackwell).
- Fichte, Johann G.

1794. *The Purpose of Higher Education: Also Known as the Vocation of the Scholar*, trans. John K. Bramann (Mt. Savage, MD: Nightsun Books, 1988).
- Fields, Stephen M.
2000. *Being As Symbol: On the Origins and Development of Karl Rahner's Metaphysics* (Washington, DC: Georgetown University Press).
- Finan, T., and V. Twomey, eds.
1992. *The Relationship between Neoplatonism and Christianity* (Blackrock, Co. Dublin: Four Courts Press).
- Fischer, Robert H.
1966. *Luther*, ed. Frank W. Klos, illustrated by Gustav Rehberger (Philadelphia: Lutheran Church Press).
- Fletcher, Joseph.
1966. *Situation Ethics: The New Morality* (Philadelphia: Westminster Press).
- Foucault, Michel.
1972. *The Archaeology of Knowledge*, trans. A. M. Sheridan Smith (New York: Pantheon Books).
- Frank, William A., ed.
1997. *Duns Scotus on the Will and Morality*, selections made, trans., and introduced by Alan B. Wolter (Washington, DC: Catholic University of America Press).
- Frank, William A., and Allan B. Wolter.
1995. *Duns Scotus Metaphysician* (West Lafayette, IN: Purdue University Press).
- Fraser, Barry J., and Kenneth G. Tobin, eds.
1998. *International Handbook of Science Education* (Dordrecht: Kluwer).
- Freire, Paulo.
1970. *Pedagogy of the Oppressed*, trans. Myra Bergman Ramos (New York: Herder and Herder).
- Fuchs, Joseph, S.J.
1971. "The Absoluteness of Moral Terms," *Gregorianum* 52, 415–45.
- Friedman, Michael.
1999. *Reconsidering Logical Positivism* (New York: Cambridge University Press).
- Gadamer, Hans-Georg.
1975. *Truth and Method* (New York: Seabury).
- Garber, Daniel.
1992. *Descartes' Metaphysical Physics* (Chicago: University of Chicago Press).
- García de Haro, Ramón.
1993. *Marriage and the Family in the Documents of the Magisterium: A Course in the Theology of Marriage*, 2nd ed. rev. with the help of Carla Rossi Espagnet, trans. William E. May (San Francisco: Ignatius Press).
- Gardner, Howard, Mihaly Csikszentmihalyi, and William Damon.

2001. *Good Work: When Excellence and Ethics Meet* (New York: Basic Books).
- Gardner, Patrick.
1963. *Schopenhauer* (Baltimore: Penguin).
- Garrigou-Lagrange, Reginald.
1950. *Reality: A Synthesis of Thomistic Thought*, trans. Patrick Cummins (St. Louis: Herder).
- Gaukroger, Stephen.
1995. *Descartes: An Intellectual Biography* (New York: Oxford University Press).
2001. *Francis Bacon and the Transformation of Early Modern Philosophy* (Cambridge: Cambridge University Press).
- Geiger, Louis B., O.P.
1947. "Abstraction et séparation d' après S. Thomas' *In de Trinitate*, q. 5, a. 3," *Revue des sciences philosophiques et théologiques* 31, 3–40.
1953. *La Participation dans la philosophie de St. Thomas d'Aquin* (2nd ed.; Paris: Vrin).
- Gell-Mann, Murray.
1994. *The Quark and the Jaguar: Adventures in the Simple and the Complex* (New York: W. H. Freeman).
- Gensler, Harry J.
1984. *Gödel's Theorem Simplified* (Lanham, MD: University Press of America).
- Geon.
2003. "The Ultimate Limits of Computers," available at <http://www.arstechnica.com/wankerdesk/01q2/limits/limits-1.html> (last accessed May 2005).
- Gerson, Lloyd P.
1994. *Plotinus. Arguments of the Philosophers* (London: Routledge).
- Gerson, Lloyd P., ed.
1996. *The Cambridge Companion to Plotinus* (Cambridge: Cambridge University Press).
- Geuss, Raymond.
1981. *The Idea of a Critical Theory: Habermas and the Frankfurt School* (Cambridge: Cambridge University Press).
- Gilleman, Gérard, S.J.
1959. *The Primacy of Charity in Moral Theology*, trans. from the 2nd French ed. by William F. Ryan and André Vachon (Westminster, MD: Newman Press).
- Gilson, Étienne.
1952a. *Being and Some Philosophers* (2nd ed. corrected and enlarged; Toronto: Pontifical Institute of Medieval Studies).
1952b. *Jean Duns Scot: Introduction à ses Positions Fondamentales* (Paris: J. Vrin).
1955. *History of Christian Philosophy in the Middle Ages* (New York: Random

- House).
1956. *The Christian Philosophy of St. Thomas Aquinas*, trans. L. K. Shook, C.S.B. (New York: Random House).
- Glanz, James.
2001. "Listen Closely: From Tiny Hum to Big Bang," *The New York Times*, April 30, section A, p. 1.
- Glaser, Helmut von.
1966. *Buddhism: A Non-theistic Religion; With a Selection from Buddhist Scriptures*, ed. Heinz Bechert, trans. from the German by Irmgard Schloegl (New York: George Braziller).
- Gleick, James.
1987. *Chaos: Making a New Science* (New York: Penguin Books).
- Gombrich, E. H.
2002. *The Preference for the Primitive: Episodes in the History of Western Taste and Art* (New York: Phaidon).
- Goodman, Nelson.
1978. *Ways of Worldmaking* (Indianapolis, IN: Hackett).
- Gormally, Luke, ed.
1994. *Moral Truth and Moral Tradition: Essays in Honour of Peter Geach and Elizabeth Anscombe* (Dublin: Four Courts).
- Gould, Stephen Jay.
2002. *The Structure of Evolutionary Theory* (Cambridge, MA: Belknap Press of Harvard University Press).
- Gracia, Jorge, ed.
1992. *Topoi* 11.2, special issue on "The Transcendentals in the Middle Ages."
- Grajewski, Maurice J., O.F.M.
1944. *The Formal Distinction of Duns Scotus: A Study in Metaphysics* (Washington, DC: Catholic University of America).
- Gray, Kenneth C., and Edwin L. Herr.
1998. *Workforce Education: The Basics* (Boston: Allyn and Bacon).
- Gredt, Joseph, O.S.B.
1937. *Elementa Philosophiae Aristotelico-Thomisticae* (7th ed., Friburg: Herder and Herder).
- Greenberg, Clement.
1979. *Art and Culture: Critical Essays* (reprint; Boston: Beacon Press).
- Greene, Brian.
1999. *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory* (New York: W. W. Norton).
- Grene, Margorie, ed.
1973. *Spinoza: A Collection of Critical Essays* (Garden City, NY: Anchor Books).
- Gregory, Richard L, ed.
1987. *The Oxford Companion to the Mind* (New York: Oxford University Press).

- Griffin, Nicholas, ed.
2003. *The Cambridge Companion to Bertrand Russell* (Cambridge: Cambridge University Press).
- Griffith, Ralph T. H., trans.
1973. *The Hymns of the Rigveda: Translated with a Popular Commentary*, ed. J. L. Shastri (rev. ed.; Delhi: Motilal Banarsidass).
- Grinnell, Frederick.
1994. "Radical Intersubjectivity: Why Naturalism Is an Assumption Necessary for Doing Science," in Jon Buell and Virginia Hearn, eds. (1994), chapter 8.
- Grisez, Germain.
1983. *The Way of the Lord Jesus*, 2 vols. (Chicago: Franciscan Herald Press).
2001. "Natural Law, God, Religion, and Human Fulfillment," *The American Journal of Jurisprudence* 46, 3–36.
- Grosenick, Uta, et al., eds.
1999. *Art at the Turn of the Millennium* (New York: Taschen).
- Guagliardo, Vincent (1944–1995).
1992. "Hermeneutics: Deconstruction or Semiotics?," in Eugene F. Bales, ed., *Symposium on Hermeneutics*, (private circulation; Conception, MO: Conception Seminary College), 63–74, followed by a discussion, 75–78. Dr. Guagliardo was quite irritated that this essay was put into circulation without his knowledge or final revisions; but it is a valuable contribution to the literature of semiotics, an improbable and fascinating comparison of Poinsett and Derrida.
1993. "Being and Anthroposemiotics," in Robert Corrington and John Deely, eds., *Semiotics 1993* (Lanham, MD: University Press of America, 1994), 50–56.
1994. "Being-as-First-Known in Poinsett: A-Priori or Aporia?" *American Catholic Philosophical Quarterly* 68.3, "Special Issue on John Poinsett" (Summer), 363–93.
1995a. "Introduction" to a special issue on Thomas Aquinas of *Listening* 30.1 (Winter), 3–6.
1995b. *An Introduction to the Metaphysics of St. Thomas Aquinas*. Manuscript complete in five of a projected ten chapters, with an additional introduction completed and conclusion projected, for twelve chapters in all.
1995c. "Introduction" to Vincent A. Guagliardo, Charles R. Hess, and Richard Taylor, trans. (1996), pp. ix–xxxv.
- Guagliardo, Vincent A., Charles R. Hess, and Richard C. Taylor, trans.
1996. *Commentary on the Book of Causes, St. Thomas Aquinas* (Washington, DC: Catholic University of America Press).
- Gulley, Anthony D.
1965. *The Educational Philosophy of Saint Thomas Aquinas* (New York: Pageant Press).
- Gurr, John.
1959. *The Principle of Sufficient Reason in Some Scholastic Systems*,

1750–1900 (Milwaukee, WI: Marquette University Press).

Guthrie, W. K. C.

1962–81. *A History of Greek Philosophy*, 6 vols. (Cambridge: Cambridge University Press, 1990).

Guttman, Julius.

1964. *Philosophies of Judaism: The History of Jewish Philosophy from Biblical Times to Franz Rosenzweig*, trans. David W. Silverman (New York: Holt, Rhinehart, and Winston).

Guyer, Paul, ed.

1992. *The Cambridge Companion to Kant* (Cambridge: Cambridge University Press).

Habermas, Jürgen.

1984. *The Theory of Communicative Action*, 2 vols., trans. Thomas McCarthy (Boston: Beacon Press).

1990. *Toward a Rational Society: Student Protest, Science, and Politics*, trans. J. J. Shapiro (reprint; Boston: Beacon).

1992. *Postmetaphysical Thinking*, trans. William Mark Hohengarten (Cambridge, MA: The MIT Press).

Hahn, Lewis E., ed.

1995. *The Philosophy of Paul Ricoeur* (Lasalle, IL: Open Court).

1997. *The Philosophy of Hans-Georg Gadamer* (Lasalle, IL: Open Court).

1998. *The Philosophy of P. F. Strawson* (Lasalle, IL: Open Court).

Haldane, John.

1998. "Thomism and the Future of Catholic Philosophy," Blackfriars Aquinas Lecture 1998; available at <http://www.assumption.edu/users/gcolvert/jjhbf1998.htm> (last accessed May 2005)

Haldane, John, ed.

1997. *The Monist* 80.4 (October), special issue on "Analytic Thomism."

Halévy, Elie.

1966. *The Growth of Philosophic Radicalism*, trans. Mary Morris (Boston: Beacon Press).

Hanink, James G.

1988. "A Theory of Basic Goods: Structure and Hierarchy," *The Thomist* 52.2 (April), 221–45.

Hannay, A., and G. D. Marino, eds.

1998. *The Cambridge Companion to Kierkegaard* (Cambridge: Cambridge University Press).

Hansen, Chad.

1992. *A Daoist Theory of Chinese Thought: A Philosophical Interpretation* (New York: Oxford University Press).

Harbison, C.

1995. *The Mirror of the Artist: Northern Renaissance Art in Its Historical Context* (New York: Harry Abrams).

Harper, Albert W. J.

1996. *Discussion and Commentary on Kant's Critique* (Lewiston: E. Mellen Press).
- Harrison, W. C.
 1967. *Dr. William Harvey and the Discovery of Circulation* (New York: Macmillan).
- Hart, Kevin.
 1989. *The Trespass of the Sign: Deconstruction, Theology and Philosophy* (New York: Cambridge University Press).
- Hayman, Ronald.
 1999. *Nietzsche: Nietzsche's Voices* (London: Routledge).
- Heath, Thomas L.
 1921. *A History of Greek Mathematics*, 2 vols. (Oxford: Clarendon Press).
 1949. *Mathematics in Aristotle* (Oxford: Clarendon Press).
- Heaton, John, and Judy Groves.
 1999. *Introducing Wittgenstein*, ed. Richard Appignanesi (New York: Totem Books).
- Heidegger, Martin.
 1922. "The Idea of Phenomenology," draft for Edmund Husserl toward a proposed joint article for the 14th ed. of the *Encyclopedia Britannica*, trans. John Deely for *The New Scholasticism* 44 (July 1970), 325–44.
 1927. *Being and Time*, trans. John Macquarrie and Edward Robinson (New York: Harper and Row, 1962).
 1929. *What Is Metaphysics?* available at http://www.msu.org/e&r/content_e&r/texts/heidegger/heidegger_wm2.html (last accessed May 2005).
 1959. *An Introduction to Metaphysics*, trans. Ralph Manheim (Garden City, NY: Doubleday/Anchor; German original 1953).
 1967. *Wegmarken* (Frankfurt am Main: Klostermann).
 1977. *The Question Concerning Technology and Other Essays*, trans. William Lovitt (New York: Harper and Row Colophon Books).
- Henle, Robert J., S.J.
 1982. "The Basis of Philosophical Realism Re-examined," *The New Scholasticism* 56.1 (Winter), pp. 1–29.
 1983a. *Theory of Knowledge* (Chicago, IL: Loyola University Press).
 1983b. "Thomas Reid's Theory of Signs," in Jonathan Evans and John Deely, eds., *Semiotics 1983* (Lanham, MD: University Press of America, 1987), 155–68.
 1983c. "Transcendental Thomism: A Critical Assessment," in Victor B. Brezik (1981), 90–116.
- Henry, John.
 1994. "'Pray Do Not Ascribe That Notion to Me': God and Newton's Gravity," in James E. Force and Richard H. Popkin, eds., *The Books of Nature and Scripture: Recent Essays on Natural Philosophy, Theology, and Biblical Criticism in the Netherlands of Spinoza's Time and the British Isles of Newton's Time* (Dordrecht: Kluwer Academic Publishers), pp. 123–48.

- Herbert, Nick.
1985. *Quantum Reality: Beyond the New Physics* (New York: Doubleday/Anchor).
- Hetherington, E. Mavis, and John Kelly.
2002. *For Better or for Worse: Divorce Reconsidered* (New York: W. W. Norton).
- Hillenbrand, Robert.
1999. *Islamic Art and Architecture* (London: Thames & Hudson).
- Hobbes, Thomas.
1651. *Leviathan* (New York: Viking Press, 1982).
- Höffe, Otfried
1994. *Immanuel Kant*, trans. Marshall Farrier (Albany: State University of New York Press).
- Hoffman, Piotr.
1982. *The Anatomy of Idealism: Passivity and Activity in Kant, Hegel, and Marx* (The Hague: Martinus Nijhoff).
- Hofstadter, Douglas.
1979. *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Vintage).
- Hollinger, R. D., and David DePew, eds.
1995. *Pragmatism* (Westport, CT: Praeger).
- Hopkins, David.
2000. *After Modern Art, 1945–2000*, Oxford History of Art (Oxford: Oxford University Press).
- Horkheimer, Max.
1972. "The Latest Attack on Metaphysics," trans. M. J. O'Connell, in *Critical Theory: Selected Essays* (New York: Herder and Herder), pp. 132–87.
- Howell, Christina, ed.
1992. *The Cambridge Companion to Sartre* (Cambridge: Cambridge University Press).
- Hoyle, Fred.
1950. *The Nature of the Universe* (New York: Harper).
- Huck, Geoffrey J., and John A. Goldsmith.
1996. *Ideology and Linguistic Theory: Noam Chomsky and the Deep-Structure Debates* (New York: Routledge).
- Hume, David.
1748. *An Enquiry Concerning Human Understanding*, ed. Tom L. Beauchamp (New York: Oxford University Press, 1999).
- Hume, Robert E., ed. and trans.
1931. *The Thirteen Principal Upanishads* (London: Oxford University Press).
- Hutchins, Robert Maynard.
1936. *The Higher Learning in America* (New Haven, CT: Yale University Press).
1938. *No Friendly Voice* (Westport, CT: Greenwood, 1968).
1943. *Education for Freedom* (Baton Rouge: Louisiana State University

- Press).
1952. *The Great Conversation: The Substance of Liberal Education* (Chicago: Encyclopedia Britannica).
- Hutton, Anthony.
1976. "This Gödel Is Killing Me," *Philosophia* 6, 135–44 (criticism of J. P. Lucas [1961], with a reply by Lucas on pp. 145–48).
- Hyman, Arthur.
1972. "Philosophy," *Encyclopedia Judaica* (Jerusalem: Keter), vol. 13, pp. 421–64.
1981. "Averroes As Commentator on Aristotle's Theory of Intellect," in Dommic J. O'Meara, ed. (1981), pp. 161–90.
- Indigenous Peoples: A Global Quest for Justice; A Report for the Independent Commission on International Humanitarian Issues.*
1987. Foreword by Sadruddin Aga Khan and Hassan bin Talal (Atlantic Highlands, NJ: Zed Books).
- Irvine, Andrew D., ed.
1999. *Bertrand Russell: Critical Assessments*, 4 vols. (London: Routledge).
- Irwin, Kenneth W., and Edmund D. Pellegrino, eds.
1994. *Preserving the Creation: Environmental Theology and Ethics* (Washington, DC: Georgetown University Press).
- Irwin, Terence.
1988. *Aristotle's First Principles* (New York: Oxford University Press).
- Isayeva, Natalia.
1993. *Shankara and Indian Philosophy*, SUNY Series in Religious Studies (Albany: State University of New York Press).
- Jaki, Stanley L., O.S.B.
1978. *The Road of Science and the Ways to God* (Chicago: University of Chicago Press).
1991. *Scientist and Catholic: An Essay on Pierre Duhem* (Front Royal, VA: Christendom Press).
- James, William.
1902. *The Varieties of Religious Experience*, in *William James: Writings 1902–1910*, ed. Bruce Kuklik (New York: Library of America, 1987).
1909. *A Pluralistic Universe*, in *William James: Writings 1902–1910*, ed. Bruce Kuklik (New York: Library of America, 1987).
- Jamieson, Dale, ed.
1999. *Singer and His Critics* (Oxford: Blackwell).
- Janaway, Christopher.
1989. *Self and World in Schopenhauer's Philosophy* (New York: Oxford University Press).
- Janson, H. W. W., and Anthony F. Janson.
2001. *The History of Art* (6th ed.; New York: Harry Abrams).
- Janz, Denis.
1989. *Luther on Thomas Aquinas: The Angelic Doctor in the Thought of the Reformer* (Philadelphia: Coronet Books).

Jaroszynski, Piotr.

2002. "A Brief History of Lublin Thomism," available at <http://www.vaxxine.com/hyoomik/lublin/jarosz1.html> (last accessed May 2005).

Jay, Martin.

1996. *The Dialectical Imagination: A History of the Frankfurt School and the Institute of Sociological Research, 1923–1950* (Berkeley: University of California).

Jears, James.

1946. *Physics and Philosophy* (Cambridge: Cambridge University Press).

John of St. Thomas. See Poinsot, John.

John of the Cross, St. (1542–1591)

- 1578–88. *The Ascent of Mount Carmel*, in *Collected Works*, trans. Kieran Kavanaugh and Otilio Rodriguez (Washington, DC: Institute of Carmelite Studies, 1979), pp. 73–294.

John Paul II, Pope.

1993. *Veritatis Splendor: The Splendor of Truth*, encyclical letter (Boston, MA: Pauline Books).

1996. "Magisterium Is Concerned with Question of Evolution for It Involves Conception of Man," message to the Pontifical Academy of Sciences, October, available at <http://www.cin.org/jp2evolu.html> (last accessed May 2005).

1997. *Theology of the Body: Human Love in the Divine Plan* (Boston, MA: Pauline Books).

1998. *Fides et Ratio: On the Relation between Faith and Reason* (Boston, MA: Pauline Books).

Johns, Helen James.

1966. *The Thomist Spectrum* (New York: Fordham University Press).

Johnson, Mark F.

1989. "Did St. Thomas Attribute a Doctrine of Creation to Aristotle?" *The New Scholasticism* 63.2 (Spring), 129–55.

1992. "Aquinas' Changing Evaluation of Plato on Creation," *American Catholic Philosophical Quarterly*, 66.1 (Winter), 81–88.

Johnson, Philip E.

1993. *Darwin on Trial* (2nd ed.; Downers Grove, IL: Intervarsity Press).

Johnston, Charles, trans. and comm.

1946. *The Crest-Jewel of Wisdom and Other Writings of S`ankarâchârya* (Covina, CA: Theosophical University Press), also available at www.sacred-texts.com/hin/cjw/.

Jolley, Nicholas.

1990. *The Light of the Soul: Theories of Ideas in Leibnitz, Malebranche, and Descartes* (Oxford: Clarendon Press).

Jordan, Mark.

1986. *Ordering Wisdom: The Hierarchy of Philosophical Discourse in Aquinas* (Notre Dame, IN: University of Notre Dame Press).

- Kant, Immanuel (1724–1804).
- 1781–87. *The Critique of Pure Reason*, trans. Norman Kemp Smith (New York: St. Martin's Press, 1990). Electronic version, ed. Stephen Palmquist, available at <http://www.arts.cuhk.edu.hk/Philosophy/Kant/cpr> (last accessed May 2005).
1788. *The Critique of Practical Reason, Conclusion*, trans. T. K. Abbott, Great Books in Philosophy (Buffalo, NY: Prometheus Books, 1996).
1790. *The Critique of Judgment*, trans. and ed. James C. Meredith (Oxford: Clarendon Press, 1952).
1798. *The Conflict of the Faculties*, trans. Mary J. Gregory (Lincoln: University of Nebraska Press, 1992).
- Kapitz, Donald R.
1985. *Compromise and Regret: A Critique of Charles E. Curran's Theory of Compromise* (Ph.D. dissertation, University of Notre Dame).
- Kasher, Asa, ed.
1991. *The Chomskyan Turn* (Oxford: Basil Blackwell).
- Kauffman, Stuart A.
1993. *The Origins of Order: Self-Organization and Selection in Evolution* (New York: Oxford University Press).
1995. *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (New York: Oxford University Press).
- Kelly, Michael, ed.
1998. *Encyclopedia of Aesthetics*, 4 vols. (Oxford University Press).
- Kennedy, James G.
1978. *Herbert Spencer* (Boston: Twayne)
- Kenny, Anthony.
1979. *Aristotle's Theory of the Will* (New Haven, CT: Yale University Press).
- Kerford, G. B.
1981. *The Sophistic Movement* (Cambridge: Cambridge University Press).
- Kerr, Fergus, O.P.
1986. *Theology After Wittgenstein* (Oxford: Basil Blackwell).
- Kirk, G. S., J. E. Raven, and M. Schofield.
1983. *The Pre-Socratic Philosophers: A Critical History with a Selection of Texts* (2nd ed.; Cambridge: Cambridge University Press).
- Klein, Julie Thompson.
1990. *Interdisciplinarity: History, Theory, and Practice* (Detroit, MI: Wayne State University).
- Klein, Julie Thompson, and William H. Newell.
1998. "Advancing Interdisciplinary Studies," in William H. Newell, ed., *Interdisciplinarity: Essays from the Literature* (New York: College Examination Board), p. 3.
- Klubertanz, George, S.J.
1955. *Introduction to the Philosophy of Being* (New York: Appleton-Century-Crafts).
1960. *St. Thomas Aquinas on Analogy* (Chicago: Loyola University Press).

- Knasas, John F. X.
 1990. *The Preface to Thomistic Metaphysics: A Contribution to the Neo-Thomist Debate on the Start of Metaphysics* (New York: Peter Lang).
 1995. "Thomistic Existentialism and the Proofs *Ex Motu* at *Contra Gentiles* I, c. 13.," *The Thomist* 59 (October), 591–615.
 1999. "Does Natural Philosophy Prove the Immaterial? An Answer to Mark Johnson," *American Catholic Philosophical Quarterly*, 64, pp. 265–69.
- Knauer, Peter, S. J.
 2002. *Das Prinzip der Doppelwirkung*, available at <http://www.jesuiten.org/peter.knauer/21.html> (last accessed May 2005).
- Kneale, William, and Martha Kneale.
 1962. *The Development of Logic* (Oxford: Clarendon Press).
- Knox, Ronald A.
 1950. *Enthusiasm: A Chapter in the History of Religion; With Special Reference to the Seventeenth and Eighteenth Centuries* (New York: Oxford University Press; reprint, Notre Dame, IN: University of Notre Dame Press, 1994).
- Kolakowski, Lesek.
 2001. *Bergson* (reprint; South Bend, IN: St. Augustine's Press).
- Koch, Josef.
 1959. *Artes Liberales von der Antiken Bildung zur Wissenschaft des Mittelalters*, *Studien und Texte Geistesgeschichte des Mittelalters* 5 (Leiden: E. J. Brill).
- Kockelmans, Joseph J.
 1994. *Edmund Husserl's Phenomenology* (West Lafayette, IN: Purdue University Press).
- Körner, Stephan.
 1960. *The Philosophy of Mathematics: An Introduction* (New York: Harper Torchbooks).
- Krapiec, Mieczyslaw A.
 1983. *I-Man: An Outline of Philosophical Anthropology*, trans. Marie Lescoe, Andrew Woznicki, Theresa Sandok, et al. (New Britain, CT: Mariel Publications).
 1991. *Metaphysics: An Outline of the History of Being*, trans. Theresa Sandok, *Catholic Thought from Lublin*, vol. 2 (New York: Peter Lang).
- Kretzman, Norman.
 2001. *The Metaphysics of Creation: Aquinas's Natural Theology in Summa Contra Gentiles II* (New York: Oxford University Press).
- Kuhn, Thomas S.
 1970. *The Structure of Scientific Revolutions* (2nd ed., enlarged; Chicago: University of Chicago Press).
- Kull, Kalevi, ed.
 2001. *Jakob von Uexküll: A Paradigm for Biology and Semiotics*, a special issue of *Semiotica* 134 (1/4).
- Küng, Hans, et al., eds.

1996. *Christianity and World Religions: Paths to Dialogue*, trans. Peter Heinegg (Maryknoll, NY: Orbis Books).
- Kuppuram, G., and K. Kumudamani, eds.
1990. *History of Science and Technology in India*, 12 vols. (Delhi: Sundeep Prakashan).
- Kurtz, Paul, ed.
1973. *Humanist Manifestos I and II* (Buffalo: Prometheus Books).
- La Barre, Weston.
1974. "Amerindian Religions," in Isma'il Ragi al Faruqi, ed., *Historical Atlas of the Religions of the World* (New York: Macmillan), pp. 51–58.
- Laer, P. H. Van.
1953. *Philosophico-Scientific Problems*, trans. Henry J. Koren (Pittsburgh: Duquesne University Press).
- Langholm, Odd.
1992. *Economics in the Medieval Schools: Wealth, Exchange, Value, Money, and Usury according to the Paris Theological Tradition, 1200–1350* (Leiden: E. J. Brill).
- Lee, Patrick.
1986. "Aquinas on Knowledge of Truth and Existence," *The New Scholasticism* 60.1 (Winter), 46–71.
- Leed, James R.
2000. *Exploring the Gaps: Vital Links between Trade, Environment, and Culture* (West Hartford, CT: Kumarian Press).
- Leibnitz, G. W. F.
1714. *G. W. Leibniz's Monadology: An Edition for Students*, ed. Nicholas Rescher (Pittsburgh: University of Pittsburgh Press, 1991).
- Leijenhorst, C.
2002. *The Mechanisation of Aristotelianism: The Aristotelian Setting of Thomas Hobbes' Natural Philosophy*, Medieval and Early Modern Science, vol. 3 (Leiden: Brill).
- Leming, David Adams.
1990. *The World of Myth* (New York: Oxford University Press).
- Leo XIII, Pope.
1879. *Aeterni Patris: The Restoration of Christian Philosophy* (Boston: Pauline Books, 2000).
- Lewis, C. S.
1944. *The Abolition of Man* (San Francisco: Harper, 2001).
- Lezl, Walter.
1975. *Aristotle's Conception of Ontology* (Padua: Editrice Antenore).
- Li, Yan, and Shiran Du.
1987. *Chinese Mathematics: A Concise History*, trans. John N. Crossley and Anthony W.-C. Lun (Oxford: Clarendon Press).
- Lilla, Mark.
1998. "The Politics of Jacques Derrida," *The New York Review of Books*, vol.

45 (11), June 25, 36–41.

Lindley, David.

1993. *The End of Physics: The Myth of a Unified Theory* (New York: Basic Books).

Liszka, James J.

1996. *A General Introduction to the Semeiotic of Charles Sanders Peirce* (Bloomington: Indiana University Press).

Little, A.

1949. *The Platonic Heritage of Thomism* (Dublin: Golden Eagle Books).

Lloyd, G. E. R.

1996. *Adversaries and Authorities: Investigations into Ancient Greek and Chinese Science* (Cambridge: Cambridge University Press).

Locke, John.

1690. *An Essay Concerning Human Understanding* (Amherst, NY: Prometheus, 1994).

Lonergan, Bernard, S.J.

1972. *Method in Theology* (New York: Herder and Herder).

Long, A. A.

1981. "Aristotle and the History of Greek Scepticism," in Dominic J. O'Meara, ed. (1981).

Losinger, Anton.

2000. *The Anthropological Turn: The Human Orientation of the Theology of Karl Rahner*, trans. Daniel Dahlstrom (New York: Fordham University Press).

Lovelock, James.

1987. *Gaia: A New Look at Life on Earth* (New York: Oxford University Press).

Lovin, Robin W., and Frank E. Reynolds, eds.

1985. *Cosmogony and Ethical Order: New Studies in Comparative Ethics* (Chicago: University of Chicago Press).

Lowe, Victor.

1962. *Understanding Whitehead* (Baltimore: Johns Hopkins Press).

Lucas, George P.

1989. *The Rehabilitation of Whitehead: An Analytic and Historical Assessment of Process Philosophy* (Albany: State University of New York Press).

Lucas, J. P.

1961. "Minds, Machines, and Gödel," *Philosophy* 36, 112–27.

1976. "Reply" to Anthony Hutton (1976), in *Philosophia* 6, 145–48.

Luce, A. A.

1963. *The Dialectic of Immaterialism: An Account of the Making of Berkeley's Principles* (London: Hodder and Stoughton).

Lucie-Smith, Edward.

1995. *Artoday* (London: Phaidon).

Luibheid, Colm, ed. and trans.

1987. *Pseudo-Dionysius: The Complete Works* (New York: Paulist Press).

- Lumbreras, Pedro, O.P.
 1944. *The Twenty-four Fundamental Theses of Official Catholic Philosophy* (Notre Dame, IN: The University Press).
- Luther, Martin.
 1525. *The Bondage of the Will*, trans. Henry Cole with slight alterations from Edward Thomas Vaughan, corrected by Henry Atherton (Grand Rapids, MI: Eerdmans, 1931).
- Maartens, J. F. M., et al., eds.
 1969. *Arts libéraux et philosophie au Moyen Age* (Montreal: Institute de études médiévales).
- MacKenna, Stephen.
 1992. *Plotinus: The Enneads* (Burdett, NY: Larson).
- Maddi, Salvatore R.
 1996. *Personality Theories: A Comparative Analysis* (6th ed.; Pacific Grove, CA: Brooks/Cole).
- Magee, Brian.
 1997. *The Philosophy of Schopenhauer* (rev. ed.; New York: Oxford University Press).
- Maier, Annaliese.
 1982. *On the Threshold of Exact Science: Selected Writings on Late Medieval Natural Philosophy*, ed., trans., and intro. by Steven D. Sargent (Philadelphia: University of Pennsylvania Press).
- Mailloux, S., ed.
 1995. *Rhetoric, Sophistry, Pragmatism* (Cambridge: Cambridge University Press).
- Manetti, Giovanni.
 1993. *Theories of the Sign in Classical Antiquity*, trans. Christine Richardson (Bloomington: Indiana University Press).
 1996. "The Concept of the Sign from Ancient to Modern Semiotics," in Giovanni Manetti, ed. (1996), pp. 11–40.
- Manetti, Giovanni, ed.
 1996. *Knowledge Through Signs: Ancient Semiotic Theories and Practices* (Bologna: Brepols).
- Mansion, Suzanne.
 1976. *Le Judgement d'Existence chez Aristote* (2nd ed., rev. and aug.; Louvain: Editions de L'Institute Supérieur de Philosophie).
- Maréchal, Josef.
 1944–49. *Le point de départ de la métaphysique: leçons sur le développement historique et théorique du problème de la connaissance* (3rd ed.; Bruxelles: L'Édition Universelle).
- Marion, Jean-Luc.
 1991. *God without Being: Hors-texte*, trans. Thomas A. Carlson, (Chicago: University of Chicago Press).
- Maritain, Jacques.
 1943a. *Education at the Crossroads* (New Haven, CT: Yale University Press).

- 1943b. "The Natural Mystical Experience and the Void," in his *Redeeming the Time* (London: Geoffrey Bles, The Centenary Press), pp. 225–55.
- 1947a. *The Person and the Common Good* (New York: Charles Scribner's Sons. Reprint; Notre Dame, IN: University of Notre Dame Press, 1972).
- 1947b. *Court Traité de l'Existence et de l'Existant* (Paris: Paul Hartmann).
1948. *Existence and the Existent*, trans. Lewis Galantière and Gerald Phelan (New York: Pantheon).
1951. *Philosophy of Nature*, trans. Imelda C. Byrne (New York: Philosophical Library).
- 1959a. *The Degrees of Knowledge*, rev. ed., trans. under the supervision of Gerald B. Phelan, reprinted as vol. 7 of the *Collected Works of Jacques Maritain* (Notre Dame, IN: University of Notre Dame Press, 1995).
- 1959b. *The Sin of the Angel: An Essay on a Re-Interpretation of Some Thomistic Positions*, trans. William L. Rossner (Westminster, MD: Newman Press).
1966. *God and the Permission of Evil*, trans. Joseph Evans (Milwaukee, WI: Bruce).
1968. *Bergsonian Philosophy and Thomism*, trans. Mabelle L. Andison in collaboration with J. Gordon Andison (New York: Greenwood Press).
1986. "Language and the Theory of Sign," originally published in English in Ruth Nanda Anshen, ed., *Language: An Enquiry into Its Meaning and Function* (New York: Harper & Bros., 1957), pp. 86–101. The text was reprinted with the addition of a full technical apparatus explicitly connecting the essay both to Maritain's work on semiotic begun in 1937 and to the text of John Poincaré (1632) on which Maritain centrally drew, in John Deely, Brooke Williams, and Felicia E. Kruse, eds. (1986), pp. 51–62. Page references in this book are based on the 1986 reprint as the most definitive English version.
- Markus, Robert Austin.
1972. "St. Augustine on Signs," in R. A. Markus, ed., *Augustine: A Collection of Critical Essays* (Garden City, NY: Doubleday), pp. 61–91.
- Marrou, Henri I.
1982. *A History of Education in Antiquity*, trans. George Lamb. (reprint; Madison: University of Wisconsin Press).
- Marsden, George.
1994. *The Soul of the American University: From Protestant Establishment to Established Nonbelief* (New York: Oxford University Press).
- Marshner, William H.
1991. *The Last End of Man According to de Lubac: A Critical Appraisal* (Ph.D. dissertation, John Paul II Institute for Studies in Marriage and Family, Washington, DC).
- Martianus Capella. See William H. Stahl, Richard Johnson, and E. L. Burge, eds. (1992).
- Martin, C. B., and D. M. Armstrong, eds.
1968. *Locke and Berkeley: A Collection of Critical Essays* (Notre Dame, IN: University of Notre Dame Press).

- Martinich, Aloysius P.
1997. *Thomas Hobbes* (New York: St. Martin's Press).
- Marx, Werner.
1977. *Introduction to Aristotle's Theory of Being as Being*, trans. R. Schine (The Hague: Martinus Nijhoff).
- Mates, Benson.
1986. *The Philosophy of Leibniz: Metaphysics and Language* (New York: Oxford University Press).
- Matteo, Anthony M.
1992. *Quest for the Absolute: The Philosophical Vision of Joseph Maréchal* (DeKalb, IL: Northern Illinois University Press).
- Maurer, Armand.
1999. *The Philosophy of William of Ockham in the Light of Its Principles* (Toronto: Pontifical Institute of Medieval Studies).
- Maurer, Armand, trans. and ed.
1958. *The Division and Methods of the Sciences*, English ed. of questions 5 and 6 of Aquinas, *Super Boetium De Trinitate* (2nd rev. ed.; Toronto: Pontifical Institute of Medieval Studies).
- Maurier, Henri.
1968. *The Other Covenant: A Theology of Paganism*, trans. Charles McGrath (New York: Newman Press).
- Maybury-Lewis, David.
1997. *Indigenous Peoples, Ethnic Groups, and the State* (Boston: Allyn and Bacon).
- Mayr, Ernst.
1982. *The Growth of Biological Thought* (Cambridge, MA: Belknap Press).
- McCamy, Ronald.
1998. *Out of a Kantian Chrysalis: A Maritainian Critique of Fr. Maréchal* (New York: Peter Lang).
- McCool, Gerald, S. J.
1977. *Catholic Theology in the Nineteenth Century* (New York: Seabury).
1989. *From Unity to Pluralism: The Internal Evolution of Thomism* (New York: Fordham University Press).
1994. *The Neo-Thomists* (Milwaukee, WI: Marquette University Press).
- McDonald, J. Ian H.
1998. *The Crucible of Christian Morality* (London: Routledge).
- McGovern, Thomas, S.J.
1955. "The Division of Logic," *Laval Théologique et Philosophique* 11.2, 157–81.
1956. "The Logic of the First Operation," *Laval Theologique et Philosophique* 12.1, 52–74.
- McGuire, J. E., and Martin Tamny.
1983. *Certain Philosophical Questions: Newton's Trinity Notebook* (Cambridge: Cambridge University Press).
- McInerny, Daniel J., ed.

1999. *The Common Things: Essays on Thomism and Education* (Mishawaka, IN: American Maritain Association).
- McInerny, Ralph.
1961. *The Logic of Analogy: An Interpretation of St. Thomas* (The Hague: Martinus Nijhoff).
1968. *Studies in Analogy* (The Hague: Martinus Nijhoff).
1986. "The Analogy of Names Is a Logical Doctrine," in his *Being and Predication: Thomistic Interpretations* (Washington, DC: The Catholic University of America Press).
1988. *Art and Prudence: Studies in the Thought of Jacques Maritain* (Notre Dame, IN: University of Notre Dame Press).
1990. *Boethius and Aquinas* (Washington, DC: The Catholic University of America Press).
1996. *Aquinas and Analogy* (Washington, DC: The Catholic University of America Press).
2001. *Characters in Search of Their Author: The Gifford Lectures, Glasgow, 1999–2000* (Notre Dame, IN: University of Notre Dame Press).
- McIntire, C. T., ed.
1977. *God, History, and Historians: An Anthology of Modern Christian Views of History* (New York: Oxford University Press).
- McKeon, Richard P.
1928. *The Philosophy of Spinoza: The Unity of His Thought* (Woodbridge, CT: Ox Bow Press, 1987).
- McKeon, Richard P., ed.
1941. *The Basic Works of Aristotle* (New York: Random House).
- McLachlan, Herbert.
1972. *The Religious Opinions of Milton, Locke, and Newton* (New York: Russell & Russell).
- McLuhan, Marshal.
1994. *Understanding Media: The Extensions of Man* (Cambridge, MA: The MIT Press).
- McMullin, Ernan, ed.
1985. *Evolution and Creation* (Notre Dame, IN: University of Notre Dame Press).
- McNeill, William H.
1963. *The Rise of the West: A History of the Human Community* (Chicago: University of Chicago Press).
- McSorley, Harry J.
1969. *Luther: Right or Wrong? An Ecumenical-Theological Study of Luther's Major Work, "The Bondage of the Will"* (New York: Newman Press).
- Menen, Aubrey, ed.
1954. *The Ramayana* (New York: Scribners).
- Merlan, Philip.
1953. *From Platonism to Neoplatonism* (The Hague: Martinus Nijhoff).
- Merton, Robert K.

1970. *Science, Technology and Society in Seventeenth Century England* (New York: Howard Fertig).
- Meyerhoff, Hans.
1959. *The Philosophy of History in Our Time: An Anthology* (Garden City, NY: Doubleday/Anchor).
- Miles, Margaret R.
1999. *Plotinus on Body and Beauty: Society, Philosophy, and Religion in Third-century Rome* (Oxford: Blackwell).
- Miller, James.
2000. *The Passion of Michel Foucault* (Cambridge, MA: Harvard University Press).
- Miller, Paula Jean.
1996. *Marriage: The Sacrament of Divine-Human Communion* (Quincy, IL: Franciscan Press).
- Monk, Ray.
1990. *Ludwig Wittgenstein: The Duty of Genius* (New York: Free Press).
1996. "What Is Analytic Philosophy," in Ray Monk and A. Palmer, eds., *Bertrand Russell and the Origins of Analytic Philosophy* (Bristol: Thoemmes Press).
- Montagnes, Bernard, O.P.
1963. *La doctrine de l'analogie de l'être d'après Saint Thomas D'Aquin* (Louvain: Publications Universitaires).
- Mooney, Carol Garhart.
2000. *Theories of Childhood: An Introduction to Dewey, Montessori, Erickson, Piaget, Vygotsky* (St. Paul, MN: Readleaf Press).
- Moore, A. W.
1990. *The Infinite* (London: Routledge).
- Moreno, Antonio, O.P.
1966. "The Nature of Metaphysics," *The Thomist* 30.2, 109–35.
- Morris, Richard.
2002. "Are There Parallel Worlds?" chapter 7 of *The Big Questions: Probing the Promise and Limits of Science* (New York: Henry Holt), 125–35.
- Mullarkey, John.
2000. *Bergson and Philosophy* (Notre Dame, IN: University of Notre Dame Press).
- Mullen, John D.
1995. *Kierkegaard's Philosophy: Self-deception and Cowardice in the Present Age* (Lanham, MD: University Press of America).
- Munro, Thomas.
1965. *Oriental Aesthetics* (Cleveland, OH: Western Reserve University Press).
- Nagel, Ernest, and James R. Newman.
1958. *Gödel's Proof* (New York: New York University Press).
- Nakamura, Hajime.
1964. *Ways of Thinking of Eastern Peoples: India, China, Tibet, Japan*, rev.

- English trans., ed. Philip P. Wiener (Honolulu: East-West Center Press).
- Nédoncelle, Maurice.
1966. *Love and the Person*, trans. Sister Ruth Adelaide (New York: Sheed and Ward).
- Needham, Joseph.
1986. "Introduction" to Robert K. G. Temple (1986), 6–10.
- Nef, John U., ed.,
1943. *The Universities Look for Unity: An Essay on the Responsibility of the Mind to Civilization in War and Peace* (New York: Pantheon Books).
- Neill, Alex, and Aaron Ridley, eds.
1995. *The Philosophy of Art: Readings Ancient and Modern* (New York: McGraw-Hill).
2002. *Arguing about Art: Contemporary Philosophical Debates* (2nd ed.; New York: Routledge).
- Nell-Breuning, Oswald von, S.J.
1986. "The Drafting of *Quadragesimo Anno*," in Charles E. Curran and Richard A. McCormick, eds., *Official Catholic Social Teaching, Readings in Moral Theology 5* (New York: Paulist Press).
- Neuhaus, Richard John, ed.
1987. *Democracy and the Renewal of Public Education*, Encounter Series 4 (Grand Rapids, MI: Eerdmans).
- Newell, William H., ed.
1998. *Interdisciplinarity: Essays from the Literature* (New York: College Entrance Examination Board).
- Newman, John Henry Cardinal.
1852. *The Idea of a University*, ed. F. M. Turner (New Haven, CT: Yale University Press, 1996).
1870. *An Essay in Aid of the Grammar of Assent* (Notre Dame, IN: University of Notre Dame Press, 1979).
- Nicholas of Autrecourt.
1973. *Letters to Bernard of Arezzo*, in Arthur Hyman and James J. Walsh, eds., *Philosophy in the Middle Ages: The Christian, Islamic, and Jewish Traditions* (Indianapolis, IN: Hackett), pp. 656–64.
- Nicolas, Jean-Hervé, O.P.
1969. *Les profondeurs de la grace* (Paris: Becauchesne).
- Nicholls, Bruce J.
1979. *Contextualization: A Theology of Gospel and Culture* (Downers Grove, IL: InterVarsity Press).
- Nieli, Russell.
1987. *Wittgenstein: From Mysticism to Ordinary Language and the Thought of Ludwig Wittgenstein* (Albany: State University of New York Press).
- Nienhauser, William H, ed., and Charles Hartman et al., associate eds.
1998. *The Indiana Companion to Traditional Chinese Literature*, 2 vols (Bloomington: Indiana University Press).
- Nijenhuis, John.

1995. "Existence vs. Being: An All-important Matter of Terminology," *American Catholic Philosophical Quarterly*, 69.1 (Winter), 89–96.
- Nochlin, Linda.
1971. *Realism* (Harmondsworth: Pelican Books).
- Noone, Timothy B.
1995. "Individuation in Scotus," *American Catholic Philosophical Quarterly* 69.4 (Autumn), 527–42.
- Norris, Christopher.
1987. *Derrida* (Cambridge, MA: Harvard University Press).
- Northcott, Michael S.
1996. *The Environment and Christian Ethics* (Cambridge: Cambridge University Press).
- Norton, David Fate.
1982. *David Hume, Common-sense Moralist, Sceptical Metaphysician* (Princeton, NJ: Princeton University Press).
- Norton, David Fate, ed.
1993. *The Cambridge Companion to Hume* (Cambridge: Cambridge University Press).
- Notman, Malkah T., and Carol C. Nadelson.
1991. *Women and Men: New Perspectives on Gender Differences* (Washington, DC: American Psychiatric Press).
- Nozick, Robert.
1981. *Philosophical Explanations* (Cambridge, MA: Harvard University Press).
- Nylan, Michael.
2001. *The Five "Confucian" Classics* (New Haven, CT: Yale University Press).
- Nygren, Anders.
1953. *Agape and Eros*, trans. Philip S. Watson (Philadelphia: Westminster Press).
- O'Brien, Elmer, S.J., trans.
1975. *The Essential Plotinus* (reprint; Indianapolis, IN: Hackett).
- Odenwald, Sten.
1996. "Space-Time: The Final Frontier," *Sky and Telescope* (February), 24–29.
- O'Donnell, John S., S.J.
1992. *Hans Urs von Balthasar* (Collegeville, MN: Liturgical Press).
- Offer, John, ed.
2000. *Herbert Spencer: Critical Assessments* (London: Routledge).
- O'Hearn, Anthony.
1997. *Beyond Evolution: Human Nature and the Limits of Evolutionary Explanation* (New York: Oxford University Press).
- O'Meara, Dominic J., ed.
1981. *Studies in Aristotle* (Washington, DC: Catholic University of America Press).
- O'Meara, Thomas F., O.P.

1982. *Romantic Idealism and Roman Catholicism: Schelling and the Theologians* (Notre Dame, IN: University of Notre Dame Press).
1997. *Thomas Aquinas: Theologian* (Notre Dame, IN: University of Notre Dame Press).
- Ong, Walter, S.J.
1958. *Ramus, Method, and the Decay of Dialogue: From the Art of Discourse to the Art of Reason* (Cambridge: Harvard University Press, 1983).
1991. *Orality and Literacy: The Technologizing of the Word* (London: Routledge).
- Origen.
- c. 230 CE. *Origen On First Principles*, trans. G. W. Butterworth (reprint; New York: Harper Torchbooks, 1966).
- Ortega y Gasset, José.
1948. *The Dehumanization of Art* (Princeton, NJ: Princeton University Press, 1968).
- Osler, Margaret J., and Paul Lawrence Farber, eds.
1985. *Religion, Science, and Worldview: Essays in Honor of Richard Westfall* (Cambridge: Cambridge University Press).
- Ott, Hugo.
1993. *Martin Heidegger: A Political Life*, trans. Allan Blunden (New York: Basic Books).
- Outka, Gene H.
1972. *Agape: An Ethical Analysis* (New Haven, CT: Yale University Press).
- Ouspensky, Leonid, and Vladimir Losky.
1982. *The Meaning of Icons* (2nd ed.; New York: St. Vladimir's Seminary Press, 1989).
- Overman, Dean L.
1997. *A Case against Accident and Self-Organization*. (Lanham, MD: Rowman & Littlefield).
- Owens, Joseph, C.Ss.R.
1963. *An Elementary Christian Metaphysics* (reprint; Houston: Center for Thomistic Studies, 1985).
1968. *An Interpretation of Existence* (Milwaukee, WI: Bruce).
- Pacey, Arnold.
1990. *Technology in World Civilization: A Thousand-year History* (Cambridge, MA: The MIT Press).
- Pais, Abraham.
1986. *Inward Bound: Of Matter and Force in the Physical World* (Oxford: Clarendon Press).
- Palmer, Richard E.
1969. *Hermeneutics: Interpretation Theory in Schleiermacher, Dilthey, Heidegger, and Gadamer* (Evanston, IL: Northwestern University Press).
- Palmquist, Stephen R.
2000. *Kant's Critical Religion*, vol. 2 of *Kant's System of Perspectives* (Aldershot: Ashgate).

- Pannenberg, Wolfhart.
1997. Foreword to Dean L. Overman (1997).
- Pannier, Russell, and Thomas D. Sullivan.
1995. "Being, Existence, and the Future of Thomistic Studies," *American Catholic Philosophical Quarterly*, 69.1 (Winter), 83–88.
- Pardue, Peter A.
1971. *Buddhism: A Historical Introduction to Buddhist Values and the Social and Political Forms They Have Assumed in Asia* (New York: Macmillan).
- Parker, Charles.
1977. *Calvin and Classical Philosophy* (Leiden: E. J. Brill).
- Parsons, Talcott, and Edward Shils, eds.
1951. *Toward a General Theory of Action* (Cambridge, MA: Harvard University Press).
- Peddicord, Richard, O.P.
2005. *The Sacred Monster of Thomism: An Introduction to the Life and Legacy of Reginald Garrigou-Lagrange* (South Bend, IN: St Augustine's Press).
- Pegis, A. C., ed.
1957. *A Gilson Reader* (Garden City, NY: Hanover House).
- Peirce, Charles Sanders.
I use the standard reference style of referring by the abbreviation CP, followed by volume and paragraph numbers with a period between, when referring to *The Collected Papers of Charles Sanders Peirce*, vols. 1–6, ed. Charles Hartshorne and Paul Weiss (Cambridge, MA: Harvard University Press, 1931–35), vols. 7–8, ed. Arthur W. Burks (same publisher, 1958); all eight vols., in electronic form, ed. John Deely (Charlottesville, VA: InteleX Corporation, 1994).
- c. 1896. "The Logic of Mathematics: An Attempt to Develop My Categories from Within," in CP 1.417–520.
1905. "What Pragmatism Is," *The Monist* 15 (April), 161–81; reprinted in CP 5.411–37.
1909. A set of manuscripts all with "Meaning" and the date in the upper left-hand corner of the pages, from which CP 1.27 derives.
- Pelikan, Jaroslav.
1990. *Imago Dei: The Byzantine Apologia for Icons* (Princeton, NJ: Princeton University Press).
- Penelhum, Terence.
1992. *David Hume: An Introduction to His Philosophical System* (West Lafayette, IN: Purdue University Press).
- Penrose, Roger.
1991. *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics* (New York: Penguin).
- Perkins, PHEME.
1980. *The Gnostic Dialogue: The Early Church and the Crisis of Gnosticism* (New York: Paulist Press).

Peterson, Marilyn R.

1982. *At Personal Risk: Boundary Violations in Professional-Client Relationships* (New York: W. W. Norton).

Philip Cancellarius ("Philip the Chancellor").

c. 1225–28. *Philippi Cancellarii Parisiensis Summa de bono, ad fidem codicum primum edita studio et cura Nicolai Wicki, Corpus philosophorum Medii Aevi, Opera philosophica Mediae Aetatis selecta 2* (Bern: Franke, 1985).

Philip, P.

1985. "The Question of Natural Purpose," in Ernan McMullin, ed. (1985), pp. 121–50.

Piaget, Jean.

1954. *The Construction of Reality in the Child*, trans. Margaret Cook (New York: Basic Books).

Pieper, Josef.

1965. *The Four Cardinal Virtues: Prudence, Justice, Fortitude, Temperance*, trans. Richard Winston and Clara Winston (New York: Harcourt, Brace & World).

1974. *About Love*, trans. Richard and Clara Winston (Chicago: Franciscan Herald Press).

Pinckaers, Servais, O.P.

1995. *The Sources of Christian Ethics*, trans. from the 3rd ed. by Sister Mary Thomas Noble. (Washington, DC: Catholic University of America Press).

Pinker, Steven.

2000. *The Language Instinct: How the Mind Creates Language*. (reprint; New York: Harper).

Pittendrigh, Colin S.

1958. "Adaptation, Natural Selection, and Behavior," in Anne Roe and George Gaylord Simpson, eds., *Behavior and Evolution* (New Haven, CT: Yale University Press), pp. 390–416

Pius XI, Pope.

1931. "On Reconstructing the Social Order (*Quadragesimo Anno*)," encyclical letter in *The Church and the Reconstruction of the Modern World: The Social Encyclicals of Pius XI*, ed. and intro. Terence P. McLaughlin, C.S.B (Garden City, NY: Doubleday/Image Books, 1957), pp. 218–78.

Pius XII, Pope.

1950. *Humani Generis*, "Concerning Some False Opinions Threatening to Undermine the Foundations of Catholic Doctrine," encyclical letter issued August, available at http://www.vatican.va/holy_father/pius_xii/encyclicals/documents/hf_p-xii_enc_12081950_humani-generis_en.html (last accessed May 2005).

Plato

c. 399/90 BCE. *Apology*, in Edith Hamilton and Huntington Cairns, eds., *The Collected Dialogues of Plato*, Bollingen Series 71 (Princeton, NJ: Princeton University Press, 1961).

- c. 355–347 BCE. *Timaeus*, in Edith Hamilton and Huntington Cairns, eds., *The Collected Dialogues of Plato*, Bollingen Series 71 (Princeton, NJ: Princeton University Press, 1961).

Plotinus

- 255–271. *The Enneads*, ed. by his student Porphyry. A reconstruction of Plotinus's own arrangement can be found in John Deely (2001a), pp. 808–10. The main complete edition of Plotinus in English translation used for the present work was A. H. Armstrong, trans. (1988); partial edition used was Elmer O'Brien, S.J., trans. (1975).

Poinsot, John, O.P. ("John of St. Thomas").

- 1631–35. *Cursus Philosophicus*, 3 vols., ed. P. B. Reiser (Turin: Marietti, 1937).
1632. *Tractatus De Signis: The Semiotic of John Poinsot*, bilingual ed. prepared by John Deely with the assistance of Ralph A. Powell, O.P. (Berkeley: University of California Press, 1985).
1637. "De Donis Spiritus Sancti," in *Tomus Quintus Cursus Theologici*, disp. 18 (vol. 6 of the Vivès edition, Paris, 1885: 572–715); ed. and trans. into French by Raïssa Maritain, *Les Dons du Saint Esprit* (Paris: Editions du Cerf, 1930), into English by Dominic Hughes, *The Gifts of the Holy Ghost* (New York: Sheed and Ward, 1951).
1643. *Tractatus de Angelis*, in *Tomus Tertius Cursus Theologici* (Lyons), which is vol. 4 in the Solesmes critical edition of this work (Paris: Desclée, 1946), pp. 441–835. The volume also contains commentary on Aquinas's views on the Trinity.

Polt, Richard.

1999. *Heidegger: An Introduction* (Ithaca, NY: Cornell University).

Popkin, Richard H.

1979. *The History of Scepticism: From Erasmus to Spinoza* (rev. and expanded ed.; Berkeley: University of California Press).
1980. *The High Road to Pyrrhonism*, ed. Richard A. Watson and James E. Force (San Diego: Austin Hill Press).

Popper, Karl.

1963. *Conjectures and Refutations: The Growth of Scientific Knowledge* (London: Routledge).
1959. *Logic of Scientific Discovery*. (London: Routledge, 1992).

Porphyry, the Phoenician.

- c.300 CE. *Life of Plotinus [Vita Plotini]*, in volume 1 of the 7-volume Loeb Classical Library bilingual edition of *Plotinus*, trans. A. H. Armstrong, (Cambridge, MA: Harvard University Press, 1969), pp. 1–85.

- c.271CE. *Porphyrii Isagoge et in Aristotelis Categorias Commentarium* (Greek text), ed. A. Busse (Berlin, 1887); English trans. by Edward W. Warren, *Porphyry the Phoenician: Isagoge* (Toronto: Pontifical Institute of Mediaeval Studies, 1975).

Porter, Jean.

1990. *The Recovery of Virtue: The Relevance of Aquinas for Christian Ethics* (Louisville, KY: J. Knox Press).

- Potter, Karl H., ed.
 1981. *Encyclopedia of Indian Philosophies*, vol. 3, *Advaita Veda-nta up to Samkara and His Pupils* (Princeton, NJ: Princeton University Press).
- Powell, Ralph Austin.
 1983. *Freely Chosen Reality* (Washington, DC: University Press of America).
- Prabhu, Joseph, ed.
 1996. *Intercultural Challenge of Raimon Panikkar* (Maryknoll, NY: Orbis Books).
- Pseudo-Dionysius.
 c. 500 CE. *Pseudo-Dionysius: The Complete Works*, trans. Colm Luibheid (New York: Paulist Press, 1987).
- Putallaz, Francois-Xavier.
 1995. *Insolente Liberté: Controverses et Condemnations au XIII siècle* (Fribourg: Editions Universitaires).
 1997. *Figures Franciscaines: De Bonaventure à Duns Scot* (Paris: Editions du Cerf).
- Queen, Stuart A., Robert W. Habenstein, and Jill Sobel Quadaquo.
 1985. *The Family in Various Cultures* (5th ed.; New York: Harper and Row).
- Quine, Willard Van Orman.
 1960. *Word and Object* (Washington, DC: The MIT Press).
 1980. "Two Dogmas of Empiricism," in *From a Logical Point of View: Non Logico-Philosophical Essays* (2nd rev. ed.; Cambridge, MA: Harvard University Press), pp. 20–46.
- Quinn, John M., O.S.A.
 1971. *The Thomism of Étienne Gilson: A Critical Study* (Villanova, PA: Villanova University Press).
- Radhakrishnan, Sarvepalli, and Charles E. Moore.
 1957. *Source Book in Indian Philosophy* (Princeton, NJ: Princeton University Press).
- Radin, Paul.
 1957. *Primitive Man As Philosopher* (2nd rev. ed.; New York: Dover).
 1971. *The World of Primitive Man* (New York: E. P. Dutton).
- Radnitzky, Gerard.
 1970. *Contemporary Schools of Metascience*, 2 vols. (Göteborg: Akademi Förlaget).
- Rahner, Karl, S.J.
 1963. "On the Question of a Formal Existential Ethics," in *Theological Investigations* (Baltimore, MD: Helicon Press), vol. 2, pp. 217–34.
- Rajaram, Navaratna S., and David Frawley.
 1995. *Vedic "Aryans" and the Origins of Civilization: A Literary and Scientific Perspective* (Quebec: World Heritage).
The Ramayana of Valmiki, see Hari Prasad Shastri, trans. (1976).
The Ramayana, see Aubrey Menen, ed. (1954).
- Rappe, Sara.
 2000. *Reading Neoplatonism: Non-discursive Thinking in the Texts of*

- Plotinus, Proclus, and Damascius* (Cambridge: Cambridge University Press).
- Reagan, Charles E.
1996. *Paul Ricoeur: His Life and His Work* (Chicago: University of Chicago Press).
- Reale, Giovanni.
1980. *The Concept of First Philosophy and the Unity of the Metaphysics of Aristotle*, trans. and ed. from the 3rd ed. by John R. Catan (Albany: State University of New York Press).
1985. *A History of Ancient Philosophy*, trans. John R. Catan (Albany: State University of New York Press).
- Regis, L. M., O.P.
1951. Critical review of the 1st ed. of Étienne Gilson (1952a), in *The Modern Schoolman* 28.2 (January), 111–25.
- Reid, Thomas.
1764. *An Inquiry Into the Human Mind: On the Principle of Common Sense*, ed. Derek R. Brookes (University Park: Pennsylvania State University Press, 1997).
- Reith, Herman, C.S.C.
1958. *The Metaphysics of St. Thomas Aquinas* (Milwaukee, WI: Bruce).
- Renfrew, Colin.
1990. *Archaeology and Language: The Puzzle of Indo-European Origins* (paperback ed.; Cambridge: Cambridge University Press).
- Riet, S. van, ed.
1977–80. *Avicenna latinus: Liber de philosophia prima*, 3 vols. (Leiden: Brill).
- Rijk, L. M. de, ed.
1994. *Nicholas of Autrecourt: His Correspondence with Master Giles and Bernard of Arezzo*. (critical ed.; Leiden: E. J. Brill).
- Rist, John M.
1969. *Stoic Philosophy* (London: Cambridge University Press).
1996. "On Taking Aristotle's Development Seriously," in William Wians, ed. (1996), pp. 359–74.
- Robert, J. D.
1947. "La métaphysique, science distincte de toute autre discipline philosophique selon Saint Thomas d'Aquin," *Divus Thomas* 50, 206–23.
- Rogers, G. A. J., and Alan Ryan, eds.
1991. *Perspectives on Thomas Hobbes* (New York: Oxford University Press).
- Rollinger, Robin D.
1999. *Husserl's Position in the School of Brentano* (Dordrecht: Kluwer Academic Publications).
- Rosenblum, Robert.
1966. *Cubism and Twentieth-century Art*. (rev. ed.; New York: Abrams).
- Rosenthal-Schneider, Ilse.
1949. "Presuppositions and Anticipations of Einstein's Physics," in Paul Arthur Schilpp, *Albert Einstein Philosopher-Scientist* (Evanston, IL: The Library

of Living Philosophers), pp. 129–46.

Ross, David.

1995. *Aristotle* (6th ed.; London: Routledge).

Ross, Kelley L.

1999. "Baruch Spinoza (1632–1677)," available at <http://www.friesian.com/spinoza.htm> (last accessed May 2005).

Rougemont, Denis de.

1983. *Love in the Western World*, trans. Montgomery Beligion (rev. and augmented ed. with a new postscript; Princeton, NJ: Princeton University Press).

Roukema, Remer.

1999. *Gnosis and Faith in Early Christianity: An Introduction to Gnosticism* (Harrisburg, PA: Trinity Press).

Ruder, Richard S.

1967. "Nelson Goodman," in *The Encyclopedia of Philosophy*, ed. Paul Edwards (New York: Macmillan), vol. 3, pp. 370–74.

Safranski, Rudiger.

1998. *Martin Heidegger: Between Good and Evil*, trans. Ewald Osers (Cambridge, MA: Harvard University Press).

Sallis, John, ed.

1987. *Deconstruction and Philosophy: The Texts of Jacques Derrida* (Chicago: University of Chicago Press).

Saunders, Simon, and Harvey R. Brown.

1991. *The Philosophy of Vacuum* (Oxford: Clarendon Press).

Scharfe, Hartmut.

2002. *Education in Ancient India* (Leiden: E. J. Brill).

Scharfstein, Ben-Ami, et al.

1978. *Philosophy East/Philosophy West: A Critical Comparison of Indian, Chinese, Islamic, and European Philosophy* (New York: Oxford University Press).

1998. *A Comparative History of World Philosophy: From the Upanishads to Kant* (Albany: State University of New York Press).

Schelling, F. W. J. von.

1966. *On University Studies*, trans. E. S. Morgan, ed. Norbert Guterman (Athens: Ohio University Press).

Schilpp, P. A., ed.

1963. *The Philosophy of Rudolf Carnap* (LaSalle, IL: Open Court Press).

Schmidt, Wilhelm.

1972. *The Origin and Growth of Religion*, trans. H. J. Rose (New York: Cooper Square).

Scholem, Gershom Gerhard.

1974. *Kabbalah* (New York: Quadrangle/New York Times Book Co.).

Schombert, James.

2002. "Early Universe," lecture 17 of the 23-lecture course "Astronomy 123:

Galaxies and the Expanding Universe,” available at <http://abyss.uoregon.edu/~js/ast123> (last accessed May 2005).

Schroyer, Trent.

1973. *The Critique of Domination: The Origins of Critical Theory* (Boston: Beacon Press).

Schwartz, Benjamin I.

1985. *The World of Thought in Ancient China* (Cambridge, MA: Belknap Press of Harvard University).

Schwartz, Regina M.

1997. *The Curse of Cain: The Violent Legacy of Monotheism* (Chicago: University of Chicago Press).

Sebeok, Thomas A.

1981. “Naming in Animals,” *Recherches Semiotique/Semiotic Inquiry* 1, 121–35.

1986a. “Communication, Language, and Speech: Evolutionary Considerations,” in his *I Think I Am A Verb: More Contributions to the Doctrine of Signs* (New York: Plenum Press), pp. 10–16.

1986b. “The Problem of the Origin of Language in an Evolutionary Frame,” *Language Sciences* 8, 169–76.

1986c. “Toward a Natural History of Language,” *The World and I* (October), 462–69.

2001. *Global Semiotics* (Bloomington: Indiana University Press).

Sebeok, Thomas A., and Robert Rosenthal.

1981. *The Clever Hans Phenomenon: Communication with Horses, Whales, Apes, and People* (New York: New York Academy of Sciences).

Sed-Rajna, Gabrielle.

1997. *Jewish Art*, trans. Sara Friedman and Mira Reich (New York: Harry Abrams).

Sellers, Wilfrid.

1975. “The Structure of Knowledge,” in Hector-Neri Catañeda, ed., *Action, Knowledge, and Reality: Critical Studies in Honor of Wilfrid Sellers* (Indianapolis, IN: Bobbs-Merrill), pp. 295–347

Selling, Joseph A., ed.

1995. *The Splendor of Accuracy: An Examination of the Assertions Made by Veritatis Splendor* (Grand Rapids, MI: Eerdmans).

Sertillanges, Antonin Dominique.

1948–51. *Le Probleme du Mal*, 2 vols. (Paris: Aubier).

Sextus Empiricus.

c. 225 CE. *Against the Logicians*, Loeb Classical Library (Cambridge, MA: Harvard University Press, 1933–49).

Shah, Natubhai.

1998. *Jainism: The World of Conquerors*, 2 vols. (Portland, OR: Sussex Academic Press).

Shankara Acharya.

Eighth cent. CE *The Crest Jewel of Wisdom*, trans. M. M. Chateerji (Adyar,

- Madras: Theosophical Publishing House, 1932).
- Shanks, Hershel, and Jack Meinhardt, eds.
1997. *Aspects of Monotheism: How the First Cause Is One*, symposium at the Smithsonian Institution, October 19, 1996 (Washington, DC: Biblical Archaeology Society).
- Shanley, Brian J., O.P.
1996. "St. Thomas Aquinas, Onto-Theology, and Marion," *The Thomist* 60.4 (October), 617–24.
- Shastri, Hari Prasad, trans.
1976. *The Ramayana of Valmiki*, 3 vols. (3rd ed.; London: Shanti Sadan).
- Shircel, Cyril L., O.F.M.
1942. *The Univocity of the Concept of Being in the Philosophy of John Duns Scotus* (Washington, DC: Catholic University of America Press).
- Silk, Joseph.
1989. *The Big Bang* (rev. ed.; New York: W. H. Freeman).
- Simon, E. D.
1954. "The Thomistic Doctrine of the Three Degrees of Formal Abstraction," *The Thomist* 22.1 (January), 37–67.
- Simon, Yves R.
1943. "Maritain's Philosophy of the Sciences," *The Thomist* 5 (January), 85–102. Reprinted in Anthony O. Simon, ed., *Philosopher at Work: Essays by Yves R. Simon* (Lanham, MD: Rowman & Littlefield, 1999), chap. 3, pp. 21–40.
1944. "The Common Good," *Review of Politics* 8 (October), 530–33.
1962. *A General Theory of Authority* (Notre Dame, IN: University of Notre Dame Press).
1971. "An Essay on the Classification of Action and the Understanding of Act," *Revue de l'Université d'Ottawa* 41.4 (Oct–Dec), 519–41; posthumously ed. with intro (pp. 518–19) by John Deely.
- Singer, Irving.
1984–87. *The Nature of Love*, 3 vols. (Chicago: University of Chicago Press).
- Sloan, Phillip P.
1985. "The Question of Natural Purpose," in Ernan McMullin, ed. (1985), pp. 121–50.
- Sluga, Hans.
1993. *Heidegger's Crisis: Philosophy and Politics in Nazi Germany* (Cambridge, MA: Harvard University Press).
- Smart, Barry, ed.
1994. *Michel Foucault: Critical Assessments*, 3 vols. (London: Routledge).
- Smart, J. J. C., and Bernard Williams.
1973. *Utilitarianism: For and Against* (Cambridge: Cambridge University Press).
- Smart, Ninian.
1967. "Indian Philosophy," in Paul Edwards, ed. (1967), vol. 4, pp. 155–69.
1999. *World Philosophies* (London: Routledge).

Smith, Vincent Edward.

1954. "The Prime Mover: Physical and Metaphysical Considerations," *Proceedings and Addresses of the American Philosophical Association* 28, 78–93.

1958. *The General Science of Nature* (Milwaukee, WI: Bruce).

Smyth, Kevin, trans.

1967. *A New Catechism: Catholic Faith for Adults* (New York: Herder and Herder).

Snow, C. P.

1964. *The Two Cultures: And a Second Look* (2nd ed.; Cambridge: Cambridge University Press).

Soble, Alan.

1990. *The Structure of Love* (New Haven, CT: Yale University Press).

Sokolowski, Robert.

2000. *Introduction to Phenomenology* (Cambridge: Cambridge University Press).

Sokolowski, Robert, ed.

1988. *Edmund Husserl and the Phenomenological Tradition* (Washington, DC: Catholic University of America Press).

Sommerfeld, Arnold.

1949. "To Einstein's Seventieth Birthday," in Paul Arthur Schilpp, *Albert Einstein Philosopher-Scientist* (Evanston, IL: The Library of Living Philosophers), pp. 99–105.

Spangler, Mary Michael, O.P.

1983. *Principles of Education: A Study of Aristotelian Thomism Contrasted with Other Philosophies* (Washington, DC: University Press of America).

Spedding, James, R. L. Ellis, and D. D. Heath, eds.

1863. *The Works of Francis Bacon* (Cambridge: Riverside Press).

Spinoza, Benedict.

1662–76 *Ethica ordine geometrico demonstrata* (Amsterdam, 1677), trans. as *Ethics Demonstrated in Geometric Order and Divided into Five Parts, Which Treat: I. Of God; I. Of the Nature and Origin of the Mind; III. Of the Origin and Nature of the Affects; IV. Of Human Bondage, or of the Powers of the Affects; V. Of the Power of the Intellect, or of Human Freedom*; in Edwin Curley, ed. and trans. (1985), pp. 408–615.

Sporre, Dennis J.

1996. *The Creative Impulse: An Introduction to the Arts* (4th ed.; Upper Saddle River, NJ: Prentice-Hall).

Stace, Walter T.

1960. *Mysticism and Philosophy* (London: Macmillan).

Stackhouse, Max L., et al., eds.

2000. *God and Globalization*, vol. 1, *Religion and the Powers of the Common Life*, vol. 2, *The Spirit and the Modern Authorities* (Harrisburg, PA: Trinity Press International).

Stahl, William H., Richard Johnson, and E. L. Burge, eds.

- Martianus Capella and the Seven Liberal Arts* (New York: Columbia University Press):
- 1991. Vol. 1, *The Quadrivium*.
 - 1992. Vol. 2, *The Marriage of Philology and Mercury*.
- Stahlman, Sandra.
- 1992. "The Relationship Between Schizophrenia and Mysticism: A Bibliographic Essay," available at <http://www.recoverybydiscovery.com/skiz.htm> (last accessed May 2005).
- Stern, Paul C., and Linda Kalof.
- 1996. *Evaluating Social Science Research* (2nd ed.; New York: Oxford University Press).
- Stewart, M. A.
- 1996. "The Scottish Enlightenment" in Stuart Brown, ed. (1996), pp. 274–308.
- Stroll, Avrum.
- 2000. *Twentieth-century Analytic Philosophy* (New York: Columbia University Press).
- Stump, Eleonore.
- 1999. "The Mechanisms of Cognition: Ockham on Mediating Species," in Paul V. Spade, ed., *The Cambridge Companion to Ockham* (Cambridge: Cambridge University Press), pp. 168–203.
 - 2003. *Aquinas* (New York: Routledge).
- Suarez, Francisco, S.J.
- 1597. *Disputationes Metaphysicae*, 2 vols. (Hildesheim: George Olms, 1965 reprint of Paris 1866 ed.).
- Sullivan, John Edward, O.P.
- 1963. *The Image of God: The Doctrine of St. Augustine and Its Influence* (Dubuque, IA: Priory Press).
 - 1970. *Prophets of the West: An Introduction to the Philosophy of History* (New York: Holt, Rinehart, and Winston).
 - 1979. *Ideas of Religion: A Prolegomenon to the Philosophy of Religion* (Washington, DC: University Press of America).
- Sullivan, Roger J.
- 1994. *An Introduction to Kant's Ethics* (Cambridge: Cambridge University Press).
- Sutherland, Peter.
- 1992. *Cognitive Development Today: Piaget and His Critics* (London: Paul Chapman Publishing).
- Sweeney, Leo.
- 1965. *A Metaphysics of Authentic Existentialism* (Englewood Cliffs, NJ: Prentice-Hall).
- Sze, Mai-Mai, ed.
- 1679–1701. *Gai Mong, The Tao of Painting*, in *The Mustard Seed Garden Manual of Painting* (2nd ed.; Princeton, NJ: Bollingen/Princeton, 1956; from 1887–88 Shanghai ed.).
- Talmor, Ezra

1980. *Descartes and Hume* (New York: Pergamon Press).
- Teilhard de Chardin, Pierre.
1959. *The Phenomenon of Man*, trans. Bernard Wall (New York: Harper Bros.).
- Temple, Robert K. G.
1986. *Genius of China: 3,000 Years of Science, Discovery, and Technology* (New York: Simon and Schuster).
- te Velde, Rudi A.
1995. *Participation and Substantiality in Thomas Aquinas* (Leiden: Brill Academic).
- Thayer, H. S., ed.
1953. *Newton's Philosophy of Nature: Selections from His Writings* (New York: Hafner).
- Theilicke, Helmut.
1966. *Theological Ethics*, 2 vols., ed. William H. Lazareth (Philadelphia: Fortress Press).
- Thiel, John E.
1994. *Nonfoundationalism* (Minneapolis: Fortress Press).
- Tipler, Frank D.
1994. *The Physics of Immortality: Modern Cosmology, God, and the Resurrection of the Dead* (New York: Doubleday).
- Toksvig, Signe.
1948. *Emmanuel Swedenborg: Scientist and Mystic* (New Haven, CT: Yale University Press).
- Torchia, N. Joseph.
1993. *Plotinus, Tolma, and the Descent of Being: An Exposition and Analysis* (New York: Peter Lang).
- Torrell, Jean-Pierre, O.P.
1996. *St. Thomas Aquinas*, vol. 1, *The Person and His Work*, trans. Robert Royal (Washington, DC: Catholic University of America Press).
- Tourpe, Emmanuel.
2001. Review of John F. Wippel (2000), *Revue Philosophique de Louvain*, 99.2 (May), 303–6.
- Toynbee, Arnold J.
1987. *A Study in History*, abridged by D. C. Sommerville, 2 vols. (reprint; New York: Oxford University Press).
- Tracy, David.
1970. *The Achievement of Bernard Lonergan* (New York: Herder and Herder).
2000. "Public Theology, Hope and the Mass Media: Can the Muses Still Inspire?" in Max L. Stackhouse et al., eds. (2000) vol. 1, pp. 231–45.
- Turnbull, G. H.
1926. *The Educational Theory of J. G. Fichte: A Critical Account together with Translations* (London: Hodder & Stoughton).
- Twetten, David.

1996. "Clearing a 'Way' for Aquinas: How the Proof from Motion Concludes to God," *American Catholic Philosophical Quarterly*, 70 (Supp.), 259–78.
- Upanishads*. See Eknath Easwaran, trans. (1987), and also Robert E Hume, ed. and trans. (1931).
- Vatican Council II.
1964. *Lumen Gentium*, "Dogmatic Degree on the Constitution of the Church," in Austin Flannery, O.P., trans. and ed., *Vatican Council II: The Conciliar and Post Conciliar Documents, New Revised Edition* (Northport, NY: Costello Publishing Company, 1996).
- Velecky, Ceslaus, O.P.
1965. "Reason and Trinity," in St. Thomas Aquinas, *Summa Theologiae* (London: Blackfriars/McGraw-Hill), vol. 6, appendix 10, pp. 154–56.
- Verbeke, Gérard.
1981. "Aristotle's Metaphysics Viewed by the Ancient Greek Commentators," in Dominic J. O'Meara, ed. (1981), pp. 107–28.
- Vitz, Paul C.
1986. *Censorship: Evidence of Bias in Our Children's Textbooks* (Ann Arbor, MI: Servant Books).
- Wagner, David, ed.
1983. *The Seven Liberal Arts in the Middle Ages* (Bloomington: Indiana University Press).
- Wallace, William A., O.P.
1974. *Causality and Scientific Explanation*, 2 vols. (Ann Arbor, MI: University of Michigan Press).
1983. *From a Realist Point of View: Essays in the Philosophy of Science* (2nd ed.; Lanham, MD: University Press of America).
1996. *The Modeling of Nature: Philosophy of Science and Philosophy of Nature in Synthesis* (Washington, DC: The Catholic University of America Press).
2001. "Science and Religion in the Thomistic Tradition," *The Thomist*, 65.1 (July), 441–64.
- Wallerstein, Judith S., Julia Lewis, and Sandra Blakeslee.
2000. *The Unexpected Legacy of Divorce: A 25-Year Landmark Study* (New York: Hyperion).
- Warren, D. Michael, L. Jan Slikkerveer, and David Brokensha, eds.
1995. *The Cultural Dimension of Development: Indigenous Knowledge Systems* (London: Intermediate Technology Publications).
- Watt, W. Montgomery.
1963. *Muslim Intellectual: A Study of al-Ghazali* (Edinburgh: Edinburgh University Press).
- Webster, Charles.
1976. *The Great Instauration: Science, Medicine, and Reform, 1626–1660* (New York: Holmes and Meier).
- Weinberg, Julius.
1969. *Nicolaus of Autrecourt: A Study in Fourteenth-Century Thought*

- (Westport, CT: Greenwood).
1977. *Ockham, Descartes, and Hume: Self-Knowledge, Substances, and Causality* (Madison: University of Wisconsin Press).
- Weinberg, Steven.
1994. *Dreams of a Final Theory* (New York: Vintage).
- Weisheipl, James A., O.P.,
1974. *Friar Thomas D'Aquino* (Garden City, NY: Doubleday).
1976. "The Relationship of Medieval Natural Philosophy to Modern Science: The Contribution of Thomas Aquinas to Its Understanding," *Manuscripta* 20, 194–96
- Weisheipl, James A., O.P., ed.
1961. *The Dignity of Science: Studies in The Philosophy of Science Presented to William Humbert Kane*, O.P. (Washington, DC: The Thomist Press), "Introduction," pp. xvii–xxxiii.
- West, Cornel.
1985. "The Politics of American Neo-Pragmatism" in John Rajchman and Cornel West, eds., *Post-analytic Philosophy* (New York: Columbia University Press).
1989. *The American Evasion of Philosophy: A Genealogy of Pragmatism* (Madison: University of Wisconsin Press).
- West, M. L.
1971. *Early Greek Philosophy and the Orient* (Oxford: Clarendon Press).
- What Is Changing in Math Education?
2002. Mathematically Correct, PO Box 22083, San Diego, CA, 92192–2083.
- White, Kevin.
1995. "Individuation in Aquinas, 'Super Boetium de Trinitate, Q. 4,'" *American Catholic Philosophical Quarterly*, 69.4 (Autumn), 543–56.
- Whitehead, Alfred North.
1929. *Process and Reality: An Essay in Cosmology*, corrected ed., David Ray Griffin and Donald W. Sherburne (New York: Free Press, 1978).
1997. *Science and the Modern World* (reprint; New York: Free Press).
- Wians, William, ed.
1996. *Aristotle's Philosophical Development: Problems and Prospects* (Lanham, MD: Rowman & Littlefield).
- Wiebe, Donald.
1998. *The Politics of Religious Studies: The Continuing Conflict with Theology in the Academy* (New York: St. Martin's Press).
- Wiggerhaus, Rolf.
1994. *The Frankfurt School: Its History, Theories, and Political Significance* (Cambridge, MA: The MIT Press).
- Willinsky, John.
2000. *Learning to Divide the World: Education at Empire's End* (Minneapolis: University of Minnesota Press).
- Wilson, Edward O.
2002. *The Future of Life* (New York: Knopf).

Windschuttle, Keith.

2000. *The Killing of History: How Literary Critics and Social Theorists Are Murdering Our Past* (San Francisco: Encounter Books).

Wippel, John F.

1984. *Metaphysical Themes in Thomas Aquinas* (Washington, DC: Catholic University of America Press).

2000. *The Metaphysical Thought of St. Thomas Aquinas: From Finite Being to Uncreated Being* (Washington, DC: Catholic University of America Press).

Wippel, John F., ed.

1987. *Studies in Medieval Philosophy* (Washington, DC: Catholic University of America Press).

Wise, John Edward.

1947. *The Nature of the Liberal Arts* (Milwaukee, WI: Bruce).

Witt, Charlotte.

1996. "The Evolution of Developmental Interpretations of Aristotle," in William Wians, ed. (1996), pp. 67–82.

Wolter, Allan B., O.F.M. (see also William A. Frank and Allan B. Wolter [1995]; and William A. Frank, ed. [1997]).

1967. "Duns Scotus, John," in Paul Edwards, ed. (1967) vol. 2, pp. 427–36.

1990. *The Philosophical Theology of John Duns Scotus*, ed. Marilyn McCord Adams (Ithaca, NY: Cornell University Press).

Wolterstorff, Nicholas.

2001. *Thomas Reid and the Story of Epistemology* (Cambridge: Cambridge University Press).

Woods, Richard, O.P.

1971. *The Occult Revolution: A Christian Meditation* (New York: Herder and Herder).

Woolhouse, Roger.

1994. "Locke's Theory of Knowledge," in Vere Chappell, ed. (1994), pp. 146–74.

Woolhouse, R. S., ed.

1994. *Gottfried Wilhelm Leibniz: Critical Assessments*, 4 vols. (London: Routledge).

Wu, Duncan

1998. *A Companion to Romanticism* (Oxford: Blackwell).

Yolton, John W.

1985. *Locke: An Introduction* (Oxford: Basil Blackwell).

Zabeeh, Farhang.

1960. *Hume, Precursor of Modern Empiricism: An Analysis of His Opinions on Meaning, Metaphysics, Logic, and Mathematics* (The Hague: Martinus Nijhoff).

Zaehner, R. C.

1961. *The Dawn and Twilight of Zoroastrianism* (New York: Putnam).

Zagzebski, Linda Trinkaus.

1996. *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical*

Foundations of Knowledge (New York: Cambridge University Press).

Zangwill, O. I.

1987. "Isolation Experiments," in Richard L. Gregory, ed. (1987), pp. 393–94.

Zelditch, Morris, Jr.

1964. "Cross-Culture Analysis of Family Structure," in Harold T Christenson, ed. (1964), pp. 462–500.

Zibawi, Mahmoud.

1993. *The Icon: Its Meaning and History* (Collegeville, MN: Liturgical Press).

Zimmerman, Michael.

1990. *Heidegger's Confrontation with Modernity: Technology, Politics, Art* (Bloomington: Indiana University Press).

INDEX

- abduction, 463n.30, 505n.62, 506n.71, 508n.18
- Abel, Niles, 212
- Abelard, Peter, 364
- Abinavagupta, 332
- Absolute, the
 - Absolute Idealism, 38–39, 394
 - in Buddhism, 377, 417
 - in Hinduism, 9, 10, 14–15, 127, 240, 244, 332, 357, 375, 378, 392, 393, 395–96, 397, 415, 417, 427–28, 429–30
 - and monism, 385, 397–98, 400, 402, 421–22, 449
 - union with, 395–96
 - unity of, 394, 397–98
 - See also Monism; Transcendental Thomism
- abstraction, 262, 281–82
 - Aquinas on, 103–4, 107–8, 155–59, 160, 187, 478nn.34, 35
 - Aristotle on, 27, 138, 484n.12
 - Cajetan on degrees of, 47, 121, 138, 155, 292, 482n.92, 484n.11
 - Locke on, 260, 479n.49
 - in mathematics, 108, 138, 155–56, 202, 204–5, 206–7, 218, 219, 256, 271, 294, 300, 302, 312, 324–25, 346
 - in phenomenology, 186
- Abstractionism, 373–74
- Academicism, 373
- accidents
 - Aristotle on, 27, 68, 75, 76–85, 86, 87, 98, 128, 135, 140, 175, 176, 177, 180–82, 223, 401, 433, 454–58, 472nn.30, 33,

473nn.34, 40, 46, 476n.18

categories of, 76–85, 86, 128, 135, 140, 174, 175, 176, 177, 180–82, 281, 285, 401, 433, 454–58, 472nn.30, 33, 473nn.34, 40, 46

mere accidents, 27, 76–78, 79, 87, 103, 155, 182, 186, 187–88, 283–84, 289, 293

proper accidents, 27, 76–85, 87, 98, 103, 155, 182, 187–88, 283–84, 289, 293

See also properties

action (*poiein*): as category of accidents, 78, 81–82, 83, 84, 181, 182, 188, 193, 199–200, 401, 411, 454, 457

actuality

Aquinas on, 50, 62–63, 65–66, 94, 95–96, 96, 123, 134, 136–37, 143, 150–63, 152, 173, 269–70, 470n.3, 488n.53

Aristotle on, 66–67, 70–72, 85–86, 93, 96, 123, 134, 141, 182, 217, 282–83, 290, 311–12, 393, 404

God as Pure Act, 50, 166, 267, 269, 270, 335, 406–7, 409–10, 411, 413, 414, 421–22

and human intelligence, 61–64, 70, 148–49, 503n.49, 505n.67

vs. potentiality, 62, 70–72, 73, 74–75, 76, 85–86, 93, 94, 96, 97, 134, 141, 143, 149, 152, 157, 160, 173, 176, 182, 217, 221, 235, 267, 269–70, 275, 282–83, 290, 310, 311–12, 347, 409–10, 421, 487n.50

relationship to existence, 143, 149, 152, 157, 173, 182, 235, 269–70

relationship to form, 71–72, 74–75, 76, 85–86, 93, 96, 141, 182, 267, 269–70, 290, 409

addictive behavior, 360

Adler, Mortimer J., 44, 495n.44

on *quo/quod* distinction, 503n.49

Adorno, Theodore, 42

Advaita Vedanta, 126–27, 297, 393, 395–96, 397, 398, 401, 415

Aertsen, Jan, 492n.1

aesthetics, 309, 326

in India, 331–32

aether, 183, 224, 225, 312

affectivity, 307

Africa, 15, 203, 330

African Americans, 19

agriculture, 7, 9

in China, 8
Akhenaton, 521n.1
Albert the Great, St., 31, 116, 510n.49, 527n.32
Albertus Magnus Lyceum of Natural Science, 53
Alexander of Aphrodisias, 30
Alphonsus Ligouri, St., 358
analogical terms, 214, 284–88, 293, 302–3, 423, 451, 508n.8
 “Being”/esse, 51, 53, 136–37, 138, 140, 142–43, 173–74, 177,
 178, 284, 385, 405, 408, 410, 428
 defined, 135, 284
 “divine causality,” 418–19
 “formal cause,” 267
 “Good,” 379–81
 “love,” 338–42
 many-to-one analogies, 287
 one-to-one analogies, 286–87
 “potential being,” 70
 “relation,” 522n.16
 and syllogisms, 288
 transcendental terms as, 174, 282, 322, 379–81
 and the Trinity, 300
Analytic Philosophy, 23, 34, 55, 63, 110, 263, 360
 Ordinary Language Philosophy, 42, 122, 254, 262, 304, 437
 origins of, 58, 251–52, 526n.17
 and relativism, 352, 514n.39
 and Thomism, 51, 54, 146, 304, 409, 485n.29
analytic propositions, 217, 218, 252, 262, 289, 291
Analytic Thomism, 51, 54, 146, 304, 409, 485n.29
anarchism, 229, 230, 367
Anaxagoras, 24
Andronicus of Rhodes, 29
angels. *See* pure contingent spirits
animals
 Descartes on, 101
 domestication of, 7
 rights of, 371–72
 sense cognition in, 381
animism, 389–90, 519n.1
Anscombe, Gertrude Elizabeth, 51
Anselm of Canterbury, St., 134–35, 245

ante-predicaments, 78–79, 85
anthropic cosmological principle, 273, 507nn.86, 87
anthropology, 239, 501n.9, 519n.1
anti-foundationalism, 18, 145, 252, 254, 263–64, 461n.43
Apocalypse Now, 125
Apollonius of Perga: *Conic Sections*, 208
Apostle, Hippocrates, 480n.66
 Aristotle's Philosophy of Mathematics, 509n.33
Aquinas, St. Thomas, 23, 31, 36, 484n.11, 527n.26
 on abstraction, 103–4, 107–8, 155–59, 160, 187, 478nn. 34, 35
 on actuality, 50, 62–63, 65–66, 94, 95–96, 123, 134, 136–37, 143,
 150–63, 152, 173, 269–70, 470n.3, 488n.53
 on analogy vs. metaphor, 286
 on astrology, 203
 on atheism, 514n.34
 on beatific vision, 150, 341, 353, 356, 357–58, 361–62, 499n.42,
 516n.17
 on beauty, 326–27, 512n.15
 on Being as *ens commune*, 96, 100, 136–37, 138–39, 150–51,
 157, 405, 408–9, 484n.14, 486n.37
 on Being as *ens mobile*, 62–63, 65–66, 93–101
 on Being as *esse/actus essendi*, 47, 50, 65–66, 95–96, 100, 123,
 136–37, 142, 143, 150–63, 173, 269–70, 470n.3, 480n.67,
 485n.24, 488n.53
 on Being as first known (*ens primum cognitum*), 52
 on certainty, 134, 220, 258–59, 405, 491n.83
 on chance, 76, 419, 471n.27
 on changeable substance, 62–63, 65–66, 93–97, 134, 256–57,
 475n.62
 on common good, 228, 340–41, 354, 364, 367, 499n.50, 524n.28
 on contemplation, 193, 195, 196, 353, 354, 356, 360–62, 368, 429
 on contingency, 65–66, 100–101
 on death, 113–14, 185, 355–56, 366, 429, 525n.58
 on decision by consensus, 367
 on divine illumination, 355–56
 on efficient causality, 100–101, 227, 393–94, 418–19, 421, 422–
 23, 424, 476n.18
epistemology of, 48, 49, 54, 58, 138, 145, 154–55, 163, 201, 202,
 237, 250, 255–67, 269–70, 295, 352, 400, 422, 423, 526n.17
on essence, 47, 63, 66, 87–89, 95–96, 100, 123, 141–42, 151–63,

173, 187–88, 193, 220, 244, 262–63, 269–70, 293, 295, 485n.24

on ethics, 226–28, 350, 352–72, 442, 499n.42, 517n.31

on the Eucharist, 511n.53

on evil, 420, 514nn.40, 44

on faith, 413, 451, 488n.53, 522n.17, 523n.23

on final causality, 101, 322–23, 357, 359, 410–11, 421

on fine arts, 308

on First Cause, 47, 63, 93–101, 134, 135, 136, 141–42, 166, 188, 269, 403–30, 405, 471n.27, 522n.12

on First Philosophy, 46, 47, 50, 54, 91, 147–63, 405, 407–9, 446, 447, 451, 470n.2, 475n.62, 488n.53

on formal causality, 101, 112–14, 269, 394, 410–11, 421, 422, 423

on form and matter, 96, 112–14, 155, 191

on forms of government, 229

on four temperaments, 88, 475n.57

on free will, 76, 203, 359, 415–16

on friendship, 340–41

on God as Creator, 47, 50, 65–66, 88, 166, 338, 342, 403, 414, 418–19, 424, 428–30, 468n.88, 521n.2, 523n.20, 524n.41

on God as goal of Metascience, 139, 405–6, 407–9, 484n.14

on God as necessary being, 406

on God as Pure Act, 50, 166, 406, 409–10

on God as Trinity, 410, 413, 523n.23

on God's beatitude, 407, 408, 416, 420–21

on God's essence, 406–10, 504n.60

on God's existence, 63, 95–96, 99, 100–101, 134–35, 141–42, 164, 269, 393–94, 404, 405–6, 407, 411, 412–13, 421, 422, 423, 475n.6, 477nn.24, 25, 26, 487n.50, 504n.60, 514n.33

on God's grace, 150, 353, 356, 366, 517n.24

on God's intelligence, 414, 416

on God's justice and mercy, 408, 418

on God's knowledge, 418

on God's life, 407, 408, 415 on God's perfection, 476n.11 on God's power, 420

on God's simplicity, 522n.16 on God's unity, 412, 522n.16 on God's will, 416

on goodness, 322–23, 342, 360, 361–62, 366, 518n.43

on happiness, 353, 354, 356, 361–62, 366, 499n.42, 517nn.24, 31

on hierarchy of creatures, 198–99, 428–30

on hierarchy of moral ends, 361
on human community, 340, 353
on human intelligence, 48, 62, 63, 103–4, 107–14, 116–17, 119, 147, 154–55, 244, 261, 266, 295, 355, 418, 419, 434, 470n.3, 478nn.34, 35, 479n.46
on human nature, 357–58, 362, 366, 499n.42
on human needs, 353–56
on imagination, 202
on immaterial being, 87, 137–39, 141, 145, 149, 157, 159–60, 163–64, 192–93, 405, 406, 475n.62
on the Incarnation, 426, 525n.54
on individuality, 87–89
on intentions, 364–65
on intuition (*intellectus*), 244, 295
on judgment of separation, 155–59, 160
vs. Kant, 48, 58–59, 369, 472n.29, 484n.7
on light, 312–13, 510n.49
“Limbo” (threshold) theory of, 517n.24
on logic, 47, 121–22, 188, 295, 299, 507n.1
on love, 416
on mathematics, 47, 147, 154–55, 158, 187, 201, 202, 405, 486n.37
on military prudence, 445, 499n.44
on moral object, 363–64
on mystical experience, 502n.29
on natural desire, 357–58
on natural place, 476n.18
on natural science, 47, 50, 53, 90, 91, 94–96, 145, 146–64, 187, 201, 202, 220, 255, 263, 293, 404, 405, 423, 448, 471n.27, 475n.62
on necessity, 99, 100–101, 134, 406, 421
on ontological proof, 99, 134–35, 164
on original sin, 359, 517n.24
on participation, 47, 50, 139, 269–70, 353, 356, 422–23
on perfection, 134–35, 269, 428–30, 476n.11
and Platonism/Neoplatonism, 47, 98, 198, 342, 393–94, 407, 422, 428
on potentiality, 71, 94, 95–96, 134, 142, 152
on prime matter, 71, 95–96, 142, 515n.4
on principle of causality, 94, 150–51

on principle of non-contradiction, 150–51
on private goods, 228, 367
on private property, 354, 368
on probability, 220
proofs of God's existence/*Quinque Viae*, 100–101, 135, 269, 393–94, 404, 405–6, 407, 411, 412–13, 421, 422, 423, 475n.6, 477nn.24, 25, 26, 487n.50
on properties, 98, 476n.18
on proper vs. common sensibles, 498n.31
on pure contingent spirits/angels, 88, 96, 116–17, 119, 141, 192–97, 198, 229, 269, 295, 330, 355–56, 366, 418, 428, 475n.55, 480n.69, 494n.29, 495n.32, 513n.21, 514n.42
on reincarnation, 191–92
on relations, 473n.40
on repentance, 366
on *res significata* vs. *modus significandi*, 287
on resurrection of the body, 113–14, 191, 355–56, 480n.69
on rhetoric, 308
on roundness of the earth, 219
on salvation, 416
on self-awareness, 244, 501n.3
on self-consciousness, 48, 108–11
on self-knowledge, 266
on sense experience, 48, 53, 62–63, 65, 90, 91, 99, 112, 134, 148–49, 202, 244, 255, 257, 258–60, 263, 266, 295, 414, 421, 423, 470n.3, 472n.29, 498n.31, 503n.49, 511n.53
on sexuality, 354
on similarity, 187, 188
on slavery, 368–69
on soul, 96, 112–14, 116, 185, 191, 355–56, 429, 480n.69, 493n.14, 513n.21, 525n.58
on species, 87–88, 116
on spontaneous generation, 272, 339
on subjects of sciences, 160
on substance, 62–63, 65–66, 87–89, 93–97, 134, 188, 256–57, 407, 409–10, 473n.40, 475n.62, 476n.18, 493n.14
on theological virtues, 353
on touch, 65, 471n.8, 477n.33
on transcendental relation, 113–14, 480n.69
on transcendentals, 492n.1

on truth, 193, 326–28, 353, 368, 527n.32
on ultimate end in ethics, 227, 358, 359, 360, 361–62, 499n.42,
517n.31
on universals, 187–88
on the universe, 95, 476n.11
on virtue, 226–27, 352–55, 358, 361, 362, 499n.48, 517n.31
on *vis cogitativa*, 205, 261, 434
on war, 368

Aquinas, St. Thomas, works of

Commentary on Aristotle's De Anima (Sententia Libri De anima),
101, 109, 477n.27, 479n.47, 487n.43, 494n.21, 497n.14,
509n.20, 510n.49

*Commentary on Aristotle's Metaphysics (Sententia super
Metaphysicam)*, 149, 150–51, 404, 405, 407, 474n.52, 475n.62,
477n.24, 484nn.9, 14, 486nn.36, 37, 41, 487n.43, 488n.53,
492nn.4, 5, 6, 495nn.33, 35, 39, 40, 497nn.3, 6, 14, 15, 19,
498nn.24, 32, 502n.34, 512n.9

Commentary on Aristotle's Physics (Sententia super Physicam),
94, 407, 473n.42

Commentary on the De Sensus et Sensato, 477n.27

Compendium theologiae, 477n.24, 525n.58

De ente et essentia, 196

De Malo, 420

De Potentia, 420

De substantiis separatis, 494n.30

Expositio Libri Peryermenias, 508n.13, 509n.26

Expositio Libri Posteriorum, 63, 471n.14, 494n.19, 508nn.15, 18

Quaestio disputata De anima, 479n.47, 480n.68

Quaestio disputata De spiritualibus creaturis, 479n.47, 481n.76

Quaestiones disputatae De potentia, 477n.24, 479n.47

Quaestiones disputatae De veritate, 470n.3, 477n.24, 486n.35

Scriptum super Libros Sententiarum, 477n.24

Sententia Libri Ethicorum, 149, 486n.37, 499n.46, 529n.38

Sententia super Librum De caelo et mundo, 521n.2

Summa Contra Gentiles, 94, 404, 406, 407–8, 409, 415, 475n.5,
477nn.24, 27, 479n.47, 480n.65, 481nn.76, 79, 486n.35,
494n.30, 522n.12, 524n.43

Summa theologiae, 54, 150, 159, 352–53, 404, 406, 407–8, 409–
10, 412–13, 415, 418, 420, 462n.10, 471n.27, 473n.40,
475nn.6, 55, 57, 476n.18, 477n.24, 479n.47, 480n.68,

481nn.76, 79, 484nn.5, 8, 488n.53, 491n.85, 493n.14, 494n.30, 499nn.46, 48, 500nn.51, 52, 509n.27, 512nn.9, 15, 17, 513n.21, 514nn.34, 40, 44, 45, 517nn.24, 29, 31, 518nn.43, 44, 45, 521n.2, 522nn.11, 16, 523n.21, 524nn.29–31, 35, 38, 42, 525nn.49, 52, 54, 57, 527n.28

Super Boetium De Trinitate, 147–49, 154, 156, 470n.3, 474n.52, 486n.35, 488n.53, 497nn.1, 2, 13, 14, 15, 522n.17

Super Librum Dionysii De divinis nominibus, 484n.14

Aranyakas, 10

Arcesilaus, 247

archaeology, 316

architecture, 330–31

Arintero, John (Juan): *The Mystical Evolution*, 502n.20

aristocracy, 229

Aristotelian Thomism, 47, 51, 53–54, 59, 146, 467n.66, 469n.102, 490n.65, 521n.7

answer to skepticism in, 255–65

Aristotle

on abstraction, 27, 138, 484n.12

on accidents, 27, 68, 75, 76–85, 86, 87, 98, 128, 135, 140, 175, 176, 177, 180–82, 223, 401, 433, 454–58, 472nn.30, 33, 473nn.34, 40, 46, 476n.18

on actuality, 66–67, 70–72, 85–86, 93, 96, 123, 134, 141, 182, 217, 282–83, 290, 311–12, 393, 404

on animal cognition, 101, 104–5

on Being, 50, 136–37, 138, 139–40, 150, 470n.2

on categories, 67–85, 128, 135, 140, 175, 176, 177, 180–82, 401, 433, 454–58, 472nn.30, 33, 473nn.34, 40, 46

on celestial spheres, 75, 93, 94, 95, 96, 111, 115–16, 128, 153, 159, 166, 192, 223, 224, 403, 481n.73, 521n.2

on certainty, 28, 57, 134, 165, 258–59, 289–91, 294, 301, 305–6, 309–10, 491n.83

on chance, 76, 273, 310–11, 323, 324, 404, 471n.26, 491n.83, 514n.46

on changeable substance, 27–28, 30, 48, 54, 57, 70–72, 74–75, 85–86, 92, 93, 96, 98, 112–13, 121, 122–23, 141, 153, 183, 256–57, 279, 290, 304, 309, 331, 338, 401, 440, 472n.28

on contemplation, 193, 349, 353–54, 355, 368, 517n.23

contemporary influence, 45–46

on death, 355

on definitions, 64, 67–72
on desire to know, 238, 259
on dialectical reasoning, 69, 256, 278, 290–91, 299, 305–6, 437, 491n.83
division of the sciences, 28–30
on education, 436
on efficient causality, 82, 86, 141, 152–53, 279, 323–24, 403–4, 415, 422–23, 425, 457, 476n.18, 521n.7
epistemology of, 48, 49, 54, 58, 66, 67–68, 69, 75, 106, 110, 138, 139–40, 163, 237, 246, 247, 251, 255–67, 280, 289–90, 308, 352, 400, 422, 423, 433, 526n.17
on essence, 27, 40, 50, 67–72, 85–86, 104–5, 161–62, 173, 177–78, 182, 183, 204, 293, 295, 305, 331, 334, 403–4, 472n.28, 476n.18, 492n.7
on ethics, 28–29, 120–21, 239, 241, 294, 308, 349–50, 366–72, 442
on existence, 64–67, 123, 151–53, 161–62, 173, 177–78, 182, 403–4, 470n.2, 472n.28, 487n.45, 492n.7
on final causality, 82–83, 85, 86, 141, 322–25, 326, 343, 368, 403, 404, 406, 415, 425, 457
on fine arts, 28–29, 120–21, 239, 304–5, 307–9, 318, 331, 334, 482n.87, 513n.29
on First Cause, 30, 93–101, 122–23, 135, 136, 141, 152–53, 158, 200, 236, 270, 338, 403–4, 406, 414, 415, 425, 447, 487n.50, 491n.86, 517n.23, 521nn.2, 7
on First Philosophy, 29–30, 43–44, 120–21, 122–23, 148, 234, 246, 402, 404, 406, 445, 446, 470n.2, 482n.86, 486n.36
on first principles in science, 63–64, 148, 246, 251, 259, 260, 263, 264, 289–90, 296, 301, 486n.37, 508n.18
on form, 74, 82, 96, 101–3, 112, 123, 141, 177–78, 182, 204, 206–7, 214, 217, 290, 323, 406, 422–23, 457, 492n.7
on formal causality, 74, 82, 98, 141, 204, 206–7, 323, 406, 422–23, 457
on forms of government, 229
on four scientific questions, 64–72, 76–85, 173, 204, 263, 280
on free events, 76, 470n.2
on free will, 104, 105, 120, 482n.88
on friendship, 340, 515n.48
on gender, 177
geocentrism of, 89, 90

on goodness, 322–23, 342, 366
on happiness, 353–54, 355, 366
on the heart, 111–12
on history, 482n.87, 526n.14
on human beings as political/social animals, 3, 366
on human intelligence, 37, 101–14, 139–40, 159, 192, 251, 257,
290–91, 301, 349, 355, 479n.46, 480nn.60, 66, 67, 482n.88,
508n.18, 521n.2
on human nature, 120
on human needs, 353–54
on Human Wisdom, 57, 61
on immaterial being, 43–44, 141, 153, 159, 190, 275, 453, 455,
479n.46, 481n.73
on infinite divisibility, 214
influence in middle ages, 31–32
and interdisciplinarity, 28–30, 58–59, 64
on intuition, 290–91, 301, 508n.18
vs. Kant, 36, 37, 78, 472nn.28, 29
on knowledge of the divine, 138, 276
on language, 105–6, 436
on lines of causation, 117–18, 119
on logic, 28, 29, 121–22, 140, 176, 277–97, 298, 299, 303, 436,
437, 507n.1
Lyceum of, 28, 30
on material causality, 74, 82, 86, 141, 204, 206–7, 323, 324, 457
on mathematics, 27, 28–29, 64, 106, 121, 138, 187, 203–4, 205,
206–7, 210, 211, 214, 217, 239, 278, 280, 292, 294, 296, 300,
301, 302, 305, 479n.46, 486n.37, 509nn.25, 33
on matter, 71, 74, 82, 86, 96, 141, 142, 182, 204, 206–7, 214,
217, 290, 323, 324, 393, 457, 492n.7
on metaphors, 286, 508n.8
on military prudence, 445, 499n.44
on mimesis, 334
on modal qualifications of propositions, 289
on moral responsibility, 105, 415, 482n.88
on natural science, 27, 28–28, 57, 78, 90–91, 96, 101, 111, 120–
21, 140, 141, 145, 148, 159, 160, 165, 179, 204, 239, 255, 259,
263, 264, 280, 290–91, 292, 293, 294, 295–96, 298, 299, 305,
309–11, 323–24, 333, 370, 404, 448, 470n.1, 473n.46, 475n.6,
481n.74, 486n.36, 491n.82, 498n.34

on nature, 71–72, 334, 338, 473n.46, 514n.46, 527n.32
on numbers, 210, 211, 214
on *phronesis* (prudence), 28, 445
on place, 473n.46, 476n.18
vs. Plato, 26, 27–28, 30, 36, 37, 47, 48, 69, 75, 106, 115, 121, 139, 159, 164, 203–4, 217, 218, 247, 256, 259, 264, 268–70, 294, 342, 349, 355, 393, 403, 422–23, 435, 436, 437, 439, 472n.28, 479n.45, 482n.89, 499n.48
on pleasure, 349
on poetry, 286, 436, 526n.14
on politics, 120, 121, 435
on potentiality, 70–71, 85–86, 93, 96, 134, 141, 182, 217, 282–83, 290, 311–12, 393, 404
on prime movers, 92–101, 111–12, 115–16, 151, 153, 403, 453
on private property, 368
on probability, 289, 306, 310
on projectile motion, 99
on properties, 27, 68, 76–85, 86, 87, 98, 182, 476n.18
on propositions, 234
on quality, 78, 79–80, 81, 176, 177, 454, 456
on quantity, 27, 28, 78, 79, 121, 183, 203–4, 210, 214, 217, 279, 296, 300, 301, 302, 310, 454, 455
on religion, 31
on rhetoric, 304–5, 307–9, 436
and same and different, 176–77
on scientific knowledge (*episteme*), 27, 28–29, 69, 72, 139, 220
on self-consciousness, 104–5
on self-knowledge, 266
on sense experience, 27, 30, 33, 34, 53, 54, 58, 68, 69, 75, 90, 99, 101–3, 104, 107, 110, 112, 134, 138, 165, 183, 192, 203–4, 251, 255, 257, 258–60, 263, 280, 289, 290, 292, 293, 295, 300, 301, 302, 305, 310, 334, 414, 437, 472nn.28, 29, 479n.46, 490n.65, 508n.18
on slavery, 368–69
on soul, 101–14, 153, 158, 190, 439
on subjects of sciences, 160, 475n.6
on substance, 50, 64–65, 67–76, 87, 92, 98, 112, 123, 128, 140, 151–53, 175, 181, 182, 309, 433, 454, 455, 472n.28, 476n.18
on technology, 71–72, 120–21, 231, 239
on Thales, 392

on time, 78, 83–84, 128, 166, 175
on truth, 27, 193, 217, 239, 289, 349, 353, 354, 368, 436
on unification of knowledge, 23, 27–31, 45–46
on unity and plurality, 175–77
on universality, 36, 38, 72, 87, 106, 179, 186–87, 204, 280, 283,
293, 305, 315, 323, 436, 471n.14, 482n.87, 494n.19, 526n.14
on the universe, 92–93, 94–95, 113, 117, 166–67, 168, 427,
525n.55
on virtue, 340, 354–55, 515n.48

Aristotle, works of

Categories, 77, 472nn.30, 33, 473n.46
De Anima, 101–14, 120, 158, 190, 220, 257, 292, 355, 415,
471n.8, 477n.27, 479n.46, 480nn.64, 66, 509n.20, 521n.2
De Caelo, 115, 190, 481n.73, 521n.2, 525n.55
De Interpretatione, 508n.13
De Partibus Animalium, 477n.27, 480n.62, 512n.12
De Sophisticis Elenchis, 278
Eudemian Ethics, 472n.30
Historia Animalium, 290, 477n.27, 480n.63
Metaphysics, 26, 29, 30, 31, 61–62, 78, 112, 115–16, 121, 122,
139, 149, 151, 158, 175–77, 190, 203, 207, 218, 234, 403, 404,
406, 415, 425, 452–53, 462nn.12, 13, 15, 470n.2, 472n.33,
479n.45, 480n.64, 481nn.73, 75, 484n.12, 486n.41, 492nn.4, 5,
6, 502n.34, 512n.8, 521n.31
Nicomachean Ethics, 193, 353, 415, 462n.12, 482n.88, 491n.83,
499n.46, 515n.48, 519n.58, 529n.38
On Dreams, 324, 512n.7
Organon, 77, 277, 278–79, 437, 472n.31
Physics, 29, 53, 77, 93–101, 111, 140–41, 151, 153, 158, 220,
236, 279, 292, 403–4, 421, 425, 473n.46, 484n.12, 514n.46
Poetics, 278, 304–5, 308, 436, 482nn.87, 89, 508n.10, 513n.29,
526n.14
Politics, 366, 441–42, 482n.89, 500n.51, 508n.17, 513n.29,
518n.55, 519n.57, 526n.8
Posterior Analytics, 61, 63–64, 111, 140–41, 277, 294, 437,
470n.6, 471n.14, 490n.72, 494n.19, 502n.33, 508nn.15, 18,
509n.25
Prior Analytics, 277, 437
Rhetoric, 278, 304–5, 436, 510nn.43, 44
Topics, 77, 278, 305, 472n.30, 510n.40

arithmetic. See mathematics, arithmetic
Arraj, James, 502n.25
artificial intelligence, 118
artificial observation/ideoscopic knowledge, 86–87, 111, 163, 181, 260, 315, 440, 448
 Deely on, 474n.49, 476n.17, 527n.32
Aryans, 10
asceticism, 11, 14, 126, 375, 376, 377
Ashley, Benedict, 471n.26, 508n.2
astrology, 124, 203, 330–31
astronomy, 9, 28, 124, 147, 203, 314
 Ptolemaic/Aristotelian, 66, 69, 89, 140, 219, 220, 237
atheism, 11, 43–44, 322, 512n.11, 514nn.33, 34, 521n.1
atman, 10, 126, 128, 375, 395–96, 398
atomism, ancient, 128
 Democritus, 22, 23, 24, 26, 33, 34, 37, 71, 89, 126, 183, 221, 312
 Leucippus, 22, 24
atoms, 410, 455
 molecules of, 71, 72, 75, 84, 86, 123, 179–80, 184, 186, 222–25, 272, 319, 325, 345, 345–46, 401, 455
 radioactive atoms, 474n.48
 subatomic particles, 83, 176, 179–80, 184–85, 219, 221–22, 223–24, 310, 312, 339, 345, 479n.51, 485n.18
Augustine, St., 26
 Confessions, 318
 Contra Academicos, 248
 De Doctrina Christiana, 438
 De Trinitate, 527n.32
 on divine illumination, 356
 influence of, 23, 31, 39, 47, 52, 134, 203, 257, 318, 422, 423–24
 on intuition (*ratio superior*), 244
 on liberal arts, 438
 on seed principles (*rationes seminales*), 339
 on signs, 506n.73
 on time, 269
 on the Trinity, 523n.23
Aumann, Jordan, 512n.15
Australia: aborigines of, 7, 15
autonomy of disciplines, 27–31, 45–46, 50
Averroes, 26, 31, 95, 112, 139, 416, 462n.7

The Incoherence of the Incoherence, 248
Avicenna, 26, 139, 147, 175, 248, 403, 462n.7, 486n.34
axiology, 144
Ayer, A. J., 23, 304
Ayers, Michael R., 464n.34

Bacon, Francis, 23, 250
 on final causes, 323, 511n.2
 on induction, 34, 259, 290, 463n.30
 Novum Organum, 503n.46
Bacon, Roger, 208, 249
Baisnée, Jules A., 499n.50
Baldick, Chris, 513n.29
Balthasar, Hans Urs von, 326, 417
Barbour, Ian G.: *Religion and Science*, 46
Barrow, John D.: *The Anthropic Cosmological Principle*, 164, 507n.86
Basham, A. L., 494n.26
beauty
 and aesthetic distance, 329, 512n.19
 Aquinas on, 326–27, 512n.15
 clarity of, 326–27, 328–29
 of creation, 308
 defined, 232
 as ethical, 329–30
 and gender, 328–29
 of God, 326, 330
 and human intelligence, 328, 342
 integrity/wholeness of, 326–27, 328–29
 and interculturality, 330–34
 in mathematics, 347, 497n.12
 physical vs. spiritual, 328–29
 Plato on, 329–30
 and proportion, 326–27, 328–29, 347
 relationship to sense perception, 328–29
 relationship to truth, 174, 238, 308, 326–28, 329, 341–42, 372,
 373–74, 497n.12
 vs. the sublime, 329
 as transcendental property of Being, 174, 326–30
 of the universe, 25, 372
Behe, Michael J.: *Darwin's Black Box*, 164

Being

- analogy of, 51, 53, 136–37, 138, 140, 142–43, 173–74, 177, 178, 284, 385, 405, 408, 410, 428
 - Aquinas on, 47, 50, 62–63, 65–66, 93–101, 95–96, 123, 136–37, 138, 139, 142, 143, 149, 150–63, 157, 173, 269–70, 405, 470n.3, 480n.65, 484n.14, 488n.53
 - Aristotle on, 50, 136–37, 138, 139–40, 150–51, 470n.2
 - “Being” as analogical term, 46, 47, 63, 136–37, 138, 139–44, 284, 488n.51
 - vs. beings, 13, 55
 - defined, 139–44, 173–74
 - degrees of, 67, 134, 136
 - Duns Scotus on, 55, 62, 66, 71, 133–34, 136, 137, 139, 140, 142, 157, 269, 405, 410, 471n.10, 474n.54, 483nn.1, 2, 485n.27
 - as *ens commune*, 96, 100, 124, 136–37, 138–39, 141, 142–43, 150–51, 157, 160, 173–74, 197, 292, 385, 405, 408–9, 428, 484n.14, 486n.37, 487n.50
 - as *ens mobile*, 62–63, 65–66, 93–101, 122–23, 140, 143, 147, 148–49, 150–51, 161, 470n.3
 - as *ens ut participium*, 143
 - as *esse/actus essendi*, 47, 50, 65–66, 95–96, 100, 123, 136–37, 142, 143, 150–63, 173, 269–70, 470n.3, 480n.67, 485n.24, 488n.53
 - goodness as property of, 144
 - Heidegger on, 13, 38, 40, 55–56, 57–58, 83, 139
 - and mathematics, 201–2
 - Parmenides on, 22, 57, 70, 73, 75, 94, 386, 462n.2
 - possible Being, 36, 66, 123, 134, 140, 149, 173, 282–83, 426, 476n.11
 - as subject of Metascience, 46, 47, 54, 133–44, 173–74, 234, 284, 292, 385, 410, 428, 486n.37, 488n.51
 - unity of, 177–78, 197
- Being, transcendental properties of Beauty, 174, 326–30
- Goodness, 85, 144, 174–75, 322, 326, 379–81, 410–11
 - and Philip Cancellarius, 492n.1
 - transcendental terms as analogical terms, 174, 282, 322, 379–81
 - Truth, 47, 85, 143–44, 174–75, 234–35, 246, 278, 326
 - Unity, 85, 174–200, 275–76, 326, 428
- belief, 236–37
- Bell, Clive, 510n.45

Bell's Theorem, 169, 312, 510n.48
Benedict, St., 369
Bentham, Jeremy, 251, 474n.49
 on the hedonic calculus, 351–52
Berggren, J. L., 497n.7
Bergson, Henri, 41, 48, 388
 Creative Evolution, 387, 506n.81
Berkeley, George, 251
 assertion that *esse est percipi*, 35, 139, 144, 485n.17
Bertalanffy, Ludwig, 179
Bertrand, Yves, 527n.23
Bessel, Friedrich, 498n.33
Bhagavad Gita, 331, 377–78, 440
Bharata: *Natya-sastra*, 331
Bible, 7, 194, 233, 243, 412, 424, 446
 biblical literalism, 438
 Hebrew Scriptures, 9, 14, 125, 189, 242, 326, 331, 347, 349, 350, 378, 390–91
 the law, 347, 350, 352
Big Bang theory. See universe, the, Big Bang theory
binary opposition, 43
bin Laden, Osama, 365
biodiversity, 325, 326, 339, 372
biology, 85, 163
 Darwin and Darwinism, 23, 41, 125, 251, 273–74, 338–39, 343–44, 512n.11, 515n.4
 evolution, 7, 23, 41, 48, 118, 164, 197, 229–30, 239, 251, 262, 273–74, 315, 325, 326, 336, 338–39, 343–45, 387, 490n.78, 495n.44, 505n.68, 507n.86, 512n.11, 515n.1, 519n.4
 final causality in, 324, 343–44
 genetics, 7, 88, 191–92, 225, 271, 344, 475n.56, 495n.44
 human evolution, 23, 41, 164, 197, 229–30, 239, 262, 273–74, 325, 495n.44, 505n.68, 507n.86, 519n.4
 mathematics in, 226
 and natural selection, 164, 273, 274, 343, 344, 490n.78, 505n.68
 quasi-substances in, 185
 role of chance in, 164, 197, 272, 273–74, 319, 335, 339, 344–45, 346, 387
black holes, 222–23
Blakenhorn, Bernhard, 520n.11

Blanchette, Oliva, 476n.11
Blondel, Maurice, 48
Bloom, Alan D.: *The Closing of the American Mind*, 5
Bodhidharma, 130
Boethius, 413, 522n.16
Bohr, Neils, 510n.47
Bolyai, John, 208
Bonaventure, St., 31, 116, 342, 423–24, 515n.53, 525n.45
Bondi, Hermann, 93
Booth, Edward, 462n.7
Bos, Abraham P., 30
Boscovich, R. G., 479n.51
Boyce, Mary, 460n.22
Bradley, F. H., 251, 493n.16
Brahe, Tycho, 491n.84 *Brahmanas*, 10, 297
Brandewie, Ernest, 519n.1
Brentano, Franz, 40, 526n.17
British Empiricism, 23, 34–36, 37, 108, 185, 248, 249–51, 304
 See also Bacon, Francis; Berkeley, George; Hume, David; Locke, John
Brouwer, L. E. J., 217, 301–2
Brown, Harvey R.: *The Philosophy of the Vacuum*, Byzantine Empire, 8, 26, 333 493n.11
Browning, Robert: *The Ring and the Book*, 232
Brück, Michael von, 397, 398
Buckley, Michael J., 512n.11
Buddhism, 15, 39, 125, 198, 257, 392, 430, 435
 the Absolute in, 377, 417
 in China, 11, 130, 240, 332, 378, 379, 395
 communities of monks in, 4
 compassion in, 395, 520n.17
 and cosmology, 125, 126
 denial of phenomenal world in, 11
 and desire, 375–76
 ethics in, 375–77
 Four Noble Truths, 375–76
 Gautama Siddhartha, 11, 31, 375–76, 380, 395
 Hinayana Buddhism, 377
 and history, 320
 iconography of, 331

in India, 9, 10, 11, 14, 240
individual self (*atman*) in, 126
in Japan, 11, 130, 333, 395, 397
karma in, 417, 450
Mahayana Buddhism, 356–57, 377, 398, 450
meditation in, 14, 20, 130, 376, 377, 395, 397, 399
as Middle Way, 376, 377
monasticism in, 376–77
as monistic, 9, 244, 401–2, 449
and natural science, 126
Nirvana in, 376–77, 395, 397, 398, 450
reincarnation in, 126–27, 190, 191, 370–71, 375, 417, 450
release from suffering in, 375–76, 379–80
religious toleration in, 449–50
Tantric Buddhism, 377
Theravada Buddhism, 377
Zen, 130, 397

Bullough, E., 512n.19
Burke, Edmund, 513n.20
Burrell, David, 152, 284
 Analogy and Philosophical Language, 508n.6
business, 16, 443, 444–45, 499n.44
Byzantine Empire, 8, 26, 333

Cahalan, John C., 465n.39
Cajetan, Thomas de Vio, Cardinal, 153
 on analogies, 287
 on degrees of abstraction, 47, 121, 138, 155, 292, 482n.92,
 484n.11
 De Nominum Analogia, 284
 on logic, 47, 121, 138
Calvin, John, 32, 418, 463n.21
Camuzhi, Scott, 514n.47
Cantor, Georg, 214, 215, 301, 303
capitalism, 9, 15, 369, 500n.56
Caputo, John D., 55, 57, 461n.43
Cardano, Girolamo, 212
Carnap, Rudolf, 41, 145, 252, 504n.43
Carneades, 26, 247
Carroll, Lewis, 282

Catechism of the Catholic Church, 481n.84, 502n.32

categories

of accidents, 76–85, 86, 128, 135, 140, 174, 175, 176, 177, 180–82, 281, 285, 401, 433, 454–58, 472nn.30, 33, 473nn.34, 40, 46

Aristotle on, 67–85, 128, 135, 140, 175, 176, 177, 180–82, 401, 433, 454–58, 472nn.30, 33, 473nn.34, 40, 46

Kant on, 37–38, 78, 165, 185, 217, 299, 323, 472n.28, 473n.37

substance, 67–76, 81, 84, 135, 140, 179–88, 281, 285

Catholicism

Catechism of the Catholic Church, 481n.84, 502n.32

Counter-Reformation, 32

doctrine of transubstantiation, 464n.36, 511n.53

and ecumenical dialogue, 17

fallen angels in, 330

revisions of Thomistic ethics, 357–66

sin in, 330

Thomistic revival in, 44–46, 53

See also Christianity; Dominican Order; Franciscan Order; Jesuit Order; John Paul II; Vatican II

Catholic University of America, 53

causality, 84, 106, 204, 471n.27

action at a distance, 83, 169, 253, 312–13, 473n.45, 510n.48

a posteriori reasoning from effect to cause, 28, 33, 93, 123, 137, 138, 141, 142, 147, 153, 157, 158, 189, 197, 253, 265, 269, 280, 296–97, 317, 462n.10, 472n.29, 477n.27, 488n.51

a priori reasoning from cause to effect, 28, 33, 77, 93, 197, 280, 289–90, 462n.10, 472n.29, 477n.27

causal determinism, 315, 386–87, 418–19, 510n.47, 514n.46

and definitions, 282

four explanatory causes, 64, 82, 85, 86, 129, 175, 198, 206–7, 246, 421, 423, 424, 457

Hume on, 81, 89, 163, 316–17, 465n.39

intrinsic vs. extrinsic causes, 82

lines of causation, 117–19, 118

principle of, 63, 73–74, 81–82, 89, 94, 97, 148, 150, 163, 165, 176, 200, 514n.47

as pure relation, 80–81, 106

and quantum physics, 90

role of contact in, 81, 83, 118, 204, 411, 473n.42

secondary causes, 114–15, 117–18, 119, 142, 311
and semiotics, 278, 296–97, 506n.76
and syllogisms, 279, 280
See also chance; efficient causality; final causality; First Cause;
formal causality; free will; material causality; prime movers
celestial spheres. See Aristotle, on celestial spheres
certainty, objective, 236–37, 238, 253–54, 258–60, 298, 401, 481n.74
Aquinas on, 134, 220, 258–59, 405, 491n.83
Aristotle on, 28, 57, 134, 165, 258–59, 289–91, 294, 301, 305–6,
309–10, 491n.83
Descartes on, 32–33, 43, 66, 109–10, 217, 218, 249, 251, 252,
260, 472n.28
in ethics, 294, 314
and history, 316–18, 320–21, 437
Locke on, 250–51, 260
in logic, 294
in mathematics, 216–18, 294, 313
and natural science, 42, 53, 85, 118–19, 134, 165, 201, 294, 373,
405, 481n.74, 491n.83
Ch'an, 130
chance, 314, 315, 347, 387, 428
Aquinas on, 76, 419, 471n.27
Aristotle on, 76, 273, 310–11, 323, 324, 404, 471n.26, 491n.83,
514n.46
and biological evolution, 164, 197, 272, 273–74, 319, 335, 339,
344–45, 346, 387
in genetics, 88
and mere accidents, 76, 77, 79, 186
changeable substance
Aquinas on, 62–63, 65–66, 93–97, 134, 256–57, 475n.62
Aristotle on, 27–28, 30, 48, 54, 57, 70–72, 74–75, 85–86, 92, 93,
96, 98, 112–13, 121, 122–23, 141, 153, 183, 256–57, 279, 290,
304, 309, 331, 338, 401, 440, 472n.28
as composed of form and matter, 71–72, 74–75, 76, 85–86, 87–
89, 93, 96, 112–14, 123, 221, 267, 324
quantity as first property of, 79, 88, 121, 140, 176, 218, 279, 302
as subject of natural science, 70–72, 73–75, 76, 85, 91, 96, 97,
119, 122, 135, 141, 143, 147, 150–51, 155–57, 313, 323, 406,
440, 448
substantial vs. accidental change, 135, 199

chaos theory, 274–75, 346
Chappell, Vere, 464n.34
Chauvet-Pont-D'Arc, cave of, 7
chemistry, 28, 85, 345
Ch'eng Hao, 130
Chenu, M.-D., 257
Chih-i, 130
China, 12, 128–31, 371
 agriculture in, 8
 Buddhism in, 11, 130, 240, 332, 378, 379, 395
 calligraphy in, 332–33
 fine arts and literature in, 129, 309, 330, 332–33
 Five Classics of literature, 129, 378–79, 435–36
 Han Dynasty, 129, 130, 379
 historiography in, 332
 vs. India, 7–8, 11, 124, 125–31, 240–41, 436–37
 logic in, 11, 130, 298
 Manchu Dynasty, 131
 Marxism in, 9, 15, 131, 369
 mathematics in, 203, 208
 monism in, 333, 385–86, 396, 401–2
 six schools in, 11, 129–31
 Song Dynasty, 130
 Taoism in, 9, 11, 129, 130, 298, 332, 379, 396
 writing in, 8
Chomsky, Noam, 15–16, 262, 505n.69
 See *also* Confucius/Confucianism
Christianity, 15, 370
 Desert Fathers of Egypt, 3–4
 doctrine of the Trinity, 265–66, 348, 356, 358, 397, 410, 413, 426–
 27, 428, 464n.36, 522nn.16, 17, 523n.23, 524n.44
 and faith, 26, 31, 32, 35, 36, 39, 45, 46, 54, 119, 196, 241–42,
 244, 245, 248, 251, 320, 353, 356, 358, 399, 465n.44, 488n.53,
 523n.23
 good works vs. grace in, 17
 and history, 319–20, 420
 iconoclasm in, 333
 Incarnation, 191, 241, 319–20, 333, 387, 397, 420, 426–27
 and Islam, 8, 9, 333, 370, 462n.7
 love of God in, 228

love of neighbor in, 228
marriage in, 377
monasticism in, 376
monotheism in, 9, 385, 390, 392, 398–99, 402, 403, 413, 414,
426–27, 443, 449
mystical experience in, 31, 248, 380, 398, 449, 520n.27
original sin, 134, 359, 387, 444, 450, 517n.24
religious wars, 13, 241, 248
repentance, 418
resurrection of the body, 113–14, 189, 191, 319–20, 355–56
revelation in, 13, 46, 53, 59, 241–42, 245, 248, 348, 350, 355,
358, 399, 412–13, 421, 495n.44, 522n.17, 527n.32
sacraments in, 125, 464n.36, 511n.53
salvation in, 350, 357, 416, 417
See also Catholicism; Eastern Orthodox Christianity; God; Jesus
Christ; Protestantism
Christian Science, 514n.38
Chuang-Tzu, 129, 298, 379
Chu Shi, 130, 379, 396
Cicero, Marcus Tullius, 247
cinema, 12, 13
cities, 7
clarity, 62, 325, 497n.12
of beauty, 326–27, 328–29
in mathematics, 201, 313, 347
of truth, 327
Clarke, W. Norris, 467n.77, 520n.11
The One and the Many, 49, 256–57, 468n.86, 504n.60
Cleary, John J., 481n.73
clergy, 443, 444, 445
Coe, Shoki, 459n.5
Cogan, Barry S., 462n.7
Cohen, H. Floris, 461n.31
Collingwood, R. G., 320
common good
Aquinas on, 228, 340–41, 354, 364, 367, 499n.50, 524n.28
Maritain on, 228
in politics, 175, 201, 228–29, 230–31, 305
and principle of subsidiarity, 230–31, 500n.56
vs. private good, 228, 367–68

See *also* ethics; goodness
common sense, 251, 260, 262, 304–5
Communism, 39, 369, 521n.1
community of spirits, 192–97
computers, 299, 304
 computer science, 216
Comte, Auguste, 23, 35, 251
Conceptualism. See Nominalism
Confucius/Confucianism, 14, 15, 31, 332, 435–36, 449
 Analects, 378–79, 440
 and education, 20, 378–79
 ethics in, 11, 20, 298, 378–39, 380
 Five Classics, 129, 378–79, 435–36
 jen, 451
 Neo-Confucianism, 130, 189, 379, 391, 396, 400
 and pragmatism, 9
Congar, Yves, 257
Conimbricenses, 41
consensus, 35, 42–43, 246, 253, 262, 367
contemplation, 326, 415
 Aquinas on, 193, 195, 196, 353, 354, 356, 360–62, 368, 429
 Aristotle on, 193, 349, 353–54, 355, 368, 517n.23
 and fine arts, 238, 307–9, 318, 333–34
 of God, 194, 195, 196, 197, 308, 420–21
 Plato on, 349
 of truth, 193, 327–28, 329, 349, 353–54, 355, 368, 370, 415, 439,
 517n.23
 See *also* Aquinas, St. Thomas, on beatific vision
contextuality. See truth, contextuality of
Continental Rationalism. See Descartes, René;
 Leibnitz, G. W.; Spinoza, Benedict de
continuing education, 445–46
contraception, 359, 363
contradiction. See principle of non-contradiction
Conway, Pierre, 508n.2
Copernicus, Nicolaus, 12, 14, 89, 166, 208, 219, 498n.33
copula, the, 288–89
corporatism, 230–31
cosmic diversity, 137, 225
cosmology, 124–28

Big Bang theory, 72, 85, 90, 92–93, 100, 118, 124, 164, 167–68,
222–23, 271–72, 273, 345–46, 386, 423, 492n.89
Grand Unified Theory (GUT), 100, 271–72
See also universe, the
Coughlan, G. D., 493nn.11, 12
Counter Reformation, 32
courage/fortitude, 226, 227–28, 354, 499n.48
Cowburn, John, 515n.49
creatio ex nihilo, 114, 128, 270, 275, 356, 385, 396, 397–98, 400,
425, 427, 449, 523n.18
Aquinas on, 47, 93–97, 403, 521n.2, 524n.41
and immaterial substances, 118, 199
creationism, 273–74
Crete, 7
Critical Theory, 305, 334, 510n.38
critical thinking skills, 438, 439, 446
Crowley, Charles B., 509n.33
cubism, 232
cultural relativism, 16–19, 24, 43, 240, 255, 352, 445
Curie, Marie, 68
Curran, Charles, 359, 363, 365
cynicism, 6, 322

Dancy, Jonathan, 252, 264
Dante Alighieri
 The Divine Comedy, 338
 on God as Love, 338, 339, 341–42
Daoism. See Taoism
Darwall, Stephen, 517n.19
Darwin, Charles, 23, 41, 125, 251, 273–74, 338–39, 512n.11, 515n.4
Dasgupta, Surendranath, 460n.26
David of Dinant, 421
Davidson, Herbert A., 494n.23
Davies, Fr. Brian, 51
Dawkins, Richard: *The Selfish Gene*, 500n.55
death
 Aquinas on, 113–14, 185, 355–56, 366, 429, 525n.58
 of God, 39–40, 55
 of human beings, 55, 113–14, 185, 189, 355–56, 429, 525n.58
 of philosophy, 55–56, 248, 254, 258

Deconstructionism, 122, 145, 163, 254–55, 258, 262, 263, 309, 437, 447

Derrida, 16, 23, 43, 56–57, 248, 254, 461n.42

Deely, John, 23, 52, 464n.32, 477n.29, 484n.6, 505n.67, 506n.81, 522n.8, 526n.17

“Animal Intelligence and Concept-Formation,” 478n.39, 525n.4

on Aquinas, 475n.6, 527n.32

on Chomsky, 505n.69

“The Emergence of Man,” 495n.44

on Epicureanism, 516n.10

on faith and reason, 522n.17

on first philosophy, 500n.2

Four Ages of Understanding, 297, 318, 460nn.17, 25, 461n.39, 464n.34, 465n.42, 466n.58, 467n.68, 471n.26, 473nn.39, 44, 475n.6, 476n.17, 477n.25, 478n.37, 480nn.67, 69, 483nn.94, 96, 484nn.7, 11, 487n.43, 490n.71, 492n.1, 494n.23, 495n.39, 497n.11, 498n.31, 501n.17, 503nn.48, 49, 505nn.61, 65, 69, 506nn.73, 76, 508nn.2, 4, 7, 509n.28, 512n.10, 515nn.1, 4, 516nn.10, 15, 517n.21, 522n.16, 523n.22, 524n.41, 527nn.27, 32

on God as Creator, 524n.41

on Husserl and Heidegger, 506n.74

on ideoscopic vs. cenoscopic knowledge, 474n.49, 476n.17, 527n.32

on immaterial substances, 161

The Impact on Philosophy of Semiotics, 463n.30

on intellect vs. sense perception, 478nn.37, 39

on Locke, 464n.34

on Maritain, 505n.61

on matter in Neoplatonism, 512n.10

on Moore’s fallacy, 501n.7

on natural selection, 490n.78

on nominalism, 473n.39

on Peirce, 474n.48

“The Philosophical Dimensions of the Origin of Species,” 495n.44, 507n.86, 515n.4

on philosophy, 460n.25, 464n.33, 476n.17

on pragmatism/pragmatism, 466n.58

on semiotics, 122, 463n.30, 483nn.94, 96, 485nn.20, 30, 498n.31, 500n.2, 506nn.73, 76

on sensation vs. perception, 474n.51, 478n.39

on Stoicism, 516n.12

on “teleonomy” vs. “teleology,” 497n.5, 515n.1

on theology, 527n.32

What Distinguishes Human Understanding?, 474n.51, 478n.39, 505n.64

definitions

Aristotle on, 64, 67–72

of Being, 139–44, 173–74

and causality, 282

and essence, 64, 67–72, 76, 77, 97, 179, 282, 283–84, 288–89, 293–94

and existence, 282

functional definitions, 14, 461n.36

by genus and species, 72, 78, 173, 179, 181, 281–82, 285, 286, 298, 310, 410

in mathematics, 214

nominal definitions, 282, 283–84, 288, 290, 295

and Porphyry’s *Isagoge*, 508n.4

real definitions, 64, 67–72, 76, 77, 97, 103, 173, 179, 282, 283–84, 288–89, 290, 293–94, 295, 310

deism, 35

De Koninck, Charles, 220, 228, 469n.103, 471n.8, 481n.74, 498n.37, 499n.50, 515nn.49, 51

Demetrius Phaleron, 30, 207

democracy, 15, 229

and literacy, 435

Democritus, 22, 23, 24, 26, 33, 34, 37, 71, 89, 126, 183, 221, 312

Derrida, Jacques, 23, 248, 461n.42

on ambiguity, 254

on communication by speech, 16, 56–57

on communication by writing, 16, 56–57

on *différance*, 43

Desargues, Girard, 208–9

Descartes, René, 55, 247, 256

analytic geometry of, 209, 212

on animals, 101

atomism of, 33, 183, 463n.24

on certainty, 32–33, 43, 66, 109–10, 217, 218, 249, 251, 252, 260, 472n.28

on clear and distinct ideas, 32–33, 66, 110, 217, 218, 249, 251, 394
on the *Cogito*, 32, 40, 43, 109–10, 249, 252, 260, 394, 414
Discourse on Method, 32
on essence of material substance as extension, 121
on existence of God, 32–33, 43, 249
influence of, 15, 32, 35, 43, 44, 49, 52, 53, 69, 217, 256, 257, 258, 265, 351, 442
on innate ideas, 15, 23, 34, 37, 110, 194, 249, 250
on mathematics, 33, 34, 109–10, 208, 209, 212, 217, 218
Meditations on First Philosophy, 32
mind-matter dualism of, 33, 58, 59, 258, 394
on natural science, 32, 33, 34, 145
on principles known *a priori*, 32–33, 145
on sense experience, 249
on space, 463n.24
turn to subject, 23, 32–33, 34, 35, 44, 58, 250, 257, 258, 265, 394, 464n.33, 465n.42

determinism, 315, 386–87, 418–19, 510n.47, 514n.46

Devereux, Daniel T., 517n.23

Devil, the, 245, 330, 518n.49

Dewan, Lawrence, 146–50, 154, 156, 158, 485n.33, 486nn.36, 37, 510n.41

Dewey, John, 352, 380
Art as Experience, 238
A Common Faith, 466n.57
The Humanist Manifesto, 41
Secular Humanism of, 41, 466n.57

dialectical reasoning, 202, 220, 255, 263, 276, 289, 318
Aristotle on, 69, 256, 278, 290–91, 299, 305–6, 437, 491n.83
of Hegel, 39, 386
of Plato, 24, 25, 247, 259, 437
and probability, 69, 116–17, 259, 306, 481n.80
and truth, 306

difference, classification through, 78, 179, 281–82, 298
See also similarity

differential calculus, 213

Diogenes Laertius, 508n.17

Diophantus, 212

docetism, 397

Dodd, J. E., 493nn.11, 12
Doig, James C., 488n.53
Dominican Order, 31, 46–47, 49, 54, 164, 350
Dostoevsky, Fyodor, 336
drama, 13, 333
 in India, 332
Drees, Willem B., 492n.90
dualism. See mind-matter dualism
Duhem, Pierre, 220
 Le Système du Monde, 498n.34
Dulles, Avery, Cardinal, 462n.44
Dummett, Michael, 526n.17
Dumoulin, Bertrand, 472n.33
Duns Scotus, John, 23, 36
 on angels, 88, 474n.54
 on Aristotle, 133
 on Being, 55, 62, 66, 71, 133–34, 136, 137, 139, 140, 142, 157,
 269, 405, 410, 471n.10, 474n.54, 483nn.1, 2, 485n.27
 on causality, 94
 on divine freedom, 31
 on essence, 142, 269, 485n.27
 on ethics, 350
 on First Philosophy, 152, 410
 on free will, 163, 524n.28
 on God, 134, 139, 142, 405, 408, 416, 471n.10
 on *grammatica speculativa*, 482n.93
 influence of, 33, 41, 249, 351, 485n.24, 522n.15
 on intelligence, 474n.54, 524n.28
 on love, 524n.28
 on matter, 142
 on natural science, 405
 on original sin, 134
 on prime matter, 142
 on principle of individual difference (*haecceitas*), 87
 on sense experience, 134
 on soul, 190–91
Durandus de St. Pourcain, 31
Dutch Catechism, 480n.71
Dvaita Vedanta, 396

Eastern Orthodox Christianity, 242, 333
Ecclesiastes 9:7–10, 349, 516n.11
Eckhardt, Meister Johannes, 31
Eco, Umberto, 512n.15
economic science, 231, 441–42
ecumenes, 6–8
Eddy, Mary Baker, 514n.38
education, 433–46
 Bertrand on, 527n.23
 continuing education, 445–46
 in the family, 341, 433–34
 higher general education, 439–43
 in liberal arts, 434–39, 440, 441, 443, 446
 professional education, 443–45
 vocational training, 443–44
efficient causality, 74, 112–13, 123, 175, 204, 428, 504n.60
 Aquinas on, 100–101, 227, 393–94, 418–19, 421, 422–23, 424, 476n.18
 Aristotle on, 82, 86, 141, 152–53, 279, 323–24, 403–4, 415, 422–23, 425, 457, 476n.18, 521n.7
 as correlative to final causality, 82–83, 275, 324, 338, 346, 404, 406, 421, 425, 507n.87
 and definitions, 282
 and existence of First Cause/God, 93–101, 122–23, 135, 153, 158, 269, 393–94, 403–4, 406, 421, 423, 425, 475n.6, 477nn.24, 25, 26, 487n.50
 vs. final causality, 275, 286–87, 296, 323–24, 347, 421, 504n.60, 521n.7
 vs. formal causality, 268–69, 296, 297, 324, 346, 421, 425
 infinite regress of efficient causes, 97, 163, 253, 263, 288
 and probability, 271
 relationship to love, 338
 and semiotics, 296–97
 transitive vs. intransitive, 200
 unity and plurality in, 175, 188, 197–200
 See also creatio ex nihilo; First Cause; God, as Creator; nature, fundamental forces in; nature, laws of; prime movers
Egypt, 7, 8, 20, 22, 189
 architecture in, 331
 burial practices, 189

- Desert Fathers, 3–4
- law in, 347
- Museum in Alexandria, 30
- Einstein, Albert, 140, 208, 239, 380, 426
 - on determinism, 386–87, 510n.47
 - on God, 386–87, 491n.79, 519n.5
 - Riemannian geometry used by, 216
 - on Spinoza, 386, 394
 - theory of relativity, 17, 166, 253, 458
 - on velocity of light, 312, 313, 458
- Eiseley, Loren, 515n.4
- Elders, Leo J., 115, 469n.103, 481n.73, 485n.24, 487n.45
- Eliot, T. S.: *The Waste Land*, 232
- emotions, 307, 439
 - and fine arts, 373, 374
- emotivism, 352, 514n.39
- Empiricism, 42, 44, 58, 236, 249–55, 257, 258–59, 264–65
 - See also British Empiricism
- Engels, Frederick, 519n.4
- engineering, 9, 232
- Enlightenment, the, 20, 31, 34, 37, 40, 43, 44, 197, 243, 258, 350, 351
 - and fine arts, 308, 333, 373
 - and natural science, 13, 32, 120, 333, 373, 402
 - reason during, 13, 35, 36, 59
 - and Secular Humanism, 59, 120, 308, 373, 402
- environment (*echein/habitus*): as category of accidents, 78, 83, 84–85, 181, 193, 454, 458, 473n.46, 474n.48
- environmental issues, 43, 125, 314, 334, 371–72, 380, 440
- biodiversity, 325, 326, 339, 372
- Epicureanism, 23, 25, 26, 189, 348–49, 516n.10
- epigenesis, 490n.78
- epistemology, 143–44, 146, 245–67, 278, 315
 - of Aquinas, 48, 49, 54, 58, 138, 145, 154–55, 163, 201, 202, 237, 250, 255–67, 269–70, 295, 352, 400, 422, 423, 526n.17
 - of Aristotle, 48, 49, 54, 58, 66, 67–68, 69, 75, 106, 110, 138, 139–40, 163, 237, 246, 247, 251, 255–67, 280, 289–90, 308, 352, 400, 422, 423, 433, 526n.17
 - defined, 245–46
 - and personalism, 265–67

See *also* Empiricism; Idealism; skepticism
equality, 80–81, 84, 106, 205, 206, 215, 268, 457
equivocal terms, 135, 284, 285, 286, 287, 288

as ante-predicamental, 78

Eschmann, I. Th., 499n.50

Esposito, John L., 501n.17

essence

Aquinas on, 47, 63, 66, 87–89, 95–96, 100, 123, 141–42, 151–63,
173, 187–88, 193, 220, 244, 262–63, 269–70, 293, 295,
485n.24

Aristotle on, 27, 40, 50, 67–72, 85–86, 104–5, 161–62, 173, 177–
78, 182, 183, 204, 293, 295, 305, 331, 334, 403–4, 472n.28,
476n.18, 492n.7

and definitions, 64, 67–72, 76, 77, 97, 179, 282, 283–84, 288–89,
293–94

vs. existence, 47, 63, 66, 67, 74, 95, 100, 115, 123, 136, 141–42,
151–63, 174, 177, 186, 193, 234, 235, 262–63, 267, 269, 293,
403–4, 408, 471n.13, 492n.7, 514n.33, 523n.19

of God, 123, 196, 406–9, 425, 504n.60, 523n.19

hierarchy of essences, 47

of immaterial beings, 138, 153, 163, 175, 270

and phenomenology, 40, 186, 188

relationship to fine arts, 331, 334

relationship to ontological truth, 234–35

relationship to potentiality, 143, 149, 152, 157, 173, 182, 235,
269–70

relationship to properties, 68, 72, 76–77, 87–89, 103, 121, 155,
173, 187, 283, 290, 293–94, 406, 476n.18

Essentialist/Conceptualist Thomism, 46–47, 49, 53–54, 146–50,
485n.33

ethics

Aquinas on, 226–28, 350, 352–72, 442, 499n.42, 517n.31

Aristotle on, 28–29, 120–21, 239, 241, 294, 308, 349–50, 366–72,
442

bioethics, 445

in Buddhism, 375–77

certainty in, 294, 314

in Confucianism, 11, 20, 298, 378–39, 380

deontology in, 347–57, 358–59, 380, 516n.8

education in, 341, 441–42

emotivism in, 352, 514n.39
ethical beauty, 329–30
exceptionless negative moral norms, 360, 362–63, 516n.8
family ethics, 226, 318, 366–67, 370, 441–42, 445
in Hinduism, 375, 377–78
vs. history, 442
individual ethics, 226–27, 314, 318, 347–57, 366, 370, 441–42, 445
intentions of agents, 359, 363–66
and interculturality, 375–79
Judeo-Christian biblical law, 347, 350, 353
Kant on, 36, 37, 38, 301, 351, 380
language of, 254
and Metascience, 363–66, 370
natural law in, 348, 353, 354, 356, 359, 363, 370
objects of, 282
Plato on, 25, 349–50, 375, 499n.48
principalism in, 352
private goods, 228
proportionalism, 361, 362–65, 518nn.46, 48
relationship to history, 318, 320
relationship to human nature, 120, 314, 361, 370, 445, 499n.42, 501n.7
relationship to natural science, 361, 370, 380–81, 445
relationship to technology, 371
role of character in, 227
role of feelings in, 251, 262, 352
role of happiness in, 227–28, 348–49, 350, 353
role of virtue in, 226–28, 352–55
situation ethics, 352, 358, 364
social/political ethics, 226, 314, 318, 366–72, 441–42, 445
spiritual goods, 228–29
teleology in, 347–57, 365–66, 516n.8
truth in, 175, 307, 314–15
and ultimate end, 227, 358, 359, 360, 361–62, 499nn.42, 46, 517n.31
unity and plurality in, 175, 226–28
unity of the virtues, 226–28
Utilitarianism, 251, 351–52, 464n.36
See *also* common good; virtue

ethnocentrism, 5, 14, 318, 436–37

Eucharist, the, 464n.36, 511n.53

Euclid, 207–8, 210, 213, 278, 313

Eudemus of Rhodes, 29, 30

Eudoxus of Cnidus, 118, 292

evil

Aquinas on, 420, 514nn.40, 44

and book of Job, 334, 336–37

and free will, 336, 337

physical evil vs. moral evil, 335–37

problem of, 322, 334–38, 388, 389, 417, 420, 494n.26, 514nn.38, 40

exemplarity, 406, 409, 415, 416

St. Bonaventure on, 423–24

and extrinsic formal causality, 410–11, 422–23, 523n.18

existence

Aquinas on Being as *esse/actus essendi*, 50, 65–66, 95–96, 123, 136–37, 143, 150–63, 173, 269–70, 470n.3, 488n.53

Aristotle on, 64–67, 123, 151–53, 161–62, 173, 177–78, 182, 403–4, 470n.2, 472n.28, 487n.45, 492n.7

and definitions, 282

vs. essence, 47, 63, 66, 67, 74, 95, 100, 115, 123, 136, 141–42, 151–63, 174, 177, 186, 193, 234, 235, 262–63, 267, 269, 293, 403–4, 408, 471n.13, 492n.7, 514n.33, 523n.19

and formal causality, 268

of immaterial beings, 43–44, 50, 53, 65, 93–124, 132, 136, 137, 138, 141, 144–45, 148, 149, 150–51, 153, 157–60, 161, 163–64, 168, 173, 190, 192–93, 197, 199, 253, 264–65, 267, 269, 275, 288, 292, 296, 311, 319, 320, 326, 335, 385, 400, 401, 403–6, 421, 453, 475n.62, 481nn.73, 74, 77, 486n.37, 488n.51, 522n.8

necessary vs. contingent existence, 123, 134, 141, 152, 267, 335, 394, 408

relationship to actuality, 143, 149, 152, 157, 173, 182, 235, 269–70

relationship to touch, 67, 73

See also Being

Existentialism, 23, 38, 39, 40

Existential Thomism, 49–50, 51, 53–54, 100, 123, 146, 150–63, 486n.41, 487n.43, 493n.16, 506n.72

exorcism, 502n.32
expressionism, 334, 373–74
extension vs. intension of terms, 303

Fabro, Cornelio, 47, 54, 269–70, 422, 467n.77

God in Exile, 43, 394

faith

Aquinas on, 413, 451, 488n.53, 522n.17, 523n.23

in Christianity, 26, 31, 32, 35, 36, 39, 45, 46, 54, 119, 196, 241–42, 244, 245, 248, 251, 320, 353, 356, 358, 399, 465n.44, 488n.53, 523n.23

fideism, 248, 257, 350, 503n.38, 505n.65

Heidegger on, 56

in Islam, 241, 242, 350, 503n.38, 505n.65

in Judaism, 241, 242

Maimonides on, 410

vs. reason, 14–15, 46, 54, 56, 241–42, 245, 248, 358, 419, 420–21, 447–48, 522n.17, 527n.32

family life

and education, 341, 433–34

family ethics, 226, 318, 366–67, 370, 441–42, 445

gender roles in, 367, 505n.69

human need for, 353, 354

Fantoli, Annibale, 521n.7

Fathers of the Church, 3–4, 248, 350, 357, 417

feelings, 307

feminism, 199, 413–14

Feng, Youlan, 483n.103

Fermat, Pierre de: Last Theorem of, 210

Ferrari, Ludovici, 212

Ferrier, J. F.: *Institutes of Metaphysics*, 246

Fichte, Johann, 5, 23, 38, 39, 394

fideism, 248, 257, 350, 503n.38, 505n.65

See also faith

film, 12, 13

final causality

Aquinas on, 101, 322–23, 357, 359, 410–11, 421

Aristotle on, 82–83, 85, 86, 141, 322–25, 326, 343, 368, 403, 404, 406, 415, 425, 457

Bacon on, 323, 511n.2

and coordination of knowledge, 379–81
as correlative to efficient causality, 82–83, 275, 324, 338, 346,
404, 406, 421, 425, 507n.87
and definitions, 282
vs. efficient causality, 275, 286–87, 296, 323–24, 347, 421,
504n.60, 521n.7
and existence of First Cause/God, 101, 410–11, 421
as extrinsic, 82, 282, 325–26, 424–25, 457, 512n.11
vs. formal causality, 82, 198, 275, 282, 296, 323
as intrinsic, 82, 282, 325–26, 512n.11
and natural science, 82, 323–24, 325, 339, 371, 374, 380–81
relationship to goodness, 322–33, 335–36, 416, 497n.12
See *also* teleology

fine arts

Adorno on, 42
aesthetics, 309, 326, 331–32
Aquinas on, 308
Aristotle on, 28–29, 120–21, 239, 304–5, 307–9, 318, 331, 334,
482n.87, 513n.29
in China, 129, 309, 330, 332–33
and contemplation, 238, 307–9, 318, 333–34
creativity of artist, 374, 375, 513n.29
Dewey on, 238
and emotions, 373, 374
Formalism in, 309, 374, 510n.45
goodness, 175
in Greece, 331, 333
in India, 309, 331–32
and Islam, 309, 333
in Japan, 309, 332, 333
in modernity, 13, 240, 334
and mythology, 330–31
Plato on, 309, 331, 482n.89, 513n.29
relationship to essence, 331, 334
representation in, 331, 333–34
and Romanticism, 13, 121, 308–9, 333, 373, 513n.29
truth in, 175, 307, 308, 314, 373–74
unity and plurality in, 175, 231–33

Finnis, John, 360

First Cause

Aquinas on, 47, 63, 93–101, 134, 135, 136, 141–42, 166, 188, 269, 403–30, 405, 471n.27, 522n.12

Aristotle on, 30, 93–101, 122, 135, 136, 141, 152–53, 158, 200, 236, 270, 338, 403–4, 406, 414, 415, 425, 447, 487n.50, 491n.86, 517n.23, 521nn.2, 7

defined, 406, 407

dependence of human soul on, 192, 199

existence of, 67, 93–101, 114, 115, 118–19, 122–23, 132, 133, 134, 135, 141–42, 150–51, 153, 158, 168, 188, 190, 235, 253, 269, 288, 292, 296–97, 319, 335, 339, 385, 393–94, 400, 403–4, 403–6, 407, 410–11, 412–13, 414, 421, 422, 423, 425, 475nn.6, 62, 477nn.24, 25, 26, 486n.86, 487n.50, 491n.79

as goal of Metascience, 139, 142, 143–44, 173, 201, 234, 405–6, 407–9, 484n.14

God as, 63, 96, 99–101, 114, 139, 153, 166, 192, 194, 199, 270, 276, 296, 297, 319, 320, 335, 336, 337, 338, 339, 350, 403–30, 453, 521n.2

identity of essence and existence in, 122–23, 141–42, 152, 267, 275, 406, 407, 408, 409–10, 411, 412, 414, 425, 523n.19

as immaterial, 93–101, 132, 134, 137–39, 141, 150–51, 153, 158, 159–60, 163–69, 190, 253, 269, 288, 292, 296, 319, 335, 385, 400, 403–4, 405, 406, 407, 421

as principle of Being (*ens commune*), 197

pure spirits dependent on, 193, 199

and secondary causes, 114–15, 117, 152, 163, 480n.72

unity of, 175, 178, 188

See also God

First Philosophy

Aquinas on, 46, 47, 50, 54, 91, 147–63, 405, 407–9, 446, 447, 451, 470n.2, 475n.62, 488n.53

Aristotle on, 29–30, 43–44, 120–21, 122–23, 148, 234, 246, 402, 404, 406, 445, 446, 470n.2, 482n.86, 486n.36

Duns Scotus on, 152, 410

relationship to natural science, 117–24, 132, 145, 146–69, 201–2, 220, 296, 403–5, 443, 482n.86

See also Metascience

Fletcher, Joseph: situation ethics of, 352, 358

form

Aquinas on, 96, 112–14, 155, 191

Aristotle on, 74, 82, 96, 101–3, 112, 123, 141, 177–78, 182, 204,

206–7, 214, 217, 290, 323, 406, 422–23, 457, 492n.7
changeable substance composed of matter and, 71–72, 74–75,
76, 85–86, 87–89, 93, 96
vs. matter, 71–72, 74–75, 76, 85–86, 87–89, 93, 96, 101–2, 112–
14, 119, 123, 129, 141, 142, 160, 176, 177–78, 182, 191, 198,
204, 214, 217, 221, 234, 261, 267, 269–70, 290, 292, 310,
311–12, 323, 324, 355, 409, 421–22, 490n.65, 492n.7, 510n.49
relationship to actuality, 71–72, 74–75, 76, 85–86, 93, 96, 141,
182, 267, 269–70, 290, 409
relationship to unity, 176, 177–78, 182
role in intellectual cognition, 61–64, 103–4, 107, 119, 148–49,
250, 292
role in sense cognition, 101–3, 107, 268, 292
soul as, 104, 112–14, 191, 199, 267, 480n.69
formal causality, 267–76, 286
Aquinas on, 101, 112–14, 269, 393–94, 410–11, 421, 422, 423
Aristotle on, 74, 82, 98, 141, 204, 206–7, 323, 406, 422–23, 457
and definitions, 282
vs. efficient causality, 268–69, 296, 297, 323–24, 421, 425
and existence, 268
and existence of First Cause/God, 101, 269, 393–94, 410–11,
421, 422, 423
as extrinsic, 410–11, 422–24, 523n.18
vs. final causality, 82, 198, 275, 282, 296, 323
as intrinsic, 82
vs. material causality, 74, 80, 268–69, 323, 421–22
and mathematics, 204, 206–7, 324, 346–47
and ontological truth, 234–35
and participation, 47, 267–70, 504n.60
relationship to properties, 98
and semiotics, 506n.76, 512n.3
Foucault, Michel, 23, 42
on archaeology of knowledge, 57
on discourse, 16
on power, 16
four scientific questions, 132, 133, 134, 136, 156, 157, 161–62, 283,
385, 405–6, 470nn.1, 3
Aristotle on, 64–72, 76–85, 152–53, 173, 204, 263, 280, 289
Fraenkel, Abraham, 215
Franciscan Order, 31, 87, 134, 190, 249, 342, 350, 408, 416, 516n.17

Frank, William A., 483nn.1, 2
Frankfort school, 42, 306, 510n.38
Franklin, Benjamin, 367
Frawley, David, 460n.20
free events/artifice, 76, 79, 82, 471n.27
free will
 and addictive behavior, 360
 Aquinas on, 76, 203, 359, 415–16
 Aristotle on, 104, 105, 120, 482n.88
 Duns Scotus on, 163, 524n.28
 and evil, 336, 337
 and history, 315, 319
 of human beings, 39, 39–40, 110, 112, 116, 117, 163, 194, 200, 265, 266, 314, 315, 319, 340, 358, 381, 401, 409, 413, 417, 418–19, 429, 442, 491n.86, 524n.28
 and Metascience, 314, 315
 and personhood, 340, 348, 371, 413, 429
 of pure contingent spirits, 194, 330, 348, 366, 409, 413, 418, 491n.86
 See also God, will of
Frege, Gottlob, 121, 526n.17
 Begriffsschrift of 1879, 299
 influence of, 299, 300
Freire, Paulo: *Pedagogy of the Oppressed*, 526n.9
French Revolution, 44
Freud, Sigmund, 42, 124, 237, 254, 309, 324, 434
friendship, 340–41, 360, 362
Fry, Roger, 510n.45
Fuchs, Joseph, 363, 518n.48
fundamentalism, religious, 447

Gadamer, Hans-Georg, 23
Galen, 112, 280
Galileo Galilei, 12, 13, 14, 89, 220, 260, 494n.29
 and mathematics, 33, 219
 telescopic observations of, 75, 86–87, 166
Galois, Evariste, 213
Gandhara style of sculpture, 331
Garrigou-Lagrange, Reginald, 46–47, 48, 51, 53–54, 467n.75
Gautama, 297

Geatch, Peter, 51

Geiger, Louis B., 47, 155, 269–70, 469n.103

Gell-Man, Murray, 272, 274, 485n.18, 510n.48

gender

Aristotle on, 177

and beauty, 328–29

gender roles, 229–30, 341, 367, 413–14, 505n.68

and reproduction, 88, 475n.56

See also sexuality

general systems theory, 179

Genesis, book of, 1:26:, 525n.48

genus, 128, 291, 301

classification and definition by genus and species, 72, 78, 173, 179, 181, 281–82, 285, 286, 298, 310, 410

geometry, 29, 204, 205, 206, 207–10, 218, 219, 271, 302, 435, 509n.33

analytic geometry, 209, 212, 213–14, 285

Euclid, 207–8, 210, 213, 278, 313

first principles in, 207–8, 215, 486n.37

parallel postulate, 207–8, 215

projective geometry, 208–9, 213

and topology, 209, 212, 213

Gerson, Lloyd P., 462n.6

Ghazali, al-: *The Incoherence of the Philosophers*, 248, 501n.17

Ghose, Sri Aurobindo, 430

Gilbert, William, 250

Gilleman, Gérard, 359

Gilson, Étienne, 49–50, 54, 151–53, 220, 361, 468n.89, 474n.54, 485n.31, 486n.41, 487nn.43, 45

Gnosticism, 335, 366, 392, 424

God

beatitude of, 358, 407, 408, 416, 420–21

beauty of, 326, 330

and biodiversity, 326

contemplation of, 194, 196, 197, 308, 420–21

as Creator, 47, 50, 65–66, 88, 96, 114, 127, 128, 137, 142, 166, 194, 197, 199, 200, 232, 233, 241, 244, 248, 269, 270, 273–74, 275, 288, 289, 297, 308, 321, 326, 327, 330, 337, 338, 340, 341–42, 348, 353, 356, 357, 362, 372, 375, 388–89, 390, 393–94, 397, 398, 401, 402, 403–6, 408, 409, 411, 413, 414–15,

416–17, 418–19, 420, 421–30, 445, 449, 450, 463n.19,
468n.88, 480n.72, 487n.50, 491n.79, 495n.44, 519n.5, 521n.2,
523nn.18, 20, 524n.41
essence of, 123, 196, 406–9, 425, 504n.60, 523n.19
as eternal/immutable, 320–21, 407, 408, 412, 419
existence of, 43–44, 63, 65, 95–96, 99–101, 114, 120, 123, 134–
35, 141–42, 249, 267, 269, 273, 289, 335, 337, 351, 390, 393–
94, 394, 399, 403–7, 411, 412–13, 425, 428, 477n.26, 484n.3,
487n.50, 504n.60, 514n.33, 522n.17, 523n.19
as First Cause, 63, 96, 99–101, 114, 139, 153, 166, 192, 194,
199, 270, 276, 296, 297, 319, 320, 335, 336, 337, 338, 339,
350, 403–30, 453, 521n.2
freedom of, 31, 235, 315, 319, 338, 348, 350, 407, 409, 413, 416,
418–19, 420, 425–26, 427, 463n.19, 491n.86
as goal of Metascience, 139, 142, 143–44, 173, 201, 234, 405–6,
407–9, 484n.14
goodness of, 256–57, 326, 334–38, 401, 407, 408, 424, 425,
476n.11, 514n.44
grace of, 17, 150, 242, 244, 245, 350, 353, 356–57, 358, 359–60,
366, 418, 517n.24, 527n.32
human soul dependent on, 192, 199
as infinite, 407, 408, 411, 412, 420
intelligence of, 319, 327, 337, 339, 408, 409, 413, 414, 415, 416,
425
justice and mercy of, 408, 418, 514n.44
knowledge possessed by, 235, 408, 415, 418
life of, 407, 408, 415
love and virtue of, 407, 408, 416–17, 418, 420, 430
love for, 228, 339, 340, 342, 350, 359, 362, 516n.17
as necessary Being, 134, 141–42, 152, 273, 335, 387, 390, 394,
406, 408, 411, 427, 450, 484n.3
omnipotence of, 389, 408, 426, 524n.41
omnipresence of, 407, 408, 411–12
as omniscient, 407, 414
participation in, 50, 139, 269, 270, 340, 348, 354, 356, 357, 397,
409, 422–24, 425, 428, 504n.60, 524n.41
perfection of, 47, 269, 270, 327, 348, 358, 408, 409, 410, 412,
420, 421, 422, 423, 424, 425–26, 428–30, 524n.41
as personal, 397, 409, 412–21
plenitude of, 270, 380, 407, 409–12

power of, 420
as Primal Love, 338, 339, 340, 341–42
and problem of evil, 322, 334–38, 388, 389, 417, 420, 494n.26,
514nn.38, 40
providence of, 196, 315, 319, 320, 408, 419
as Pure Act, 50, 166, 267, 269, 270, 335, 406–7, 409–10, 411,
413, 414, 421–22
revelation from, 13, 14, 46, 53, 57, 59, 196, 241–42, 243, 244,
245, 248, 348, 350, 355, 358, 399, 412–13, 421, 427, 447–48,
495n.44, 522n.17, 527n.32
simplicity of, 178, 191, 407–8, 409–12, 414, 522n.16
as Trinity, 265–66, 348, 356, 358, 397, 410, 413, 426–27, 428,
464n.36, 522nn.16, 17, 523n.23, 524n.44
as Truth, 326, 327, 407, 415
union with, 150, 350, 358, 364, 416, 516n.17
unity of, 306, 326, 348, 407, 408, 409–12, 414, 424, 425, 428,
504n.60, 522n.16
will of, 31, 235, 315, 319, 338, 353, 407, 409, 413, 416, 418–19,
420, 425–26, 427, 463n.19, 473n.45, 491n.86, 514n.44
wisdom of, 337, 348, 353, 354, 425

Gödel, Kurt, 41–42, 110–11, 215, 301, 304

Goldbach, Christian: conjecture of, 210

Goodman, Nelson, 188, 293
Ways of Worldmaking, 509n.24

goodness

Aquinas on, 322–23, 342, 360, 361–62, 366, 518n.43

Aristotle on, 322–23, 342, 366

bonum honestum vs. *bonum utile* vs. *bonum delectabile*, 518n.43

common good, 201, 228, 228–29, 230–31, 340–41, 354, 364, 367,
367–68, 499n.50, 500n.56, 524n.28

in fine arts, 175

of God, 256–57, 326, 334–38, 401, 407, 408, 424, 425, 476n.11,
514n.44

Grisez on, 360–62, 499n.42, 517n.39

hierarchy of goods, 360–62

and interdisciplinarity, 175

material goods, 367, 372

in mathematics, 174–75, 324–25

and multiculturalism, 175

in natural science, 174–75

- Plato on, 24, 25, 134, 175, 264, 270, 342, 349, 392, 422
- private vs. common good, 228, 367–68
- relationship to final causality, 322–33, 335–36, 416, 497n.12
- relationship to ontological truth, 322
- relationship to perfection, 322
- relationship to unity, 322, 325
- spiritual goods, 228–29, 231, 366–67
- substantive vs. reflexive/existential goods, 360–61, 517n.39
- summum bonum*, 380
- in technology, 175
- as transcendental property of Being, 85, 144, 174–75, 322, 326, 379–81, 410–11
- See also virtue
- Gould, Stephen Jay, 273
- Gracia, Jorge, 492n.1
- Grand Unified Theory (GUT), 100, 271–72
- Gredt, Joseph, 78
- Greece
 - education in, 435, 439
 - Hellenistic period, 7
 - historians in, 318, 320
 - natural science in, 11, 12, 14, 125, 239–40
- Greek art, 331, 333
- Greek mathematics, 12, 125, 128, 203–4, 212, 298, 313–14, 497n.7
- Greek mythology, 391, 394
- Greek philosophy, 7, 9
 - atomism, 22, 23, 24, 26, 33, 34, 37, 71, 89, 126, 128, 183, 221, 312
 - four elements in, 129
 - and mathematics, 203
 - and myth, 124, 125, 391, 392
 - reason in, 12, 14, 15
 - Sophism, 24, 26, 42, 246, 247, 255, 262, 352, 437
 - truth in, 203
 - unification of knowledge in, 22–31
 - See also Aristotle; Heraclitus; Neoplatonism; Parmenides; Plato; Pythagoras
- Green, T. H., 251
- Greenburg, Clement, 510n.45
- Greene, Brian, 89, 475n.3, 492n.89

Gregorian University, 48, 363
Gregory of Nyssa, St., 26
Grisez, Germain: on incommensurable goods, 360–62, 499n.42, 517n.39
Guagliardo, Vincent, 52
Guttmann, Julius, 501n.16

Habermas, Jürgen, 42
 on dialogue, 16, 306
 Toward a Rational Society, 526n.9
habit formation, 354
Haldane, John, 51, 485n.29
Hanink, James G., 498n.42
happiness, 320, 358, 371–72, 380, 416–17, 501n.7
 Aquinas on, 353, 354, 356, 361–62, 366, 499n.42, 517nn.24, 31
 Aristotle on, 353–54, 355, 366
 role in ethics, 227–28, 348–49, 350, 353
Häring, Bernard, 358–59
Hart, Kevin, 466n.53
Hartle, James, 168, 492n.89
Hartshorne, Charles, 523n.20
Harvard University, 299
Harvey, William, 12, 112, 250, 259, 503n.45
Hawking, Stephen, 168, 491n.79, 492n.89
health, physical, 360
 human need for, 353, 354
Hegel, G. W. F., 23, 144, 256, 263, 394
 dialectic of, 39, 386, 482n.93
 on history, 38–39, 41, 57, 258, 315
 influence of, 39, 41, 258, 315
Heidegger, Martin, 23, 43, 309, 466n.53, 506n.74, 522n.15
 on Being, 13, 38, 40, 55–56, 57–58, 83, 139
 Being and Time, 55
 on *dasein*, 40, 55, 56, 57–58
 on death of philosophy, 55–56, 248, 254, 258
 on faith, 56
 on fragmentation of knowledge, 459n.6
 on history, 55–56, 57, 320
 influence of, 55, 144, 359
 on metaphysics of presence, 55–57

and National Socialism, 55, 56
on onto-theology, 56, 408–9, 410, 522n.13
on technology, 13, 55, 56
on truth, 55, 56
Wegmarken, 459n.6
What is Metaphysics?, 55
Heisenberg, Werner, 311, 510n.47
hell, 417
Henle, Robert J., 471n.8
Heraclitus, 22, 26, 27, 57, 75, 345
Herbert, Nick: *Quantum Reality*, 311, 510nn.47, 48
hermeneutics, 23, 58, 278, 438–39
Hermeticism, 392
Herodotus, 320
hierarchic systems, 180, 233, 240–41, 325, 330, 335–36
hierarchy of creatures, 200, 269, 270, 330, 336, 371–72, 423
 Aquinas on, 198–99, 428–30
 contingent pure spirits, 88, 116, 119, 195–96, 198, 225–26, 295,
 325–26
Hilbert, David, 215, 217, 301
Hinduism, 198, 257, 460n.26
 the Absolute in, 9, 10, 14–15, 127, 240, 244, 332, 357, 375, 378,
 392, 393, 395–96, 397, 415, 417, 427–28, 429–30
 artha (life of material prosperity) in, 375
 asceticism in, 375, 377, 378
 atman in, 10, 126, 128, 375, 395–96, 398
 avatars in, 377, 397
 bakhti devotions in, 257, 332, 356, 377, 378, 396, 402, 430, 449
 Bhagavad Gita, 331, 377–78, 440
 Brahma in, 395–96, 398, 399
 Cavarka School, 11, 189
 dharma (life of duty) in, 375, 378
 divine creation in, 426
 Enlightenment in, 243–44
 ethics in, 375, 377–78
 kama (life of pleasure) in, 375
 karma in, 417, 450
 Laws of Manu, 375
 and mathematics, 203, 208
 maya/samsara in, 321, 396, 400, 450

meditation in, 9, 14, 127, 243–45, 375, 376, 378, 398, 399, 401
moksha in, 10, 332, 375
as monistic, 9, 10, 244–43, 333, 378, 385–86, 392, 393, 394–96,
397–98, 401–2, 419–20, 449
mukti in, 10
philosophical systems (*darshana*) in, 11, 126–28, 129, 131, 243,
297, 298
reincarnation in, 126–27, 128, 190, 191, 298, 356, 370–71, 375,
377, 396, 398, 417, 450, 494n.26
religious toleration in, 449–50
samadhi in, 243–44
and sexuality, 377
Vedas, 10, 125, 126–27, 128, 242, 297, 375, 377–78, 392, 395–
96, 399, 435, 446, 450
Hispanic Americans, 19
history
certainty and probability in, 316–18, 320–21, 437
vs. ethics, 442
Hegel on, 38–39, 41, 57, 258, 315
Heidegger on, 55–56, 57, 320
historicity of human condition, 257
and human freedom, 315, 319, 419
laws of, 57, 310, 315, 319–20, 419–20
and Metascience, 318, 319, 321
in monism vs. monotheism, 419–20
vs. poetry, 482n.87
relationship to ethics, 318, 320
study of, 436–37
truth in, 315–21, 436–37
Hobbes, Thomas, 23, 34, 189, 231
Höffe, Otfried, 465n.44
Holy Spirit, 397
Homer, 5–6, 22, 24, 331, 435
hope, 353, 358
Horace: *Ars Poetica*, 308
Hoyle, Fred, 93, 167
Hsün Tzu, 129, 379
Hubble expansion, 84, 167
human body, 225
beauty of, 328–29

- relationship to human soul, 104, 112–14, 185, 190, 191, 199, 267, 355–56, 429, 480n.69, 525n.58
- human community, 339–41
 - human needs for, 353, 354
- human nature
 - Aquinas on, 357–58, 362, 366, 499n.42
 - in Confucianism, 379
 - humans as image of God, 340
 - innate needs, 226, 314, 320
 - and marriage, 341
 - relationship to ethics, 120, 314, 361, 370, 445, 499n.42, 501n.7
- human needs, 370, 380
 - Aquinas on, 353–56
 - for community, 353, 354
 - for health, 353, 354
 - innate needs, 226, 314, 320
 - for property, 353–54, 368, 445
- human person, 112–14, 197
- human rights, 369, 371–72
- Hume, David, 23, 34, 38, 253
 - on analytic principles, 289, 293
 - on causality, 81, 89, 163, 316–17, 465n.39
 - on history, 316–17
 - influence of, 41, 249, 251, 304
 - on miracles, 316–17
 - on self-consciousness, 110
 - skepticism of, 35, 36, 37, 248, 491n.82, 511n.53
- hunting and gathering, 7
- Husserl, Edmund, 23, 40, 51, 55, 109, 188, 263, 267, 290, 506n.74, 526n.17
- Hutchins, Robert Maynard: *The Higher Learning in America*, 5
- Hyman, Arthur, 462n.7, 501n.16
- hypothetico-deductive method, 463n.30, 505n.62, 506n.71

- Ibn Rushd. See Averroes
- Ibn Sina. See Avicenna
- iconoclasm, 333
- Idealism, 23, 44, 52, 55, 119, 144–45, 264–65, 291, 400, 424, 440
 - of Berkeley, 35, 139, 144, 485n.17
 - German Idealism, 38–39, 251, 252, 394

and skepticism, 247–49
Transcendental Idealism, 37–38, 164–65
See *also* Descartes, René; Hegel, G. W. F.

identity and diversity, 108, 176–77, 457

imagination, 103, 113, 202, 205–6, 257, 261, 477n.34

immaterial being, 455, 490n.65, 493n.17
Aquinas on, 87, 137–39, 141, 145, 149, 157, 159–60, 163–64, 192–93, 405, 406, 475n.62
Aristotle on, 43–44, 141, 153, 159, 190, 275, 453, 455, 479n.46, 481n.73
essences of, 133, 138, 153, 163, 175, 270
existence of, 43–44, 50, 53, 65, 93–124, 132, 136, 137, 138, 141, 144–45, 148, 149, 150–51, 153, 157–60, 161, 163–64, 168, 173, 190, 192–93, 197, 199, 253, 264–65, 267, 269, 275, 288, 292, 296, 311, 319, 320, 326, 335, 385, 400, 401, 403–6, 421, 453, 475n.62, 481nn.73, 74, 77, 486n.37, 488n.51, 522n.8
intelligence as, 91, 101–14, 115, 122, 158, 163, 188–92, 197, 225, 235, 244, 257, 266, 267, 292–93, 296, 355, 479n.46
and natural science, 50, 53, 91, 93–101, 120, 122–24, 163–69
See *also* First Cause; God; pure contingent spirits; soul

impetus, 99

impossible: as transcendental term, 174

impressionism, 334, 373

India
aesthetics in, 331–32
Aryans in, 10
Buddhism in, 9, 10, 11, 14, 240
caste system in, 10, 11, 131, 375, 444
vs. China, 7–8, 11, 124, 125–31, 240–41, 436–37
education in, 20
fine arts and literature in, 309, 331–32
Jainism in, 10–11, 125–26
logic in, 11, 297–98
mathematics in, 313–14
musical theory in, 331
Parsis in, 10
tolerance in, 16
See *also* Hinduism

indigenous peoples, 15, 19–20

individualism, 228, 318, 439

individuation, 72, 87–89, 182, 187–88, 191–92, 293
Indo-European languages, 10
induction, 505n.62, 508n.18
 Bacon on, 34, 259, 290, 463n.30
 vs. deduction, 33, 34, 463n.30
infinite divisibility, 214, 221–22
infinite regress
 of efficient causes, 97, 163, 253, 263, 288
 of intertextuality, 16
 of probabilities, 253, 263
infinite sets, 214–15, 301, 303
infinity of universes, 90, 419n.4
information explosion, 3–4
information theory, 271, 506n.79
integral calculus, 213
intelligence, animal, 505n.67
intelligence, human, 245, 256, 319, 338, 414, 415
 and actuality, 61–64, 70, 148–49, 503n.49, 505n.67
 agent/abstractive intellect (*intellectus agens*), 103–4, 478nn.34, 35
 Aquinas on, 48, 62, 63, 103–4, 107–14, 116–17, 119, 147, 154–
 55, 244, 261, 266, 295, 355, 418, 419, 434, 470n.3, 478nn.34,
 35, 479n.46
 Aristotle on, 37, 101–14, 139–40, 159, 192, 251, 257, 290–91,
 301, 349, 355, 479n.46, 480nn.60, 66, 67, 482n.88, 508n.18,
 521n.2
 and beauty, 328, 342
 and the brain, 74, 104, 105, 107, 108, 110, 111–13, 118, 124, 200,
 205, 225, 229, 230, 265, 273, 275, 400, 480n.60
 as disembodied, 114–19
 God as cause of, 339, 348, 409, 425, 429
 and the heart, 111–12, 480n.60
 as immaterial, 91, 101–14, 115, 122, 158, 163, 188–92, 197, 225,
 235, 244, 257, 266, 267, 292–93, 296, 355, 479n.46
 as intuitive, 48, 244, 290–91, 295, 301, 508n.18
 material object of, 61–64, 148–49, 244, 266
 and personhood, 340, 348, 371, 413, 429
 possible intellect (*intellectus possibilis*), 103–4, 478nn.34, 35
 as prime mover, 101–14, 115, 117, 118, 119, 478n.35
 relationship to sense experience, 48, 103, 113, 250, 251, 260–61,
 276

relationship to truth, 150, 275–76
role of form in intellectual cognition, 61–64, 103–4, 107, 119, 148–49, 250, 292
and *species expressa*, 103, 477n.33, 478nn.35, 39, 503n.49
and *species impressa*, 103, 477n.33, 478nn.35, 39, 503n.49
See also abstraction; reason

intelligent design theory, 273–74

intentionality of consciousness, 40, 526n.17

intentions of agents, 359, 363–66

interculturality, 36, 55, 145, 305, 306, 370–71, 433
and beauty, 330–34
and common ground, 17, 264, 448
conditions of effective dialogue, 15–19, 263–64
and contextuality of truth, 4–5, 318
and ethics, 375–81
and goodness, 175
and grace, 356–57
and hermeneutics, 438
and history, 318, 321
and language, 15–16, 239, 262
and mathematics, 218
models of dialogue, 19
regarding monism and monotheism, 399–402
regarding nature, 124–31
and public consensus theory of truth, 42–43
relationship to Metascience, 442, 447, 448
role of myths in, 125
See also monism; monotheism; multiculturalism

interdisciplinarity, 5, 21, 61, 145, 263–64
and Aristotle, 28–30, 58–59, 64
defined, 4
and goodness, 175
and history, 321
and language, 262
and natural science, 400
and public consensus theory of truth, 42–43
relationship to Metascience, 433, 442
and Snow's *The Two Cultures*, 20, 59
and truth, 15, 175, 234, 239–41, 255, 277
and unity and plurality, 175, 232–33

internal sensation, 127, 190
vs. external sensation, 202, 205–6, 225, 261, 302, 307, 328

Internet, 12

intertextuality, 16

intuition, 244–45, 290–91

Iran, 15
Aryans in, 10
Magi in, 7, 10

Iraq, 15

Isayeva, Natalia, 520n.20

Islam
and Christianity, 8, 9, 333, 370, 462n.7
faith in, 241, 242, 350, 503n.38, 505n.65
and fine arts, 309, 333
and history, 420
Mohammad, 399, 420
monotheism of, 9, 385, 390, 397, 398, 399, 402, 403, 413, 414,
426, 443, 449
mystical experience in, 449
in Persia, 333
the Qur'an, 14, 189, 242, 243, 248, 420, 446
resurrection in, 189, 191, 355
revelation in, 241, 241–42, 248, 348, 399, 421
and Secular Humanism, 15

Islamic thought, 12, 14, 462n.7, 475n.5, 494n.23, 501n.17
and fideism, 350, 503n.38, 505n.65
mathematics in, 203, 208, 314
See also Averroes; Avicenna; Ghazali, al-

Jaeger, Werner, 472n.30

Jaimini, 297

Jainism, 10–11, 125–26, 128, 377

Jaki, Stanley L., 498n.34

James, Henry, 197

James, William
pluralism of, 197
The Varieties of Religious Experience, 41, 197

Japan, 7, 128–29, 371
Buddhism in, 11, 130, 333, 395, 397
calligraphy in, 333

- fine arts in, 309, 332, 333
- mathematics in, 203
- monism in, 397
- No drama in, 333
- Shintoism in, 391, 397
- Taoism in, 9
- tea ceremony in, 333

Jeans, Sir James, 86, 474n.50

Jesuit Order, 48, 49, 350

Jesus Christ, 16, 76, 189, 286, 399, 501n.15

- as carpenter, 369, 444
- compassion for sinners, 376
- crucifixion, 319–20
- humanity of, 397
- as Incarnation, 191, 241, 319–20, 333, 387, 397, 420, 426–27
- resurrection of, 319–20
- as Savior, 464n.36
- Sermon on the Mount, 348
- on spirit vs. letter of the law, 353
- temptation by Satan, 518n.49

Job, book of, 334, 336–37, 518n.49

John, Gospel of 20:25, 65

- use of “Word” (*Logos*) in, 524n.44

John of Mirecourt, 31, 32

John of St. Thomas. See Poinsot, John

John of the Cross, St., 449, 520n.27

John Paul II

- on biological evolution, 495n.44
- on demonic possession and mental illness, 502n.32
- on family ethics, 366–67
- Fides et Ratio*, 45, 46, 54, 60, 144, 242, 463n.29, 502n.18
- on marriage, 366–67
- On Work (Laborem Exercens)*, 444
- and personalism, 265, 267, 506nn.72, 75
- and Phenomenological Thomism, 51, 263
- on philosophy, 463n.29
- on reason, 45, 46, 60, 242, 463n.29
- Veritatis Splendor*, 362–63, 518n.46

John Philoponus, 99

Johnson, Mark F., 468n.88

Jordan, Mark, 469n.103

Joyce, James

Finnegan's Wake, 232

Ulysses, 232

Judaism, 10, 15, 191, 370, 501n.16

faith in, 241, 242

Hebrew Scriptures, 9, 14, 125, 189, 242, 326, 331, 347, 349, 350, 352, 378, 390–91

and history, 420

iconoclasm in, 333, 513n.25

the law in, 347, 350, 353

marriage in, 377

monotheism of, 9, 385, 390–91, 397, 398, 399, 402, 403, 413, 414, 426, 443, 449

mystical experience in, 248, 394, 449

revelation in, 241, 241–42, 248, 348, 349, 399, 421

sacrifice in, 375

judgment, 288–89, 295

Jung, Karl Gustav, 88, 124

justice, 226–27, 337, 354–55, 360, 362, 499n.48

Kabbalah, 248, 394, 503n.41

Kalisasha: *Shakuntala and the Love Token*, 332

Kananda, 127

Kant, Immanuel, 23, 159, 465n.42, 512n.19, 524n.28

on analytic statements, 252, 262, 293

on *a priori* knowledge, 36–37, 38, 145, 165, 217, 237, 258, 262, 289, 293, 351, 472n.29, 473n.37

vs. Aquinas, 48, 58–59, 369, 472n.29, 484n.7

vs. Aristotle, 36, 37, 78, 472nn.28, 29

on autonomy, 351

on the categorical imperative, 351

on categories, 37–38, 78, 165, 185, 217, 299, 323, 472n.28, 473n.37

on Christian faith, 36, 465n.44

The Conflict of the Faculties, 5

on cosmological argument, 99–100

Critique of Judgment, 512n.4, 513n.20

Critique of Practical Reason, 465n.46

Critique of Pure Reason, 472n.28, 479n.55, 484n.4, 493n.17

on *Dingen an sich* ("things in themselves"), 38, 76, 311, 472n.28
on ethics, 36, 37, 38, 301, 351, 380
on final causality, 323
on God, 37–38, 59, 99, 120, 135, 164–65, 351, 484n.5
on immortal soul, 38, 59
influence of, 23, 41, 44, 58–59, 251, 265, 352, 359
on mathematics, 217, 301
on metaphysics, 36–38, 48, 59, 144, 395
on moral freedom, 38, 120
on morality, 38, 120, 465nn.44, 46
on natural science, 36, 38, 89
and Newton, 36, 37, 38
on ontological proof, 99, 135, 164–65
on physico-theological proof, 99
on place, 37
on politics, 36, 37
on reason, 38, 351, 466n.47
Religion Within the Limits of Reason Alone, 36
vs. Rousseau, 351, 517n.19
on self-consciousness, 109, 110, 479n.55
on sense experience, 37, 48, 59, 165, 185, 186, 258, 472nn.28,
29, 473n.37
on space, 217, 258, 472n.28
on substance, 185, 479n.55, 493n.17
on synthetic *a posteriori* truths, 262
on synthetic *a priori* truths, 36–38, 165, 217, 262, 289, 491n.82
on time, 37, 258, 301–2, 472n.28, 493n.17
on unity of apperception, 37
on the will, 39

Kapila, 127

karma, 10, 126, 417, 450

Kauffman, Stuart, 274

on self-organization, 338–39

Keats: *Ode on a Grecian Urn*, 327

Keller, Helen, 65

Kenny, Anthony, 51, 482n.88

Kepler, Johannes, 203, 208

Kierkegaard, Soren, 23, 39

Klein, Julie Thompson, 459n.3

Klubertanz, George, 153, 484n.6, 488n.51

- Knasas, John F. X., 158–60, 161, 404, 485n.31, 488n.64, 490nn.65, 68
- Knauer, Peter, 518n.48
- knowledge
- a posteriori* knowledge, 28, 33, 123, 289, 475n.6, 484n.3
 - a priori* knowledge, 28, 33–34, 36–38, 48, 145, 159, 165, 203–4, 217, 256, 258, 263, 264, 280, 289, 294, 351, 472n.29, 473n.37, 484n.3, 491n.82
 - cenoscopic vs. ideoscopic, 86–87, 111, 163, 181, 260, 315, 440, 448, 474n.49, 476n.17
 - as connatural, 153, 261, 275–76
 - fragmentation of, 3–4, 15, 20, 342, 379–81, 433, 459n.6
 - information explosion, 3–4
 - of self, 235–36, 244, 265, 266, 292–93
 - unified by coordinating autonomous disciplines, 27–31, 45–46
 - unified by one material principle, 22, 23, 24, 25–26, 27
 - unified by one spiritual principle, 23, 24, 25–26, 27
- See also epistemology; natural science; science; truth
- Korea, 7, 128, 333, 395
- Krapiec, Mieczyslaw A., 506n.72
- Krause, Karl C. F., 389
- Kretzman, Norman, 409, 520n.11
- Kuhn, Thomas, 42
- Structure of Scientific Revolutions*, 475n.58
- Kull, Kalevi, 505n.64
- Kumudamani, K., 460n.28
- Küng, Hans, 460n.18
- Kuppuram, G., 460n.28
- Kurosawa, Akira: *Rashamon*, 232
- La Barre, Weston, 391
- labor, manual, 369–70, 444
- Lacan, Jacques, 42
- Lamarck, J. B., 344
- language, 106–7
- Aristotle on, 105–6, 436
 - Chomsky on, 15–16
 - grammar, 435, 436
 - Indo-European languages, 10, 460n.20
 - and interculturality, 15–16, 239, 262

- and interdisciplinarity, 262
- learning of, 434
- Maritain on, 106
- of natural science, 254
- Sapir-Whorf Hypothesis, 15–16
- Sebeok on, 478n.37
- and translation, 15–16, 461n.39
- and truth, 284
- See also Analytic Philosophy
- Lao-Tzu, 129, 144
 - See also Taoism
- Laval University, 469n.103, 481n.74
- law, 347–48, 352
 - lawyers, 443, 444
 - and probabilism, 350–51
 - and virtue of *epicheia*, 358–59
- leadership, 307
- Leed, James R., 461n.37
- Legalist School, 11, 129, 379
- Legal Positivism, 347–48
- Leibniz, G. W., 23, 208, 299, 351, 479n.51, 491n.82
 - and calculus, 212–13
 - on God as necessary Being, 484n.3
 - influence of, 36, 41, 45, 48, 78, 388
 - on mathematical propositions, 217, 218
 - on possible being, 36, 66, 134, 140, 426, 476n.11
 - on principles of the sciences, 33–34, 36
- Lenin, V. I., 258
- Leo XIII, 53, 352
 - Aeterni Patris*, 44–45
 - and twenty-four theses, 47
- Leucippus, 22, 24
- Levi-Strauss, Claude, 43
- liberation theology, 120
- Life Philosophy, 23, 39–40
- Lincoln, Abraham
 - assassination of, 320
 - Gettysburg Address, 286
- Lindley, David, 491n.79, 492n.89
- literacy, 435

Little, A., 47

liturgy, 308

Liu Hsieh: *The Literary Mind and the Carving of the Dragon*, 332

Lloyd, G. E. R., 460n.28

Lobachevski, Nicholas, 208

Locke, John, 23, 259

on abstraction, 260, 479n.49

on certainty, 250–51, 260

on Christianity, 35, 464n.36

on ideas, 34, 35, 108, 185, 250–51, 260, 464nn.33, 34, 479n.49, 493n.15

on the self, 110

on sense experience, 185, 186, 250–51, 479n.49, 493n.15

on substance, 185, 464n.36, 493n.15

on truth, 250–51

logic

Aquinas on, 47, 121–22, 188, 295, 299, 507n.1

Aristotle on, 28, 29, 121–22, 140, 176, 277–97, 298, 299, 303, 436, 437, 507n.1

Cajetan on, 47, 121, 138

certainty in, 294

in China, 11, 130, 298

deduction vs. induction, 33, 34, 463n.30

formal logic vs. material logic, 277–78, 299, 507n.1

in India, 11, 297–98

informal logic, 277, 304–9

and mathematics, 41–42, 110, 121–22, 217, 262, 299–304

Mill on, 293

and mind-dependent beings (*entia rationis*), 277–78, 291–92, 294, 300

objects of, 232

and opposition between terms, 176–77

Peirce on, 482n.93

Plotinus on, 30–31

and principle of non-contradiction, 280, 291, 295–96

propositional logic, 299, 303

relationship to Metascience, 277, 278, 291–96, 306, 385

relationship to natural science, 295–96

relationship to psychology, 291, 295

relationship to sense perception, 261, 295, 437

relationship to set theory, 216
rule of excluded middle, 302
and semiotics, 482n.93
symbolic logic, 299–304, 437
truth in, 234–36, 245, 246, 278, 281, 289, 295, 307, 315, 327
unity and plurality in, 232

Logical Positivism, 41–42, 58, 110, 122, 145, 252, 254, 262, 304

Logicism, 300–301

Lonergan, Bernard, 48, 54
Method in Theology, 501n.4
Lotus Sutra, 130

love, 338–42
as *agape/caritas*, 34, 353, 358
as analogous term, 338
erotic love, 229–30, 340
for God, 228, 250, 339, 340, 342, 359, 516n.17
God as Primal Love, 338, 339, 340, 341–42
God's love and virtue, 407, 408, 416–17, 418, 420, 430
vs. knowledge, 516n.17
of neighbor, 228, 340, 359
relationship to efficient causality, 338
of truth, 339

Lubac, Henri de, 357, 499n.42
on Buddhism, 520n.18
Surnaturel, 515n.52, 517n.27

Luc Chi: *The Art of Letters*, 332

Luke, Gospel of, 2:13, 192

Lull, Ramon, 299

Luther, Martin, 32, 351, 463n.21, 515n.50
The Bondage of the Will, 418

Lytard, Jean-François, 42 2

2 Maccabees, 390

Magee, Brian, 520n.19

Mahabharata, 331, 377–78

Mahavira, 10–11

Mahdva, 396, 397

Maimonides, 410

Malebranche, Nicholas, 480n.72

Manicheanism, 335, 340, 366, 424

- Maréchal, Joseph, 256
Le point de départ de la métaphysique, 48
- Marion, Jean-Luc, 522n.13
- Maritain, Jacques, 49, 50, 51, 52, 257, 405, 468n.89, 484n.5, 485n.31, 499n.50, 505n.61, 506n.81, 515n.51
on Aquinas and angels, 495n.32
on common good, 228
on connatural knowledge, 153
on Descartes, 414
on language, 106
on meditation, 244–45
on mysticism, 244–45, 502n.25
on natural philosophy, 220
on natural science, 54, 220
The Sin of the Angel, 514n.42
- Mark, Gospel of: 8:24, 76
- marriage, 340–41, 360, 366–67, 377, 505n.68, 515nn.50, 51, 525n.47
- Marx, Karl, 23, 39, 189, 380, 444, 519n.4
historical materialism of, 41, 258, 315, 386
on theory and practice, 237, 238
- Marxism, 43, 55, 120, 144, 309, 400, 510n.38
in China, 9, 15, 31
Communism, 15, 39, 521n.1
as Left Wing Hegelianism, 258
in Russia, 9
theory of ideology, 254
- material causality, 198, 275, 286, 393, 427
Aristotle on, 74, 82, 86, 141, 204, 206–7, 323, 324, 457
and definitions, 282
vs. formal causality, 74, 80, 268–69, 323, 421–22
and mathematics, 204, 206–7, 324, 346
See also matter
- materialism, 34, 51, 131, 146, 159, 164, 169, 232, 233, 400, 402, 441, 448, 462n.6
historical materialism, 41, 258, 315, 386
of Stoicism, 23, 26, 31, 144, 396, 400, 422, 462n.6
See also atomism, ancient; Marxism
- mathematics
abstraction in, 108, 138, 155–56, 202, 204–5, 206–7, 218, 219,

256, 271, 294, 300, 302, 312, 324–25, 346
algebra, 203, 209–12, 213, 214, 314
a posteriori establishment of axioms in, 28
Aquinas on, 47, 147, 154–55, 158, 187, 201, 202, 405, 486n.37
Aristotle on, 27, 28–29, 64, 106, 121, 138, 187, 203–4, 205, 206–
7, 210, 211, 214, 217, 239, 278, 280, 292, 294, 296, 300, 301,
302, 305, 479n.46, 486n.37, 509nn.25, 33
arithmetic, 29, 61, 64, 204, 207, 209, 210–13, 211, 218, 219, 261,
271, 285, 302, 313, 435, 509n.33
axioms in, 24–25, 28, 64, 90, 110–11, 156, 207–8, 299, 301, 304
beauty in, 347, 497n.12
and Being, 201–2
in biology, 226
calculus, 212–13
category theory, 215–16, 299–300
certainty in, 216–18, 294, 313
in China, 203, 208
construction in, 204–5, 205–6, 207, 211, 215, 301–2
definitions in, 214
Descartes on, 33, 34, 109–10, 208, 209, 212, 217, 218
education in, 438
and formal causality, 204, 206–7, 324, 346–47
Formalism regarding, 301, 302, 313
formal object of, 62
geometry, 29, 204, 205, 206, 207–10, 212, 213, 213–14, 215, 218,
219, 271, 278, 285, 302, 313, 435, 486n.37, 509n.33
Gödel on, 41–42, 110–11, 215, 301, 304
goodness in, 174–75, 324–25
Greek development of, 12, 125, 128, 203–4, 212, 298, 313–14,
497n.7
group theory, 213
and Hinduism, 203, 208
and interculturality, 218
Intuitionism/Constructivism regarding, 301–2, 313
Leibnitz on, 217, 218
and logic, 41–42, 110, 121–22, 217, 262, 299–304
Logicism regarding, 300–301, 302
and material causality, 204, 206–7, 324, 346
mathematical symbolism, 218
in modern period, 205–18, 299

and natural science, 9, 12, 33, 59, 62, 121, 164, 201–2, 210, 218–26, 271, 312, 313, 323, 347, 373, 438, 440
objects of, 155–56, 201–2, 204–5, 206–7, 213, 215, 218, 233, 282, 300–301, 324–25
Plato on, 24–25, 27, 106, 121, 164, 203–4, 217, 218, 247, 256, 300, 302, 312, 313, 393, 423, 479n.45, 497n.9
Pythagoras on, 25, 106, 203, 218, 292, 298, 313, 440
and quality, 205, 207
and quantity, 62, 79, 121, 143, 155–56, 158, 202, 203–4, 205–6, 207, 209–10, 214, 215, 216, 217, 218, 221, 271, 294, 296, 300, 302, 313, 346–47
relationship to Metascience, 201–18, 302, 385
relationship to sense experience, 202, 203–4, 216, 218–19, 256, 261, 300, 302
role of imagination in, 202, 205–6
set theory, 214–16, 299–301
and teleology, 324–25, 346–47
truth in, 174–75, 203, 205, 216–18, 327, 373
unity and plurality in, 174–75, 201–18, 210, 216, 301
and universals, 186–88
univocal terms in, 135, 214, 302–3
See also physics, mathematical

matter

Aquinas on, 96, 112–14, 155, 191
Aristotle on, 71, 74, 82, 86, 96, 141, 142, 182, 204, 206–7, 214, 217, 290, 323, 324, 393, 457, 492n.7
Duns Scotus on, 142
vs. form, 71–72, 74–75, 76, 85–86, 87–89, 93, 96, 101–2, 112–14, 119, 123, 129, 141, 142, 160, 176, 177–78, 182, 191, 198, 204, 214, 217, 221, 234, 261, 267, 269–70, 290, 292, 310, 311–12, 323, 324, 355, 409, 421–22, 490n.65, 492n.7, 510n.49
in Neoplatonism, 325, 393, 512n.10
Plato on, 115, 268, 325, 393
prime matter, 71, 88, 142, 325, 421, 515n.4
relationship to potentiality, 71–72, 74–75, 76, 85–86, 88, 93, 96, 141, 142, 182, 267, 269–70, 290, 325, 409, 421, 515n.4
See also material causality; materialism

Matthew, Gospel of, 4:1–11:, 518n.49

Maurer, Armand, 463n.19

mayasamsara, 321, 396, 400, 450

Mayr, Ernst, 515n.1
Mazdaism. See Zoroaster
McCool, Gerald, 467n.66
McCormick, Richard, 363
McDonald, J. Ian H.
 on New Testament, 469n.1
 on pluralism, 4
 on worldviews, 3
McInerny, Ralph, 135, 284, 461n.39, 469n.103, 484n.6, 487n.43, 490n.71, 508n.7
McLachlan, Herbert, 464n.36
McNeill, William H.
 on ecumenes, 6–7
 The Rise of the West, 6–7
meaning in life: desire for, 5–6
medical science, 231–32, 325
Medieval Institute, Toronto, 53
meditation, 424, 451
 in Buddhism, 14, 20, 30, 376, 377, 395, 397, 399
 in Hinduism, 9, 14, 127, 243–45, 375, 376, 378, 393, 398, 399, 401
 Maritain on, 244–45
 in *Yoga*, 127, 243–45, 298, 332
Meinhardt, Jack, 521n.1
Melanesia: *mana* in, 391
memory, 103, 113, 261, 315–16, 477n.33
Mencius, 129, 379
Mercier, Joseph Désiré, Cardinal, 48
Merton, Robert K., 461n.32
Mesopotamia, 7, 22
 agriculture in, 8
metaphors, 284, 285–86, 287, 288, 451
metaphysics. See First Philosophy; Metascience; Thomist metaphysics
Metascience, 60, 132–69
 education in, 442, 445, 446
 and ethics, 363–66, 370
 God as goal of, 139, 142, 143–44, 173, 201, 234, 405–6, 407–9, 484n.14
 and history, 318, 319, 321

- and human freedom, 314, 315
- and interreligious dialogue, 406–7, 449–51
- and mystical experience, 243
- and personalism, 265–67
- relationship to interculturality, 442, 447, 448
- relationship to interdisciplinarity, 433, 442
- relationship to logic, 277, 278, 291–96, 306, 385
- relationship to mathematics, 201–18, 302, 385
- relationship to natural science, 120–24, 132, 145, 146–69, 201–2, 220, 240, 296, 385, 402, 403–5, 443, 448, 451, 481n.73, 482n.86
- subject and validity of, 43–44, 46, 47, 50, 53, 54, 93–101, 122–24, 132–69, 173–74, 178, 190, 234, 246, 284, 292, 294, 335, 385, 403–4, 405–6, 407–9, 410, 428, 481n.73, 486n.37, 488n.51

Mexico, 203

- Aztecs, 8, 331
- Classic period in, 8
- Mayas, 8, 331

Michelson-Morley experiments, 166, 183, 224

Miles, Margaret R., 497n.9

Mill, John Stuart, 251, 293

Milton, John: on Lucifer, 330

Mimamsa, 126–27, 297

mind-matter dualism, 131, 164

- of Descartes, 33, 58, 59, 258, 394

miracles, 316–17

modernity

- and ancient cultures, 9
- fine arts in, 13, 240, 334, 373–74
- Secular Humanism in, 13–15, 239–40, 446–47
- See also postmodernism

Mohammad, 399, 420

Mohist School, 11, 129, 298, 379

moksha (emancipation), 10, 332, 375

Molina, Luis de: on *scientia media*, 418–19

monarchy, 229

Mongols, 8

monism, 188, 270, 385–402

- and the Absolute, 385, 397–98, 400, 402, 421–22, 449
- in Buddhism, 9, 244, 401–2, 449

in China, 333, 385–86, 396, 401–2
critique of, 397–402
and evil, 335
in Hinduism, 9, 10, 244–43, 333, 378, 385–86, 392, 393, 394–96,
397–98, 401–2, 419–20, 449
in Japan, 397
materialistic monism, 386–87, 394, 400, 402
vs. monotheism, 9, 197, 244–45, 333, 370–71, 377, 385–86, 390,
393–94, 396, 397–402, 406–7, 409, 411, 413–14, 415, 417,
419–20, 421–22, 424, 427–28, 429–30, 443, 448, 449–51,
519n.1, 521n.1
in Neoplatonism, 189, 392–93, 394
process philosophy monism, 387–89
relationship to mythical religions, 386, 389, 391
relationship to polytheism, 385
of Spinoza, 23, 33, 82
spiritual monism, 389–94, 399, 422, 424, 443, 448, 520n.17
in traditional religions, 385, 389–92, 402
and worldviews, 233, 333, 389–90
monotheism, 101, 241–42, 248, 320–21, 380, 412–14
in Christianity, 9, 385, 390, 392, 398–99, 402, 403, 413, 414, 426–
27, 443, 449
in Islam, 9, 385, 390, 397, 398, 399, 402, 403, 413, 414, 426, 443,
449
in Judaism, 9, 385, 390–91, 397, 398, 399, 402, 403, 413, 414,
426, 443, 449
vs. monism, 9, 197, 244–45, 333, 370–71, 377, 385–86, 390,
393–94, 396, 397–402, 406–7, 409, 411, 413–14, 415, 417,
419–20, 421–22, 424, 427–28, 429–30, 443, 448, 449–51,
519n.1, 521n.1
Montagnes, Bernard, 508n.7
Montaigne, Michel de, 32
Moore, Charles E., 460n.26
Moore, G. E., 251, 352, 501n.7
moral relativism, 9, 24, 43, 51, 352, 441, 514n.39
moral responsibility, 248, 319, 450
Moreno, Antonio, 469n.102
Moses, 399
motion
and existence of First Cause/God, 93–101, 122–23, 135, 153,

158, 269, 393–94, 403–4, 406, 421, 425, 475n.6, 477nn.24, 25,
26, 487n.50

projectile motion, 99
and time, 84, 168, 412

Mo Tzu, 129, 144, 298, 379

Mounier, Immanuel, 499n.50

mukti, 10

multiculturalism

and cultural relativism, 16–19

and goodness, 175

and Human Wisdom, 18, 446–47

models of multicultural dialogue, 19, 447

in modern universities, 4–5, 19–21, 61, 232–2, 442–43

and spiritual beings, 197

and truth, 175, 234, 239–41, 255

and unity and plurality, 175, 232–33

See *also* interculturality

music, 331, 374

Mycenean cultures, 22

mystical experience, 23, 387, 399, 447–48, 502n.23

Aquinas on, 502n.29

in Christianity, 31, 248, 380, 398, 449, 502n.20, 520n.27

in Hinduism, 9, 26, 331–32, 435

in Islam, 449

in Judaism, 248, 394, 449

in Neoplatonism, 26, 31, 248, 257

Shankara on, 395–96

and truth, 242–45

myth, 242, 436

in cosmology, 124–25

defined, 9

of Eternal Return, 40

in Greece, 391, 394

worldviews based on, 124–25, 330–31, 386, 389–90, 397

Nagarjuna, 377

Nakamura, Hajime: *Ways of Thinking of Eastern Peoples*, 240–41

National Socialism, 15, 55, 56, 369

Native Americans, 4–5, 19, 125, 294, 391, 438

naturalism, 253, 311, 443

natural observation/cenoscopic knowledge, 86–87, 111, 163, 181, 260, 315, 440, 448
Deely on, 474n.49, 476n.17, 527n.32
natural science, 9, 44, 49, 282, 487n.50
action and reception in, 81–82
analogical arguments in, 288
Aquinas on, 47, 50, 53, 90, 91, 94–96, 145, 146–64, 187, 201, 202, 220, 255, 263, 293, 404, 405, 423, 448, 471n.27, 475n.62
Aristotle on, 27, 28–28, 57, 78, 90–91, 96, 101, 111, 120–21, 140, 141, 145, 148, 159, 160, 165, 179, 204, 239, 255, 259, 263, 264, 280, 290–91, 292, 293, 294, 295–96, 298, 299, 305, 309–11, 323–24, 333, 370, 404, 448, 470n.1, 473n.46, 475n.6, 481n.74, 486n.36, 491n.82, 498n.34
and Buddhism, 126
and certainty, 42, 53, 85, 118–19, 134, 165, 201, 294, 373, 405, 481n.74, 491n.83
changeable being (*ens mobile*) as subject of, 70–72, 73–75, 76, 85, 91, 96, 97, 119, 122, 135, 141, 143, 147, 150–51, 155–57, 313, 323, 406, 440, 448
Comte on, 35
Descartes on, 32, 33, 34, 145
dianoetic vs. perinoetic natural philosophy, 220
education in, 438, 439, 441
efficient causality in, 82, 347, 381
and the Enlightenment, 13, 32, 120, 333, 373, 402
expansion of, 12–15, 16, 53
experimentation in, 13, 86–87, 163, 181, 250, 315
and final causality, 82, 323–24, 325, 339, 371, 374, 380–81
first principles of, 12, 63, 72–75, 148, 149–50, 165, 240, 259, 319, 361, 401
formal causality in, 271–72, 323
formal object of, 62
fundamental theorem of, 74–75
goodness in, 174–75
in Greece, 11, 12, 14, 125, 239–40
hierarchic systems in, 180
and human nature, 370
and immaterial being, 50, 53, 91, 93–101, 120, 122–24, 163–69
Kant on, 36, 38, 89
language of, 42

Leibniz on, 33–34

and mathematics, 9, 12, 33, 59, 62, 121, 164, 201–2, 210, 218–26, 271, 312, 313, 323, 347, 373, 438, 440

measurement in, 218–19, 315

as mechanistic, 33, 34–35, 89, 168, 221

paradigm shifts in, 42, 164

quality in, 218–19

quantity in, 218–19

relationship to ethics, 361, 370, 380–81, 445

relationship to Human Wisdom, 90–91, 120–24, 132

relationship to Metascience, 117–24, 132, 145, 146–69, 201–2, 220, 240, 296, 385, 402, 403–5, 443, 448, 451, 481n.73, 482n.86

relationship to other sciences, 27–28, 53, 90–91, 120–23, 122, 132, 133, 180, 201, 361, 370, 440–41, 470n.1

relationship to religion, 46

role of logic in, 295–96

role of sense experience in, 53, 64, 70, 76–77, 85, 86–87, 90–91, 97, 122, 148, 163, 202, 205, 219–22, 223–24, 250, 253, 263–64, 291, 295, 315, 361, 401, 423

scientific revolution, 12–13, 14

and Secular Humanism, 120, 241, 242–43, 402, 447, 450–51

special instruments of observation in, 12–13, 75, 86–87, 166, 181, 315

taxonomies in, 179–80, 181, 186

and technology, 238–39

teleology in, 343–46, 374

truth in, 32, 85, 120, 174–75, 205, 219–22, 240, 246, 252, 255, 258, 318, 373, 440, 448

unity and plurality in, 174–75, 179–80, 222–26, 232

Wolff on, 33–34

See *also* materialism; principle of causality; principle of non-contradiction; reductionism

nature

Aristotle on, 71–72, 334, 338, 473n.46, 514n.46, 527n.32

vs. art/technology, 71–72

fundamental forces in, 83, 92, 97–99, 100, 118, 176, 179, 180, 184, 218, 222–23, 224, 225, 271–72, 275, 313, 319, 323, 338, 339, 423, 474n.48

laws of, 82, 85, 229, 230, 310, 314, 315, 320, 323, 338, 344, 345,

346, 370, 381, 386–87, 442, 491nn.82, 83, 507nn.86, 87, 514n.46

technological control over, 55, 59, 239–40, 319

necessity

Aquinas on, 99, 100–101, 134, 406, 421

vs. contingency, 100, 123, 134, 141, 152, 201, 267, 273, 275, 289, 387, 390, 394, 401, 411, 422, 426, 427, 450

as hypothetical, 406

of Neoplatonic emanation, 392–93

See also God, as necessary Being Nédoncelle, Maurice, 515n.49

Neo-Classicism, 373

Neoplatonism, 23, 257, 258, 270, 392–94, 401–2, 409, 417, 515n.53

and Aquinas, 47, 98, 198, 342, 393–94, 422, 428

emanations in, 98, 392–93, 427

influence of, 47, 98, 189, 248, 342, 350, 392, 393–94, 398–99, 400, 407, 416, 424, 449

matter in, 325, 393, 512n.10

mystical experience in, 26, 31, 248, 257

the One in, 189, 392–93, 394

reincarnation in, 393

truth in, 394

See also Plotinus

New Age, 114, 191, 392, 449

Newell, William H., 459n.3

Newman, John Henry, Cardinal, 316

on convergence of probabilities, 251, 316, 511n.52

The Idea of a University, 5

Newton, Isaac, 13, 34–35, 90, 208, 253

and calculus, 212–13

on God as Prime Mover, 99

and Kant, 36, 37, 38

on space, 312

theory of gravitation, 66, 69, 83, 99, 473n.45

Nicholas of Autrecourt, 31–32

Nicholls, Bruce J., 459n.5

Nicolas, Jean-Hervé, 499n.42

Nicomachus of Gerasa: *Introduction to Arithmetic*, 210

Nietzsche, Friedrich, 23, 57

on death of God, 39–40, 55

on death of philosophy, 248, 254

on Eternal Return, 40
Nirvana, 376–77, 395, 397, 398, 450
Nominalism, 35, 41, 108, 186–88, 236, 248, 260, 283, 291, 293–94, 418, 473n.45, 477n.29, 509n.24
Deely on, 473n.39
of Ockham, 23, 31, 87, 187–88, 220, 293, 350, 463n.19, 473n.39
Peirce on, 509n.23, 517n.21
and Protestantism, 350
Quine on, 510n.35
non-being: as supertranscendental term, 174
North Africa, 8
Nozick, Robert, 491n.79
nuclear weapons, 43, 337
numbers, 79, 106, 108, 215, 285, 300, 301–2
and algebra, 210–12
Aristotle on, 210, 211, 214
artificial numbers, 455
irrational numbers, 211
natural numbers, 196, 428, 455
prime numbers, 210
Russell on, 300–301
transcendental numbers, 211
See also mathematics, arithmetic
numerology, 218
Nyaya-Vaisheshika system, 127–28, 129, 297–98
Nygren, Anders: *Agape and Eros*, 340, 515n.49

observation. *See* artificial observation/ideoscopic knowledge; natural observation/cenoscopic knowledge; sense experience
occasionalism, 114
occultism, 144, 197, 392, 449
Odenwald, Sten, 184
O'Meara, Thomas, 54
one, the
Plato on, 24, 25, 134, 175, 264, 270, 342, 349, 392, 393, 422
Plotinus on, 392–93, 394
one and many. *See* unity and plurality
ontological proof, 99, 134–35, 164–65
Ordinary Language Philosophy, 42, 122, 254, 262, 304, 437
orientation: as category of accidents, 78

Origen, 26
 De Principiis, 191, 520n.28
original sin, 387, 444, 450
 Aquinas on, 359, 517n.24
 Duns Scotus on, 134
Ottoman Empire, 8
Outka, Gene H., 515n.49
Overman, Dean L., 514n.47
Owens, Joseph, 50, 158–63, 361, 485n.31, 490nn.65, 68

Pacey, Arnold: *Technology in World Civilization*, 501n.11
Pacific Islands, 15
Pakistan, 8
Paley, William, 512n.11
Palmquist, Stephen R., 465n.44
Panikkar, Raimon, 397, 398
Panini, 127
panpsychism, 185, 388
pantheism, 31, 270, 321, 386–87, 389, 391, 414
parapsychology, 196
Parmenides, 82, 130, 312, 472n.28
 on Being as changeless, 22, 57, 70, 73, 75, 94, 386, 462n.2
 and Plato, 27, 55, 57, 70, 75, 309
participation
 Aquinas on, 47, 50, 139, 269–70, 353, 356, 422–23
 and formal causality, 47, 267–70, 504n.60
 in God, 50, 139, 269, 270, 340, 348, 354, 356, 357, 397, 409,
 422–24, 425, 428, 504n.60, 524n.41
Pascal, Blaise, 208–9
Pasteur, Louis, 272–73
Patanjali, 243
patriarchy, 413–14
Paul, St.
 on sexuality, 354
 as tent-maker, 369
Paul VI: *Humanae Vitae*, 359, 363
Peddicord, Richard: *The Sacred Monster of Thomism*, 467n.75
Peirce, Charles Sanders, 42
 on abduction, 463n.30
 on coenosopic vs. idiosopic knowledge, 474n.49

- on Nominalism, 509n.23, 517n.21
- on pragmaticism vs. pragmatism, 466n.58, 481n.85, 501n.5, 517n.21
- on semiotics, 41, 52, 58, 121–22, 482n.93
- on skepticism, 503n.42
- Pelagianism, 350
- Penrose, Roger: *The Emperor's New Mind*, 107, 164
- perfection, 134–35, 136, 137, 161, 176, 177–78, 198–99, 322
 - degrees of, 421, 422, 423, 428–30
 - of God, 47, 269, 270, 327, 348, 358, 408, 409, 410, 412, 420, 421, 422, 423, 424, 425–26, 428–30, 524n.41
 - of the universe, 425, 426–27, 476n.11
- Persia
 - Achaemenid dynasty, 10
 - Islam in, 333
 - Zoroaster, 9, 10, 31, 335, 366, 460n.22
- personalism, 51, 257–58, 265–67, 340–41, 499n.50
- Peru, 203
 - Incas, 8
 - kingdom of Chavín, 8
- Pharisees, 189
- phenomenalism, 185, 510n.47
- Phenomenological Thomism, 51, 146, 263
- Phenomenology, 34, 109, 254, 262–63, 265, 266–67, 509n.19
 - Brentano, 40, 526n.17
 - and essence, 40, 186, 188
 - Husserl, 23, 40, 51, 55, 109, 188, 263, 267, 290, 506n.74, 526n.17
 - and Thomism, 51, 146, 263
- Philip Cancellarius: *Philippi Cancellarii Parisiensis Summa de Bono*, 492n.1
- Philosophy of Vacuum, The*, 183–84
- phlogiston, 237
- physicians, 443, 444
- physics
 - and calculus, 212–13
 - dark energy, 97
 - electromagnetism, 83, 97, 98, 179, 184, 222–23, 224, 225, 271–72, 313, 323, 338, 423
 - gravity, 66, 69, 83, 97, 98, 99, 176, 180, 184, 218, 222–23, 224,

225, 271–72, 275, 313, 323, 338, 423
second law of thermodynamics, 167, 206, 275
weak and strong nuclear forces, 83, 97, 222–23, 225, 271–72,
313, 338, 423, 474n.48
See also physics, mathematical; quantum physics
physics, mathematical, 59, 203, 218–26, 312, 313, 347
and category theory, 216
motion and time in, 70–71
probability in, 219–20, 222
String Theory, 206
truth in, 219–22
unity and plurality in, 222–26
Piaget, Jean, 433
Picasso, Pablo, 331, 334, 513n.32
Pieper, Josef, 340, 515n.49
Pilate, Pontius, 245
Pinckaers, Servais, 359
Pittendrigh, Colin S., 515n.1
Pius X: *24 Thomistic theses approved by*, 47
Pius XI: *Quadragesimo Anno*, 500n.56
Pius XII: *Humani Generis*, 495n.44
place
Aristotle on natural place, 473n.46, 476n.18
as category of accidents, 78, 83, 84, 128, 135, 175, 180, 193, 454,
458
Kant on, 37
relativity of, 17
Plato, 35, 112, 128, 139, 144, 145, 257, 297, 439, 440
Academy of, 24, 26, 30, 115, 247
Apology, 6, 495n.38
vs. Aristotle, 26, 27–28, 30, 36, 37, 47, 48, 69, 75, 106, 115, 121,
139, 159, 164, 203–4, 217, 218, 247, 256, 259, 264, 268–70,
294, 342, 349, 355, 393, 403, 422–23, 435, 436, 437, 439,
472n.28, 479n.45, 482n.89, 499n.48
on beauty, 329–30
Cave Analogy, 268–69
on change, 57
on contemplation, 349
Demiurge of, 128, 275
dialectical reasoning of, 24, 25, 247, 259, 437

on ethics, 25, 349–50, 375, 499n.48
on fine arts, 309, 331, 482n.89, 513n.29
Gorgias, 503n.35
on immortality of the soul, 24
vs. Indian thought, 240, 241
influence of, 26, 47, 49, 59, 99, 119, 129, 146, 189, 203, 248, 258,
270, 325, 333, 340, 398–99, 448, 504n.60, 520n.11
on literature, 436
and logic, 292
on mathematics, 24–25, 27, 106, 121, 164, 203–4, 217, 218, 247,
256, 300, 302, 312, 313, 393, 423, 479n.45, 497n.9
on matter, 115, 268, 325, 393
Meno, 24–25, 479n.45
myth of the cave, 444
on the One/Good, 24, 25, 134, 175, 264, 270, 342, 349, 392, 393,
422
and Parmenides, 27, 55, 57, 70, 75, 309
Phaedrus, 329–30
on philosopher king, 435
on physics, 24, 25
on pleasure, 349
and Plotinus, 26, 462n.6
on poetry, 308, 309
Protagoras, 499n.48, 503n.35
and Pythagoras, 106, 113, 192, 203, 218, 292, 313, 349, 392, 450
on reincarnation, 113, 190, 349, 356, 375, 450
on religion, 31
Republic, 269, 308, 482n.89, 499n.48, 513n.29, 526n.7
Symposium, 329–30
Theaetetus, 503n.35
theory of Ideas, 23, 24–25, 27, 69, 75, 106, 159, 186–87, 194,
203, 217, 247, 248, 256, 262, 264, 268–70, 291, 293, 294, 306,
388, 392, 393, 422, 479n.45, 510n.35
Timaeus, 481n.73, 516n.14
on truth, 14, 24, 25, 28, 36, 247, 349
on virtue, 355
on wisdom, 227, 499n.48

See also Neoplatonism

Platonizing Thomism, 47, 49, 146

pleasure, 348–49, 354, 381, 433–34, 518n.43

hedonic calculus, 351–52

Plotinus, 23, 26, 240, 256, 426, 463n.18
on emanation and return, 392–93, 462n.6
Enneads, 30–31, 248
on ethics, 30–31
on mystical experience, 26, 31, 248
on Nous, 393, 415
on the One/Good, 392–93, 394
and Plato, 26, 462n.6
on sensible beauty, 497n.9
on the World Soul, 393, 415, 422

pluralism. See multiculturalism

poetics, 278, 304–5, 307–9, 482n.87

Poinsot, John, 41, 52, 292, 463n.30, 473n.35, 478n.35, 478n.39
Cursus Philosophicus, 507n.1
Tractatus de Angelis, 481n.77, 494n.29, 495n.32
Tractatus de Signis, 503n.49

Polish School of Thomism, 490n.73

politics
common good in, 175, 201, 228–29, 230–31, 305
forms of government, 229
Kant on, 36, 37
principle of subsidiarity, 230–31, 439–40, 441
truth in, 175, 307
unity and plurality in, 175, 228–31

polytheism, 9, 10, 385, 391, 394–95, 398, 449

Popper, Karl, 69
on falsification, 252

population growth, 12

pornography, 307, 329, 374

Porphyry, 392
Isagoge, 508n.4

position: as category of accidents (*keisthail/thesis*), 78, 83, 84–85, 181, 193, 454, 458

Positivism, 23, 35, 251

possession: as category of accidents (*echein*), 78, 83, 84–85

possibility, 282–83, 406

postmodernism, 14, 23, 41, 43, 52, 55–60, 163, 334, 461n.39, 467n.66
See also Deconstructionism

post-predicamental terms, 85, 285
postulates vs. axioms, 207–8
potentiality
 vs. actuality, 62, 70–72, 73, 74–75, 76, 85–86, 93, 94, 96, 97, 134, 141, 143, 149, 152, 157, 160, 173, 176, 182, 217, 221, 235, 267, 269–70, 275, 282–83, 290, 310, 311–12, 347, 409–10, 421, 487n.50
 Aquinas on, 71, 94, 95–96, 134, 142, 152
 Aristotle on, 70–71, 85–86, 93, 96, 134, 141, 182, 217, 282–83, 290, 311–12, 393, 404
 and prime matter, 71, 88, 142, 325, 421, 515n.4
 relationship to essence, 143, 149, 152, 157, 173, 182, 235, 269–70
 relationship to matter, 71–72, 74–75, 76, 85–86, 88, 93, 96, 141, 142, 182, 267, 269–70, 290, 325, 409, 421, 515n.4
Potter, Karl H., 460n.26
poverty, 369–70
Powell, Ralph Austin, 52
practical sciences, 385
 means and ends in, 226, 337, 347–72, 509n.25, 516n.8
 relationship to theoretical sciences, 226, 372
 teleology in, 322–23, 325, 347–72
 truth in, 314–15, 318
 See also ethics; politics; technology
pragmatism
 in Confucianism, 9
 vs. pragmaticism, 466n.58, 481n.85, 501n.5, 517n.21
 in United States, 41, 120, 352, 461n.43, 466n.58, 481n.85, 501n.5, 517n.21
pre-Columbian Americas, 330, 331
predestination, 418–19
predicamental relations, 78, 480n.69
prime matter, 71, 88, 95–96, 142, 325, 421, 515n.4
prime movers, 103, 198, 272, 364
 Aristotle on, 92–101, 111–12, 115–16, 151, 153, 403, 453
 human intelligence, 101–14, 115, 117, 118, 119, 478n.35
 pure contingent spirits as, 115–17, 118, 119, 192, 197
 See also First Cause; God
principle of causality, 63, 81–82, 89, 163, 176, 200, 514n.47
 Aquinas on, 94, 150–51

- and existence of immaterial First Cause, 93, 94, 97, 148
- relationship to sense experience, 73–74, 165
- principle of corporation, 500n.56
- principle of double effect, 518n.48
- principle of non-contradiction, 63, 90, 148, 201, 217, 288, 306
 - Aquinas on, 150–51
 - and logic, 280, 291, 295–96
 - relationship to sense experience, 65, 66–67, 72–73, 295, 401
- principle of subsidiarity, 230–31, 368, 439–40, 441, 500n.56
- privation, 176
- probabilism
 - in epistemology, 69, 248, 253–54
 - vs. probabiliorism in ethics, 350–51
- probability
 - Aquinas on, 220
 - Aristotle on, 289, 306, 310
 - degrees of, 236
 - and dialectical reasoning, 69, 116–17, 259, 306, 481n.80
 - Hume on, 316–17
 - infinite regress of probabilities, 253, 263
 - of natural laws, 310, 319, 338
 - Newman on, 251, 316, 511n.52
 - of practical truths, 237, 238
- process philosophy, 23, 41, 145, 411, 416–17, 523n.20
 - monism in, 387–89
 - of Whitehead, 27–28, 387–89
- Proclus Diadochus, 207
- properties, 135, 143, 234
 - Aquinas on, 98, 476n.18
 - Aristotle on, 27, 68, 76–85, 86, 87, 98, 182, 476n.18
 - as extrinsic, 79–85
 - as intrinsic, 79–80, 84, 174
 - as proper accidents, 27, 76–85, 87, 103, 155, 182, 187–88, 283–84, 289, 293
 - relationship to essence, 68, 72, 76–77, 87–89, 103, 121, 155, 173, 187, 283, 290, 293–94, 406, 476n.18
 - relationship to formal causality, 98
 - relationship to substance, 67–73, 97, 98, 175, 179–86, 267, 293–94, 410, 476n.18, 521n.29
 - unity of, 175, 180, 182, 185, 186, 202

See also accidents
property: human need for, 353–54, 368
proportionalism, 361, 362–65, 518nn.46, 48
propositions
 analytic propositions, 217, 218, 252, 262, 289, 291
 modal qualifications of, 289
 synthetic *a priori* truths, 36–38, 165, 217, 262, 289, 491n.82
Protagoras, 24, 42, 246
Protestantism, 242, 299, 352, 355, 358, 443, 464n.36, 473n.45
 and ecumenical dialogue, 17
 Luther, 32, 351, 418, 463n.21, 515n.50
 Protestant Reformation, 13, 32, 59, 350, 463n.21
Proverbs, book of, 378 8:30–31, 525n.51
prudence, 226–27, 228, 355, 362, 368, 441, 445, 499n.48
Psalm 19:2, 424
Pseudo-Dionysius, 26, 47, 196, 199, 422, 428, 495n.39
 The Celestial Hierarchy, 198
 The Ecclesiastical Hierarchy, 198
psychology, 28, 85, 441, 451
 of children, 433–34
 psychoanalysis, 42, 88, 237, 254
 relationship to logic, 291, 295
Ptolemy, 66, 69, 89, 118, 140, 219
Ptolemy II Philadelphus, 30
pure contingent spirits
 Aquinas on, 88, 96, 116–17, 119, 141, 192–97, 198, 269, 295,
 330, 355–56, 366, 418, 428, 475n.55, 480n.69, 494n.29,
 495n.32, 513n.21, 514n.42
 beauty of, 330
 and contemplation, 194, 195, 196, 197, 420
 Duns Scotus on, 88, 474n.54
 essence of, 193, 513n.21
 existence of, 114–24, 137, 141, 173, 190, 192–93, 197, 199, 267,
 275, 300, 320, 326, 387, 401, 410, 481n.73
 free will of, 194, 330, 348, 366, 409, 413, 418, 491n.86
 hierarchy of, 88, 116, 119, 195–96, 198, 225–26, 295, 428
 innate ideas of, 356, 372, 420
 intelligence of, 115–17, 119, 193, 194, 195, 196, 197, 295, 330,
 348, 355–56, 366, 372, 409, 413, 414, 418, 420, 513n.21
 and multiculturalism, 197

as prime movers, 115–17, 118, 119, 192, 197
relationship with God, 114, 194, 195, 196, 197, 326, 339, 372,
420, 480nn.71, 72, 514n.41
simplicity of, 191
sins of, 330, 336, 418, 514n.42

Purgatory, 366

Puritans, 461n.32

Pyrrho of Elis, 24, 246

Pythagoras

influence of, 106, 113, 192, 203, 218, 292, 312, 440
on mathematics, 25, 106, 203, 218, 292, 298, 313, 440
and Plato, 106, 113, 192, 203, 218, 292, 313, 349, 392, 450
Pythagorean theorem, 298
on reincarnation, 24, 113, 192, 349, 450, 494n.26
on the soul, 24, 113, 192, 349, 450, 494n.26

Qoheleth, 349

quality

Aristotle on, 78, 79–80, 81, 176, 177, 454, 456
as category of accidents, 78, 79–80, 81, 84, 88, 175, 180, 182,
193, 205, 207, 267, 456, 457
conditions/habits, 80, 81
formal vs. terminating, 456
in natural science, 218–19
powers, 80
primary vs. secondary qualities, 219, 498n.31

quantity

Aristotle on, 27, 28, 78, 79, 121, 183, 203–4, 210, 214, 217, 279,
296, 300, 301, 302, 310, 454, 455
as category of accidents, 78, 79, 84, 88, 176, 180, 193, 202, 207,
455, 457
as continuous, 79, 121, 183, 184, 204, 205, 207, 209–10, 214,
218, 302, 455
as discrete, 79, 204, 209, 210, 218, 302, 455
as first property of changeable substance, 79, 88, 121, 140, 176,
218, 279, 302
and individuation, 191
and mathematics, 62, 79, 121, 143, 155–56, 158, 202, 203–4,
205–6, 207, 209–10, 214, 215, 216, 217, 218, 221, 271, 294,
296, 300, 302, 313, 346–47

and measurement, 218–19, 310
and unity, 175, 180
quantum physics, 140, 167, 193, 221–22, 224, 253, 263, 304, 386,
400–401, 485n.18, 493n.11
Bell's Theorem, 312, 313
and Big Bang theory, 168, 345–46
indeterminism in, 83, 89–90, 184, 272–73, 310, 311–12, 315, 319,
338, 386, 479n.51, 492n.89, 510n.47
quantum fluctuations, 89–90, 184
wave function, 271
quasi-substances, 184–85
Quine, Willard Van Orman, 41, 254, 259, 293, 461n.43
on Nominalism, 510n.35
on numbers, 300–301
“Two Dogmas of Empiricism,” 252–53, 262, 504n.54
Quinn, John M.: *The Thomism of Étienne Gilson*, 487nn.42, 43
Quintilian, 308
quo/quod, 61–64, 148–49
vs. *quo/in quo/quod* distinction, 503n.49, 505n.67

Radhakrishnan, Sarvepalli, 430, 460n.26
Radin, Paul, 501n.9
radium, 68, 77, 474n.48
Rahner, Karl, 49, 54
“A Formally Existential Ethics,” 359
on the “fundamental option” for God, 359–50
Rajaram, Navaratna S., 460n.20
Raja Yoga, 243
Ramanuja, 144, 396, 397, 398
Ramayana, 331, 378
Ramsey, Paul, 352, 358
Ramus, Peter, 250, 299
Ranke, Leopold Von, 318
Reale, Giovanni, 139
Realism, 52, 291, 293–94
reason, 245, 276, 357–58, 451
Adorno on, 42
autonomy of, 12, 15
deductive reasoning, 33, 34, 280, 463n.30
distrust in power of, 31

during the Enlightenment, 13, 35, 36, 59
vs. faith, 14–15, 46, 54, 56, 241–42, 245, 248, 358, 419, 420–21,
447–48, 522n.17, 527n.32
Gilson on, 50
inductive reasoning, 33, 34, 250, 280, 290, 463n.30, 505n.62
John Paul II on, 45, 46, 60, 242, 463n.29
in public discourse, 306
Rousselot on, 48
and Secular Humanism, 14
styles of human reasoning, 239–41
and transcendental properties of Being, 175
See also dialectical reasoning; intelligence, human; logic
receptivity (*paschein*), as category of accidents, 78, 81–82, 83, 84,
181, 182, 188, 193, 199–200, 401, 411, 454, 457
Redemptorists, 350, 358–59
reductionism, 25, 131, 179, 265, 400, 437, 439, 441, 447
Regis, I. M., 487n.43
Reid, Thomas, 35, 251
reincarnation, 372, 399–400
Aquinas on, 191–92
in Buddhism, 126–27, 190, 191, 370–71, 375, 417, 450
in Hinduism, 126–27, 128, 190, 191, 298, 356, 370–71, 375, 377,
396, 398, 417, 450, 494n.26
in Jainism, 125–26
in Neoplatonism, 393
Origen on, 520n.28
Plato on, 113, 190, 349, 356, 375, 450
Pythagoras on, 24, 113, 192, 349, 450, 494n.26
Reith, Herman, 469n.103
relational properties
as categories of accidents, 78, 80–85, 181, 182, 193, 401, 454,
457, 473n.40, 480n.69, 492n.7
human awareness of, 105–6
relativism, 9, 16–18, 24, 43, 51, 255, 441, 445
relativity theory, 17, 166, 206, 253, 458
Renaissance, 32, 208, 299, 308, 373
Renfrew, Colin, 460n.20
resurrection of the body
in Christianity, 113–14, 189, 191, 319–20, 355–56, 480n.69
in Islam, 189, 191, 355

revelation, 14, 57, 196, 243, 244, 427, 447–48
 in Christianity, 13, 46, 53, 59, 241–42, 245, 248, 348, 350, 355,
 358, 399, 412–13, 421, 495n.44, 522n.17, 527n.32
 in Islam, 241, 241–42, 248, 348, 399, 421
 in Judaism, 241, 241–42, 248, 348, 349, 399, 421
Revelation, Book of, 5:11, 192
rhetoric, 24, 278, 306, 320, 372, 435
 Aristotle on, 304–5, 307–9, 436
Ricoeur, Paul, 23, 58
Riemann, Bernhard, 208, 216
Rig Veda, 10, 377, 450
Rist, John M., 481n.73
River Forest Thomism. See Aristotelian Thomism
Roman Empire, 7, 331, 333
Romanticism, 251, 258, 340
 and fine arts, 13, 121, 308–9, 333, 373, 513n.29
Rorty, Richard, 41, 42, 253, 254, 352, 461n.43, 501n.5
Rose, Valentin, 472n.30
Ross, David, 521n.2
Rougemont, Denis de: *Love in the Western World*, 340
Rousseau, Jean-Jacques, 36, 251, 318
 on human nature, 466n.47
 vs. Kant, 351, 517n.19
 on moral sense, 351, 352, 466n.47
Rousselot, Pierre, 48
Russell, Bertrand, 23, 41, 121, 217, 251–52, 262, 300–301, 465n.42,
 526n.17
 Principia Mathematica, 300
Russia: Marxism in, 9
Rutherford, Ernest, 176

Saccheri, Fr. Geronimo, 208
Sagan, Carl, 118, 481n.82
Salamucha, Jan, 490n.73
salvation, 10, 350, 357, 416, 417, 447
Samkhya-Yoga system, 127, 128, 129, 243–44, 378
Sanchez, Francisco de
 Quod Nihil Scitur, 32, 35
 on truth, 249
Sapir-Whorf Hypothesis, 15–16

Sapsezian, Aharon, 459n.5
 Sartre, Jean-Paul, 23, 55, 67
 Being and Nothingness, 40
 on God and absurdity, 335, 337, 362, 514n.33
 Satan, 245, 330, 518n.49
 Saunders, Simon: *The Philosophy of the Vacuum*, 493n.11
 Saussure, Fredinand de, 43
 Schelling, F. W. J. von, 5, 23, 38, 394
 Schlick, Moritz, 252
 Schmidt, Wilhelm, 519n.1
 Scholasticism, 31–32, 41, 44, 58, 72, 78, 174, 189, 249–50, 277–78, 308
 Scholem, Gershom Gerhard, 503n.41
 Schombert, James, 224
 School of Mind, 130, 379
 School of Names, 11, 129, 298
 School of Practical Learning, 131
 School of Principle/Reason, 379
 Schopenhauer, Arthur, 23, 39, 380, 395, 520n.19
 science
 first principles in, 63–64, 148, 155–56, 246, 251, 259, 260, 263, 264, 289–90, 296, 301, 361, 486n.37, 508n.18
 material vs. formal objects of, 61–62
 relationship to myth, 124
 as saving the appearances, 220, 498n.34
 scientific method, 59, 69, 165
 as of the universal, 36, 38, 72, 87, 106, 179, 186–88, 187, 204, 280, 283, 293, 305, 315, 323, 436, 471n.14, 482n.87, 494n.19, 526n.14
 See *also* four scientific questions; mathematics; natural science; practical sciences; principle of causality; principle of noncontradiction
 Scientific Revolution, 89–91, 111
 Scottish School of Common Sense, 251, 260
 Sebeok, Thomas A., 52, 478n.37
 Secular Humanism, 43
 of Dewey, 41, 466n.57
 dominance of, 13–15, 239–40, 446–47
 and the Enlightenment, 59, 120, 308, 373, 402
 and natural science, 120, 241, 242–43, 402, 447, 450–51

vs. spiritual worldviews, 14–15, 114, 241, 242–43, 314, 370, 380, 443, 447–49, 450–51
and technology, 59, 239–40, 241, 242–43, 319, 447, 450–51
Sed-Rajna, Gabrielle, 513n.25
self-awareness, 48, 104–5, 108–11, 235, 244, 260, 261, 376, 388, 495n.44, 501n.3
self-organization, 338–39, 514n.47
Sellars, Wilfred, 252, 461n.43
Selling, Joseph A., 518n.46
semiotics, 23, 60, 105–6, 467n.66, 512n.3
and causality, 278, 296–97, 506n.76
Deely on, 122, 463n.30, 483nn.94, 96, 485nn.20, 30, 498n.31, 500n.2, 506n.73, 506nn.73, 76
Peirce on, 41, 52, 58, 121–22, 482n.93
Semiotic Thomism, 51–52, 54, 146, 485n.30
and the *Umwelt*, 52, 505n.64, 512n.16, 525n.4
Semiotic Thomism, 51–52, 54, 146, 485n.30
Sensationalism, 23, 34
sense experience, 74, 79, 157, 159, 161, 169, 185–86, 206, 235–36, 250, 395, 478n.37
Aquinas on, 48, 53, 62–63, 65, 90, 91, 99, 112, 134, 148–49, 202, 244, 255, 257, 258–60, 263, 266, 295, 414, 421, 423, 470n.3, 472n.29, 498n.31, 503n.49, 511n.53
Aristotle on, 27, 30, 33, 34, 53, 54, 58, 68, 69, 75, 90, 99, 101–3, 104, 107, 110, 112, 134, 138, 165, 183, 192, 203–4, 251, 255, 257, 258–60, 263, 280, 289, 290, 292, 293, 295, 300, 301, 302, 305, 310, 334, 414, 437, 472nn.28, 29, 479n.46, 490n.65, 508n.18
in children, 433–34
external vs. internal, 202, 205–6, 225, 261, 302, 307, 328
and illusions, 261
Kant on, 37, 48, 59, 165, 185, 186, 258, 472nn.28, 29, 473n.37
Locke on, 185, 186, 250–51, 479n.49, 493n.15
natural vs. artificial observation, 86–87, 111, 163, 181
negative error of the senses, 222, 474n.51
Nicholas of Autrecourt on, 31–32
relationship to beauty, 328–29
relationship to intelligence, 48, 103, 113, 250, 251, 260–61, 276
relationship to mathematics, 202, 203–4, 216, 218–19, 256, 261, 300, 302

relationship to principle of causality, 73–74, 165
relationship to principle of non-contradiction, 65, 66–67, 72–73,
295, 401
relationship to self-consciousness, 108–9
role in natural science, 53, 64, 70, 76–77, 85, 86–87, 90–91, 97,
122, 148, 163, 202, 205, 219–22, 223–24, 250, 253, 263–64,
291, 295, 315, 361, 401, 423
role of form in, 101–3, 107, 268, 292
sensation vs. perception, 474n.51, 477n.33, 503n.49
sense cognition, 67–68, 101–3, 104, 105–7, 110, 222, 268, 292,
338, 373, 381, 401, 439, 498n.39
and *species impressa*, 103, 477n.33, 478n.39, 503n.49
touch, 65, 67, 73, 101–2, 186, 261, 295, 302, 310, 471n.8,
477n.33, 479n.54
September 11 attacks, 337
Sertillanges, Antonin Dominique, 514n.40
set theory, 214–16, 299–301
Seventh Ecumenical Council (Nicaea II), 333
Sextus Empiricus, 24, 246
sexuality, 314, 329, 353, 354, 367, 377, 416–17, 475n.57
 contraception, 359, 363
 erotic love, 229–30, 340
 homosexuality, 359
 See also gender
shamans, 390, 434–35
Shankara, 126–27, 144, 395–96, 397, 401, 415, 429–30, 502n.22,
520n.20
Shanks, Hershel, 521n.1
Shanley, Brian J., 522n.13
Shannon, Claude, 506n.79
Shintoism, 391, 397
Shircel, Cyril L., 483n.1
sight, 102, 302
signs. See semiotics
Sikhism, 449
similarity, 80–81, 84, 106, 108, 178, 187, 188, 201, 268, 398, 413–
14, 457
Simon, E. D., 482n.92
Simon, Yves R., 498n.37, 499n.50
simple vs. complex terms, 78

simplicity

of God, 178, 191, 407–8, 409–12, 414, 522n.16

of pure contingent spirits, 191

of soul, 190–91

Simpson, George Gaylord, 515n.1

sin, 359–60, 362–63, 417, 418

mortal sin, 330

original sin, 134, 359, 387, 444, 450, 517n.24

among pure contingent spirits, 330, 336, 418, 514n.42

Singer, Irving: *The Nature of Love*, 340, 515n.50

Singer, Peter: on animal rights, 371–72

skandhas, 126

skepticism, 14, 17, 18, 23, 31, 43–44, 236, 237, 316, 503n.36

and Aristotelian Thomism, 255–66

and empiricism, 249–55

of Hume, 34, 35, 36, 37, 89, 248, 249, 251, 260

and Idealism, 247–49

of Pyrrho, 24, 246

of Sanchez, 32

of Sextus Empiricus, 24, 246

and Sophism, 245–47

slavery, 444

Aristotle on, 368–69

Smart, Ninian

“Indian Philosophy,” 460n.26

World Philosophies, 6, 7, 460n.18

Smith, Adam, 251

Smith, Vincent Edward, 469n.102

Smuts, Jan C., 179

Snow, C. P.: *The Two Cultures*, 20, 59

Soble, Alan, 515n.49

social ethics

family ethics, 226, 318, 366–67, 370, 441–42, 445

teleology in, 366–72

See also common good

social sciences, 85, 226, 441–42, 527n.30

sociobiology, 367

sociology, 314

Socrates, 9, 16, 23, 25, 26, 28, 31, 297

guardian spirit (*daimon*) of, 194–95, 495n.38

- on the unexamined life, 6
- on wisdom, 18, 227, 246
- Sokolowski, Robert, 509n.19
- solipsism, 35, 52, 465n.42
- something: as transcendental term, 174
- Song of Songs, 2:1, 286
- Sophism, 26, 245–47, 255, 262, 352, 437
 - Protagoras, 24, 42, 246
- soul
 - Aquinas on, 96, 112–14, 116, 185, 191, 355–56, 429, 480n.69, 493n.14, 513n.21, 525n.58
 - Aristotle on, 101–14, 153, 158, 190, 439
 - beauty of, 330
 - after death, 185, 355–56, 429, 525n.58
 - as dependent on God, 192, 199, 495n.44
 - as form of body, 104, 112–14, 191, 199, 267, 480n.69
 - as immaterial, 101–14, 118, 188–92, 190, 488n.52
 - immortality of, 24, 189, 190–92, 248
 - Pythagoras on, 24, 113, 192, 349, 450, 494n.26
 - relationship to body, 104, 112–14, 185, 190, 191, 199, 267, 355–56, 429, 480n.69, 525n.58
 - simplicity of, 190–91
 - unity of, 188–92, 439
 - See also free will; intelligence, human; reincarnation
- Southeast Asia, 11
- space, 183–84, 223–25
 - Descartes on, 463n.24
 - Kant on, 217, 258, 472n.28
 - Newton on, 312
 - vs. time, 89–90, 206
- species, 87–89, 128, 135, 136, 177, 193, 235, 291, 298, 410, 428–29
 - Aquinas on, 87–88, 116
 - classification and definition by genus and, 72, 78, 173, 179, 181, 281–82, 285, 286, 298, 310, 410
 - number within a genus, 116–17, 192–93, 481n.80, 494n.31
 - and pure contingent spirits/angels, 88, 248–29
 - unity of, 186–88
- Spencer, Herbert, 23, 41, 251
- Spinoza, Benedict de
 - on God, 73, 386, 389, 425, 525n.50

- influence of, 394
- monism of, 23, 33, 82, 394
- on substance, 394
- sports, 13
- Sri Lanka, 11, 395
- Ssu-ma Ch'ien: *Shih-chi (Historical Records)*, 332
- Stace, Walter T., 245
- Stahlman, Sandra, 502n.23
- steady-state hypothesis, 93, 167, 168
- Stein, St. Edith, 40
- stellar parallax, 219, 498n.33
- Stoicism, 24, 25, 30, 32, 189, 386, 516n.12, 524n.44
 - freedom from passion in, 349, 380
 - and logic, 299, 303
 - materialism of, 23, 26, 31, 144, 396, 400, 422, 462n.6
- Strawson, Peter F.: *Individuals*, 58
- String Theory, 206
- Stroll, Avrum, 526n.17
- Structuralism, 43, 262, 263
- Stump, Eleonore, 51, 477n.33
- Suarez, Francisco, 23, 33, 45, 46, 134, 139, 142, 145, 163, 269, 351
 - Disputationes Metaphysicae*, 78, 467n.68, 473nn.34, 35, 490n.75
- substance
 - Aquinas on, 62–63, 65–66, 87–89, 93–97, 134, 188, 256–57, 407, 409–10, 473n.40, 475n.62, 476n.18, 493n.14
 - Aristotle on, 50, 64–65, 67–76, 87, 92, 98, 112, 123, 128, 140, 151–53, 175, 181, 182, 309, 433, 454, 455, 472n.28, 476n.18
 - as category, 67–76, 81, 84, 135, 140, 179–88, 281, 285
 - independent existence of, 70, 73–74, 84, 140, 143, 152, 175, 180, 181, 182, 184–85, 223–24, 285, 325, 401
 - individuation of, 72, 87–89, 182, 187–88, 191–92, 293
 - Kant on, 185, 479n.55, 493n.17
 - Locke on, 185, 464n.36, 493n.15
 - quasi-substances, 184–85
 - relationship to properties, 67–73, 97, 175, 179–86, 267, 293–94, 410, 476n.18, 521n.29
 - self-organization of, 339
 - unity of, 69, 84, 97, 175, 178, 188–200, 198, 202, 223–24, 293, 319, 325, 428
- See also changeable substance

substantial terms, 79
Sufism, 449, 501n.17
supertranscendental terms, 174
Swedenborg, Emmanuel, 36
Sweeney, Leo, 153, 158
syllogisms, 278–84, 289, 295, 296, 303
 and analogical terms, 288
 Barbara form, 280–81
 and causality/middle terms, 177, 279, 280
 Celarent form, 280–81
 in Indian logic, 298
 universal vs. particular propositions in, 280
symbols, 286

Tai Chen, 131
Taoism, 130, 198, 244, 391, 449
 in China, 9, 11, 129, 130, 298, 332, 379, 396
 Chuang-Tzu, 129, 298, 379
 in Japan, 9
 Lao-Tzu, 129, 144
 as monistic, 9
 Tao Te Ching, 242
Tartaglia, Nicholas, 212
technology
 Aristotle on, 71–72, 120–21, 231, 239
 computers, 216, 299, 304
 control over nature through, 55, 59, 239–40, 319
 education in, 442, 444, 446
 expansion of, 12–15, 16
 faith in, 9
 goodness in, 175
 Heidegger on, 13, 55, 56
 and natural science, 238–39
 nuclear weapons, 43, 337
 relationship to ethics, 371
 and religion, 241, 242–43
 and Secular Humanism, 59, 239–40, 241, 242–43, 319, 447, 450–
 51
 teleology in, 371–72
 and truth, 175, 314–15

unity and plurality in, 175, 226, 231–32

Teilhard de Chardin, Pierre, 200, 271, 343–44, 394
on complexification, 387
The Phenomenon of Man, 387, 506n.81

teleology
and ecology, 371
in ethics, 347–57, 365–72, 516n.8
and fine arts, 372–75
and mathematics, 324–25, 346–47
and natural science, 343–46, 374
and practical sciences, 322–23, 325, 347–72
and social ethics, 366–72
and technology, 371–72
as teleonomy, 82–83, 85, 99, 141, 275, 321, 343, 380–81, 406,
485n.23, 493n.16, 497n.5, 507n.87, 515n.1
See also final causality

television, 12, 13

temperance/moderation, 226, 227–28, 254, 499n.48

Temple, William, 250

Teotihuacan, 8

Teresa of Avila, St., 449

te Velde, Rudi A., 270

Thales, 124, 389, 392

Theilicke, Helmut, 358, 359

theodicy. See evil, problem of

Theophrastus, 30

Theosophy, 114, 144, 197, 392

thing, as transcendental term, 174

Thomist metaphysics: varieties of, 44–54
See also Aristotelian Thomism; Essentialist/Conceptualist
Thomism; Existential Thomism; Platonizing Thomism

Thucydides, 320

Tibet: Buddhism in, 11

T'ien Tai sect, 130

Tillotson, Dr., 511n.53

time, 313, 320–21, 428
Aristotle on, 78, 83–84, 128, 166, 175
Augustine on, 269
as category of accidents, 78, 83–84, 128, 135, 168, 175, 181, 193,
454

Kant on, 37, 258, 301–2, 472n.28, 493n.17
and motion, 70–71, 84, 168, 412
relativity of, 17
vs. space, 89–90, 206

Tipler, Frank J.: *The Anthropic Cosmological Principle*, 164, 507n.86

toleration, religious, 241, 449–50, 521n.1

Torchia, N. Joseph, 462n.6

totalitarianism, 228, 229, 231, 233, 265, 367, 368

touch, 101–2, 186, 261, 302, 479n.54
Aquinas on, 65, 471n.8, 477n.33
Aristotle on, 310
and principle of non-contradiction, 65, 66–67, 72–73, 295
relationship to existence, 67, 73

Tourpe, Emmanuel, 486n.41

Toynbee, Arnold J.: *A Study in History*, 6, 7

Transcendental Idealism, 37–38, 164–65
See also Kant, Immanuel

transcendental relation, 113–14, 480n.69, 492n.7, 521n.29

transcendentals. See Being, transcendental properties of

Transcendental Thomism, 48–49, 53, 54, 55, 109, 146, 153, 159,
236, 256–57, 265, 359–60, 483n.94, 504n.60

trigonometry, 209, 314

Truman, Harry S.: dropping of atomic bomb by, 337, 365

truth, 399, 429, 451
Aquinas on, 193, 326–28, 353, 368, 527n.32
Aristotle on, 27, 193, 217, 239, 289, 349, 353, 354, 368, 436
coherence theory of, 252, 253–54, 263, 264
consistency theory of, 37, 237, 253, 258
contemplation of, 193, 327–28, 329, 349, 353–54, 355, 368, 370,
415, 439, 517n.23
contextuality of, 4–5, 15, 19, 36, 61, 257–58, 264, 315, 318, 319,
440, 446–47, 459n.5
correspondence theory of, 37, 250
degrees of, 289
and dialectical reasoning, 306
in ethics, 175, 307, 314–15
and fine arts, 175, 307, 308, 314, 373–74
God as Truth, 326, 327, 407, 415
Heidegger on, 55, 56
in history, 315–21, 436–37

and interdisciplinarity, 15, 175, 234, 239–41, 255, 277
and language, 284
Locke on, 250–51
logical truth, 234–36, 245, 246, 278, 281, 289, 295, 307, 315, 327
love of, 339
in mathematics, 174–75, 203, 205, 216–18, 327, 373
and modal qualifications, 289
as moral, 307, 308
and multiculturalism, 175, 234, 239–41, 255
and mystical experience, 242–45
and narrative, 436
in natural science, 32, 85, 120, 174–75, 205, 219–22, 240, 246,
252, 255, 258, 318, 373, 440, 448
objective vs. subjective aspects of, 236–37, 245
ontological truth, 234–36, 238, 245, 275–76, 315, 322, 326–28
Plato on, 14, 24, 25, 28, 36, 247, 349
in politics, 175, 307
in practical sciences, 314–15
in pragmatism, 120, 237–38
public consensus theory of, 35, 42–43, 246, 253, 262
relationship to beauty, 174, 238, 308, 326–28, 329, 341–42, 372,
373–74, 497n.12
relationship to formal causality, 234–35
relationship to intellect, 150
relativism regarding, 9, 16–18, 24, 43, 51, 255, 441, 445
and rhetoric, 307
social search for the, 237
sources of, 239–45
spiritual need for, 231
and technology, 175, 314–15
theoretical vs. practical, 237–39
as transcendental property of Being, 47, 85, 143–44, 174–75,
234–35, 246, 278, 326
See also epistemology; knowledge
Twetten, David, 476n.8, 487n.50
Tylor, E. B., 390

Umwelt, the, 52, 505n.64, 512n.16, 525n.4
Unabomber, 4
unconscious, the, 42, 307

unitarianism, 35

United States

Analytic Philosophy in, 42

capitalism in, 369

Catholic and Protestant universities in, 443

education in, 435, 439

illiteracy in, 435

indigenous minority cultures in, 19–20

moral relativism in, 9

pragmatism in, 41, 120, 352, 461n.43, 466n.58, 481n.85, 501n.5, 517n.21

rich and poor in, 369

September 11

attacks, 337

slavery in, 444

voting in, 369

unity

of the Absolute, 394, 397–98

of Being, 177–78, 197

of contingent spiritual substances, 188–200

of First Cause, 175, 178, 188

of God, 306, 326, 348, 407, 408, 409–12, 414, 424, 425, 428, 504n.60, 522n.16

of materials things, 178

of properties, 175, 180, 182, 185, 186, 202

and quantity, 175, 180

of soul, 188–92, 439

of species, 186–88

of substance, 69, 84, 97, 175, 178, 188–200, 198, 202, 223–24, 293, 319, 325, 428

as transcendental property of Being, 85, 174–200, 275–76, 326, 428

of universe, 94–95, 100, 117, 222–23, 225–26, 322, 325, 326, 330, 386–87, 400–401, 412, 428

of the virtues, 226–28

vs. plurality, 175–88, 424

unity and plurality

Aristotle on, 175–77

in efficient causality, 175, 188, 197–200

in ethics, 175, 226–28

- in fine arts, 175, 231–33
- and interdisciplinarity, 175, 232–33
- in mathematics, 174–75, 201–18, 210, 216, 301
- and multiculturalism, 175, 232–33
- in natural science, 174–75, 179–80, 222–26, 232
- as perfection, 176, 177–78, 322
- in politics, 175, 228–31
- relationship to simplicity, 178
- in technology, 175, 226, 231–32

Universal Declaration of Human Rights, 369

universality

- Aristotle on, 36, 38, 72, 87, 106, 179, 186–87, 204, 280, 283, 293, 305, 315, 323, 436, 471n.14, 482n.87, 494n.19, 526n.14
- universals, 35, 186–88, 260, 291, 293–94

universe, the, 10, 20, 41, 47

- Aquinas on, 95, 476n.11

- Aristotle on, 92–93, 94–95, 113, 117, 166–67, 168, 427, 525n.55

- beauty of, 25, 372

- Big Bang theory, 72, 85, 90, 92–93, 100, 118, 124, 164, 167–68, 222–23, 271–72, 273, 345–46, 386, 423, 492n.89

- cosmic diversity, 137, 225

- cosmic evolution, 118, 125, 271, 273–75, 336, 339

- cosmic order, 319, 371, 391, 402

- infinity of universes, 90, 419n.4

- perfection of, 425, 426–27, 476n.11

- unity of, 94–95, 100, 117, 222–23, 225–26, 322, 325, 326, 330, 386–87, 400–401, 412, 428

universities, medieval Christian, 12, 14, 31, 45, 59, 208, 249–50, 299

- ethics in, 350

- logic in, 277–78, 299, 435

- professional education in, 443

- the quadrivium in, 435, 438

- the trivium in, 278, 435

universities, modern, 12, 462n.46

- academic freedom in, 16

- Christian universities, 45–46, 443

- fragmentation in, 20

- hard sciences and soft humanities as two cultures in, 20, 33–34, 59, 439

- and Human Wisdom, 19–21

interdisciplinarity in, 20, 21, 61, 232–33
multiculturalism in, 4–5, 19–21, 61, 232–33, 442–43, 447
philosophy departments in, 33–34, 254, 461n.42
religious studies departments in, 442, 527n.32
universities, Renaissance, 45
University of Louvain, 48
University of Lublin, 51, 257–58, 265, 506n.72
University of Paris, 31, 416, 488n.53
univocal terms, 284, 285, 287, 293
 as ante-predicamental, 78
 Being as univocal, 55, 71, 133–34, 137, 157, 410, 471n.10,
 483nn.1, 2
 for categories of accidents, 78, 135, 174
 and definition by genus and specific difference, 281–82, 286
 in mathematics, 135, 214, 302–3
Unmoved Mover. See First Cause
Upanishads, 10, 127, 394–96, 520n.17
Utilitarianism, 251, 351–52, 464n.36

vacuum, 183–84
value systems
 and family education, 433–34
 in modernity, 13
 and worldviews, 3–4, 9, 120, 374, 390, 446
Vatican II, 45, 49, 357, 362
 “Dogmatic Decree on the Constitution of the Church” (*Lumen
 Gentium*), 501n.13
Veatch, Henry B., 44
Vedas, 125, 126–27, 128, 242, 297, 375, 377–78, 392, 395–96, 399,
 435, 446
 Rig Veda, 10, 377, 450
Vega, Lope de, *Life is a Dream*, 35
via compositionis, 486n.35
via demonstrationis, 68–69, 77
via doctrinae, 477n.27
via inventionis, 68–69, 76, 77, 148, 477n.27, 486n.35
via resolutionis, 148, 486n.35, 488n.53
Vienna Circle, 41, 252
virtue, 200, 369–70
 Aquinas on, 226–27, 227, 352–55, 358, 361, 362, 499n.48,

517n.31

Aristotle on, 340, 354–55, 515n.48

cardinal virtues, 226–28, 254–55, 499n.48

hierarchy of virtues, 228

natural vs. infused, 358, 517n.31

Plato on, 355

relationship to human community, 339–40

theological virtues, 353, 358

unity of the virtues, 226–28

virtue of *epicheia*, 358–59

virtue of legal justice, 367

See also ethics; goodness

vis aestimativa/ratio particularis, 505n.67

vis cogitativa, 205, 261, 434

Vivekananda, Swami, 430

Voltaire, 426

voluntarism, 347–57, 358–59, 416

of Ockham, 350, 359, 408, 416, 463n.19

Wagner, Richard, 395, 520n.19

Wallace, William A., 53, 220, 515n.4

The Modeling of Nature, 164

Wang Yang Ming, 379

water, 77

Watt, W. Montgomery, 501n.17

weapons of mass destruction, 231

nuclear weapons, 43, 337

Webster, Charles, 461n.32

Weinberg, Steven, 273, 346, 426, 491n.79, 507n.87

Weisheipl, James A., 53, 469n.102, 485n.33, 488n.53

West, Cornel, 461n.43

West, M. L., 520n.12

Whitehead, Alfred North, 23, 145, 185, 387–89, 394

vs. Aristotle, 27–28

on change, 493n.16

on God, 41, 388–89, 416–17, 426, 523n.20

Principia Mathematica, 300

process philosophy of, 27–28, 387–89

on subject-superject, 493n.16

whole and part. See unity and plurality

Wians, William, 472n.30
Wiebe, Donald, 527n.32
Wiles, Andrew, 210
Wilinsky, John, 462n.46
William of Ockham, 36, 80, 81, 249
 Nominalism of, 23, 31, 87, 187–88, 220, 293, 350, 463n.19, 473n.39
 voluntarism of, 350, 359, 408, 416, 463n.19
Wippel, John, 50, 153–58, 159, 160–61, 485n.31, 486n.41, 488n.51, 489n.56, 490n.68
Wisdom, Divine, 337, 348, 353, 354, 425
Wisdom, Human, 308, 446–51
 Aristotle on, 28–29, 57, 61
 based on reason vs. faith, 14–15
 as interdisciplinary, 64
 as knowledge of Creator, 142
 and modern universities, 19–21
 as multicultural, 18, 446–47
 relationship to natural science, 90–91, 120–24, 132
 yearning for, 5–6, 20
Witt, Charlotte, 481n.73
Wittgenstein, Ludwig, 23, 42, 58, 252, 526n.17
Wojtyla, Karol. See John Paul II
Wolff, Christian, 23, 45, 48, 134, 144, 479n.55
 on natural science, 33–34, 36
 on ontology, 139
 on philosophy as deductive system, 33–34
Wolter, Allan B., 483nn.1, 2, 485n.27
Woolhouse, Roger, 464n.34
worldviews, 5–12
 based on reason vs. faith, 14–15, 242
 classifications of, 6, 7
 common elements in, 263–64
 and communities, 3–4
 contextuality of truth in, 4–5
 and fine arts, 374–75
 functional definitions of, 14, 461n.36
 and immortality of human soul, 189–90
 and information explosion, 3–4
 and modernity, 9

and monism, 233, 333, 389–90
as mythological, 124–25, 330–31, 386, 389–90, 397
and technology, 12
toleration of, 241, 449–50, 521n.1
and value systems, 3–4, 9, 120, 374, 390, 446
See *also* interculturality; monism; monotheism; multiculturalism;
Secular Humanism

writing

in China, 8

Derrida on, 16, 56–57

invention of, 7

Wyclif, John, 249–50

Yin-Yang School, 11, 129–30, 379

Yoga, 127, 128, 129, 243–44, 298, 332, 378, 395, 401

Yolton, John W., 464n.34

Zeami Motokiyo, 333

Zen Buddhism, 130

Zeno of Citium, 23, 26

Zermelo, Ernest, 215

Zoroaster, 9, 31, 335, 366, 460n.2

on Ahuramazda and Ahriman, 10

influence of, 10

BENEDICT M . ASHLEY, O. P.,

is emeritus professor of moral theology at Aquinas Institute of Theology,
St. Louis. Among his publications are *Health Care Ethics*, with Kevin
O'Rourke, O.P.,

Justice in the Church, Truth in Love, and Theologies of the Body.