

The Place of *Musica* in Medieval Classifications of Knowledge

JOSEPH DYER

As the Philosopher says in the beginning of the *Metaphysics*, it belongs to the wise man to put things in order. . . . For, although the sense powers know some things absolutely, it belongs to the intellect or reason alone to know the order of one thing to another (Thomas Aquinas, Commentary on Aristotle's *Ethics*).

During the later 12th and throughout most of the 13th century numerous classification systems were devised to impose order on the ever-expanding breadth of human knowledge and to demonstrate the interconnectedness of its parts.¹ Known as a *divisio*

3

¹ In the Middle Ages the term *musica* applied properly to the speculative science that considered proportional relationships, while *cantilena* and *cantus* referred to sounding music. I will generally use “music,” since my focus of interest will be exclusively on the first category. For an overview see Herbert M. Schueller, *The Idea of Music: An Introduction to Musical Aesthetics in Antiquity and the Middle Ages*, Early Drama, Art, and Music Monograph Series 9 (Kalamazoo: Medieval Institute Publications, Western Michigan Univ., 1988). For a recent explanation of the distinction see Wolfgang Fuhrmann, *Herz und Stimme: Innerlichkeit, Affekt und Gesang im Mittelalter*, Musiksoziologie 13 (Kassel: Bärenreiter, 2004), 19–47. General surveys of the classifications are: Joseph Mariétan, *Problème de la classification des sciences d’Aristote à St. Thomas* (St.-Maurice [Valais, Switzerland]: Imprimerie St. Augustin, 1901); Ludwig Baur, *Dominicus Gundissalinus. De divisione philosophiae*, Beiträge zur Geschichte der Philosophie im Mittelalter, Texte und Untersuchungen 4/2–3 (Münster in Westfalen: Aschendorff, 1903), 316–400 (“Die philosophische Einleitungsliteratur bis zum Ende der Scholastik”) (hereafter Baur, *De divisione*); Fernand Van Steenberghen, “L’organisation des études au moyen âge et ses repercussions sur le mouvement philosophique,” *Revue philosophique de Louvain* 52 (1954): 583–92; Martin Grabmann, *Die Geschichte der scholastischen Methode*, 2 vols. (Freiburg im Breisgau: Herder, 1909; repr. Graz: Akademische Druck- und Verlagsanstalt, 1957), 2:28–54; Olga Weijers, *Le maniement du savoir: Pratiques intellectuelles à l’époque des premières universités (XIII^e–XIV^e siècles)*, Studia Artistarum Subsidia 3 (Turnhout: Brepols,

scientiarum or *divisio philosophiae*, the aim of such a classification was to fix the number of subjects and disciplines, define the content and methods of each, establish the relationships among them, and in some cases propose an order in which they should be studied.² Models for the medieval classifications were available in Greek philosophy, Latin authors of Late Antiquity (Boethius), and in the writings of Arabic philosophers and commentators on Aristotle. The Spaniard Dominic Gundissalinus, author of an important mid-12th-century classification, explained their purpose: “there is no knowledge [*scientia*] that is not some part of philosophy; thus first of all it is to be declared what philosophy is and why it is so called; then what is its purpose, what its end; afterwards, what are its parts and the parts of these parts; finally, what is to be considered in each of these parts.”³ Although medieval philosophers might disagree over details, they believed that coherent orderings of the entire scope of human knowledge could be devised, based (generally) on assumptions that the immaterial was superior to the material and the activity of the mind superior to that of the practical intellect.

While it is common knowledge that during the Middle Ages the Pythagorean-Platonic conception of reality eventually yielded to the empirical methodology of Aristotle, the implications of that change for the medieval conception of *musica* have yet to be thoroughly explored. Instead of taking as a starting point the music theory literature of the Middle Ages, I propose to examine how philosophers integrated music into the grand scheme of human knowledge founded on Aristotelian principles.

1996), 187–201; eadem, “L’appellation des disciplines dans les classifications des sciences aux XII^e et XIII^e siècles,” *Bulletin Du Cange [Archivum Latinitatis Medii Aevi]* 46–47 (1988): 39–64.

² For typical contents see Claude Lafleur, “Les textes ‘didascaliques’ (‘introductions à la philosophie’ et ‘guides de l’étudiant’) de la Faculté de Paris au XIII^e siècle: *notabilia et status quaestionis*,” in *L’enseignement des disciplines à la Faculté des arts (Paris et Oxford, XIII^e–XIV^e siècles)*. *Actes du colloque international*, ed. Olga Weijers and Louis Holtz, *Studia Artistarum* 4 (Turnhout: Brepols, 1997), 345–72. Modern understanding of “science” inevitably involves the empirical observation of natural phenomena, the use of experimentation, and application of strict principles of demonstration to arrive at an explanation of the phenomena, but natural science was considered a philosophical discipline in the Middle Ages. The word *scientia* had a wide range of meaning for the Middle Ages, being the equivalent of both “knowledge” or “philosophy” in general. Boethius, like Aristotle before him, defined scientific knowledge as a “doctrine built on first principles and derived by strict demonstration,” according to Charles Lohr, “The New Aristotle and ‘Science’ in the Paris Arts Faculty,” in *L’enseignement des disciplines*, 263–64 [251–69]; several articles on this theme are published in “*Scientia*” and “*Disciplina*”: *Wissenstheorie und Wissenschaftspraxis im 12. und 13. Jahrhundert*, ed. Rainer Berndt, Matthias Lutz-Bachmann, and Ralf M. W. Stammberger, *Erudiri Sapientia* 3 (Berlin: Akademie Verlag, 2002).

³ Quapropter quoniam nulla est scientia quae philosophiae non sit aliqua pars; ideo in primis videndum est quid sit philosophia et quare sic dicatur; deinde que sit eius intentio et quis finis; postea que partes eius et partes parcium; ad ultimum quid circa unamquamque earum sit considerandum; Baur, *De divisione*, 5.

The quadrivium, of which music was a part, could not be ignored, supported as it was by no less an *auctoritas* than Boethius, but the fact that music was perceptible to the sense of hearing could not be overlooked either. On the other hand, Boethius' *musica mundana* and *humana* were and always had been utterly inaudible. The ways in which these conflicting demands were resolved is the theme of the present essay.

The Liberal Arts

For the earlier Middle Ages the seven liberal arts, trivium and quadrivium, represented, ideally, the sum of basic, non-theological learning.⁴ Cassiodorus, Isidore, Augustine, and other Christian authors of antiquity and the Middle Ages, while warning of the dangers inherent in their pagan origins, encouraged or permitted study of the liberal arts as preparation for the understanding of Scripture and the study of theology.⁵ The literary orientation of the trivium had an obvious connection with this goal, but the practical value of the quadrivial disciplines could also be demonstrated: arithmetic (*computus*) for the reckoning of the seasons of the church year, geometry for measurement, music for the calculation of intervals and their realization on the monochord in chant instruction, astronomy for the calculation of the stellar, solar, and lunar movements that determined the times and seasons for the celebration of liturgical offices.⁶ In addition, knowledge of mathematics

⁴ Pierre Riché, *Education and Culture in the Barbarian West*, trans. John Contreni (Columbia: Univ. of South Carolina Press, 1976); David L. Wagner, ed., *The Seven Liberal Arts in the Middle Ages* (Bloomington: Indiana Univ. Press, 1983); *Arts libéraux et philosophie au moyen âge*, Actes du quatrième congrès international de philosophie médiévale, Montréal, 27 août—2 septembre 1967 (Montréal: Institut d'Études Médiévales, 1969); Günther Glauche, *Schullektüre im Mittelalter. Entstehung und Wandlungen des Lektürekansons bis 1200 nach den Quellen dargestellt*, Münchener Beiträge zur Mediävistik und Renaissance-Forschung 5 (Munich: Ardeo Gesellschaft, 1970). Special attention to music is given in Karl Gustav Fellerer, "Die Musica in den Artes Liberales," in *Artes Liberales: Von der antiken Bildung zur Wissenschaft des Mittelalters*, Studien und Texte zur Geistesgeschichte des Mittelalters 5, ed. Joseph Koch (Leiden: E. J. Brill, 1976), 33–49; and Klaus-Jürgen Sachs, "Artes liberales," in *Die Musik in Geschichte und Gegenwart*, 2nd ed., ed. Ludwig Finscher (Kassel: Bärenreiter, 1994–), Sachteil 1:919–24.

⁵ Marie-Dominique Chenu, *Saint Augustin et la fin de la culture antique* (Paris: E. de Boccard, 1937), 211–35.

⁶ Alexander Neckam (1157–1217) recommended to scholars of the liberal arts the study of "metapfiscam Aristotelis et librum eiusdem de generacione et corruptione, et librum de anima" (*Sacerdos ad altare*, before 1213): a forward-looking program at the time, given that these books were forbidden by the Council of Sens and interdicted at Paris by Cardinal Robert de Courçon two years before Neckam's death. An edition of chapter 18 of Neckam's treatise is included in Charles Homer Haskins, *Studies in the History of Medieval Science* (Cambridge: Harvard Univ. Press, 1924), 372–76. There Neckam says of music: "postea musicam Boecii legat . . . postea ad axiomata musicæ," the latter possibly a reference to book 19 of the pseudo-Aristotelian *Problemata* whose subject is music; ed. and trans. Walter S. Hett, *Problems*, 2 vols. (Cambridge: Harvard Univ. Press, 1936), 378–415. Excerpts from the *Problemata* are printed in Andrew Barker, *Greek Musical Writings*, 2 vols. (Cambridge: Cambridge Univ. Press, 1984), 2:85–97.

fertilized the imagination for the allegorical interpretation of numbers mentioned in the Scriptures.

The four mathematical disciplines of the quadrivium were paired by Boethius (ca. 480–524) depending on whether the discipline concerned multitude (arithmetic, music) or magnitude (geometry, astronomy).⁷ Accordingly, arithmetic is *multitudo per se*, while music is *multitudo ad aliquid* (i.e. one number related to another proportionally). Magnitude is either *immobile* (geometry) or *mobile* (astronomy). These definitions prevailed throughout the Middle Ages, combined with observations from natural science that were heavily influenced by the spirit of Aristotelian empiricism and to a lesser extent by Arabic learning.

Classifications of Knowledge in the Greek Philosophical Tradition

Since medieval classifications of knowledge relied on schemata passed down from the ancient world, it will be useful to review briefly how the ancients perceived the scope and structure of human knowledge. Modern scholars have divided the classification systems of Greek philosophy into two broad categories: one derived from the Pythagorean-Platonic tradition—subsequently modified by the Stoics—the other informed by passages in the works of Aristotle.⁸ These two classification systems were founded on two different ontological models that reflected opposed assessments of the value of sense perception. Further, they embodied divergent answers to the question of whether observation of natural phenomena reveals information useful to the intellect in understanding the visible world and the underlying relationships that hold it together.

⁷ Ancius Manlius Severinus Boethius, *De arithmetica*, ed. Henricus Oosthout and Iohannes Schilling, Corpus Christianorum: Series Latina 94A (Turnhout: Brepols, 1999), 10–14. On the quadrivium see John North, “The Quadrivium,” in *A History of the University in Europe 1: Universities in the Middle Ages*, ed. Hilde de Ridder-Symoens (Cambridge: Cambridge Univ. Pres, 1992), 337–59, though North attributes to music a more important part in the university curriculum than I would be inclined to do (pp. 343–44); Pearl Kibre, “The *Quadrivium* in the 13th-Century Universities (with Special Reference to Paris)” in *Arts libéraux et philosophie au moyen âge*, 185–87, an erudite article in which the references to music treatises could have been better informed.

⁸ The history of classifications of knowledge receives an exemplary treatment in Baur, *De divisione*, 316–97; According to Hans Martin Klinkenberg, “die *divisio philosophiae* gehört zu den großen philosophischen Problemen;” see “*Divisio philosophiae*” in *Scientia und Ars im Hoch- und Spätmittelalter*, ed. Ingrid Craemer-Ruegenberg and Andreas Speer, *Miscellanea Medievalia* 22, 2 vols. (Berlin: Walter de Gruyter, 1994), 1:3–19, esp. p. 3; James A. Weisheipl, “The Concept of Scientific Knowledge in Greek Philosophy,” in *Mélanges à la mémoire de Charles De Konnack* (Québec: Presses de l’Université Laval, 1968), 487–507.

Plato

Since the Platonic model exercised relatively little influence on medieval classifications of knowledge, a brief description will suffice. According to Plato, as the mind conceptualizes objects in abstraction, it contemplates them as they really are. Reality exists in a world of abstract Ideas and Forms, not in the appearances available to the senses.⁹ The mutable and inconstant phenomena of sense perception offer no possibility of arriving at true knowledge. The most that the deception of the senses can provide is mere “opinion” (δόξα), never genuine truth (ἐπιστήμη), which by definition must be unchanging.¹⁰ Number and geometric figures (square, triangle, etc.), existing independently of perception, share in the absoluteness of the abstract Forms. This notion, inherited from Pythagorean philosophy, attributed to number independent subsistence: “intermediate between the world of pure ‘ideas’ and the world of material objects perceived by sensation, . . . mathematical being is more fully real than physical, sensible being.”¹¹ Number is thus not merely an abstraction from matter perceived by the senses; rather, it is an archetype existing independently of abstractions derived from sense perception.

The tripartite Platonic classification of knowledge ascended from physics (“but ‘shadows’ and reflections of a subsisting Idea”) to mathematics (“intelligible objects to which the mind must turn as to the model of physical objects”) to dialectics (“intelligible objects apprehended without the aid of any sensible object, the mind passing only from one Idea to another Idea”). Later tradition attributed to Plato another threefold classification: (1) ethics (moral philosophy), (2) physics (natural philosophy), and (3) dialectic (rational philosophy). The latter organization, sometimes known as Platonic-Stoic, became familiar to the medieval West from Augustine’s summary: “Plato . . . philosophiam . . . in tres partes distribuit: unam moralem, quae

⁹ For the classical background I am indebted to Pierre Hadot, “Les divisions des parties de la philosophie dans l’Antiquité,” *Museum Helveticum* 36 (1979): 201–23; see also James A. Weisheipl, “The Nature, Scope, and Classification of the Sciences,” in *Science in the Middle Ages*, ed. David C. Lindberg (Chicago: Univ. of Chicago Press, 1978), 464–66.

¹⁰ In his extensive commentary on Boethius’ *De Trinitate*, Thomas Aquinas rejected Plato’s view, asserting that he erred in believing that what could be *considered* apart from matter could also *exist* independently of matter. Thomas Aquinas, *In Boethii De Trinitate*, Q. 5, a.2, responsio, ed. Bruno Decker, *Expositio super librum Boethii De Trinitate*, Studien und Texte zur Geschichte des Mittelalters 4 (Leiden: E. J. Brill, 1955): 175–76; see also the analysis in Maurer, *The Division and Methods of the Sciences*, Medieval Sources in Translation 3, 4th rev. ed. (Toronto: Pontifical Institute of Mediaeval Studies, 1986), 27–28.

¹¹ Weisheipl, “The Nature,” 465. William D. Ross argues that Aristotle fairly portrayed Plato’s theory on this point; *Aristotle*, 5th ed. rev. (London: Methuen, 1949), 157–59.

maxime in actione versatur; alteram naturalem, quae contemplationi deputata est; tertiam rationalem qua verum determinatur a falso.”¹² Since *Timaeus* was the only complete work of Plato known to the medieval West in Latin translation, Plato’s system could have hardly been understood.

Aristotle

Aristotle proposed a diametrically opposite view. Rejecting Plato’s subsistent Forms or Ideas as the ultimate realities of which the perceptible world is only a shadow, he asserted that observation of phenomena could in fact lead to true knowledge. Though Aristotle granted the abstract quality of number (more abstract than natural science), he denied the independent existence of “eternal archetypes” or mathematical entities (number and geometrical forms) apart from the mind’s activity of abstracting them from physical phenomena. Since number was abstracted from the phenomena, it could never by itself be an explanation for them. For Aristotle, then, mathematics did not enjoy the privileged position it held in Plato’s philosophical scheme.¹³ Lamenting (perhaps with a touch of exaggeration) that “mathematics has become all of philosophy for present-day philosophers,” Aristotle rejected the entire apparatus of the Pythagorean-Platonic number theory, and most emphatically the existence of cosmic music (*musica mundana*).¹⁴ He recognized mathematics as one of the speculative sciences, but he also attributed to it a place in basic education, arguing that mathematics did not require experience of the world, as did physics.

Aristotle denied that music was merely a science of proportion but (along with optics, astronomy, and mechanics) possessed a physical component as well as mathematical one. Such disciplines occupied a place *between* physics and mathematics. They were, in other words, “the more physical part of mathematics.” This viewpoint, unknown to the earlier Middle Ages, was to play a decisive role in the late 13th-century

¹² Augustine, *De civitate dei* 8.4; *Sancti Aurelii Augustini episcopi opera*, 5/1–2, ed. Emanuel Hoffmann, 2 vols., Corpus Scriptorum Ecclesiasticorum Latinorum 40 (Vienna: F. Tempisky, 1899), 1:359. Through Augustine this structure of learning entered the West. John of Salisbury (d. 1180) nurtured “une idée essentiellement augustiniennne de la sagesse et de la philosophie,” according to Joseph Mariétan, *Le problème de la classification*, 145–55.

¹³ *Metaphysics* 985b 23–986a 23, 991b 10–992a, 1084a; ed. and trans. William D. Ross, *The Works of Aristotle*, vol. 8, 2nd ed. (Oxford: Clarendon Press, 1928); the Ross edition is unpaginated. Aristotle’s reference to “those called Pythagoreans” (οἱ καλούμενοι Πυθαγόρειοι) seems to carry a hint of disdain.

¹⁴ *De celo et mundo* 2.9; 290b 12–291a 28; trans. John L. Stocks in *The Works of Aristotle*, ed. William D. Ross, *The Works of Aristotle*, vol. 2 (Oxford: Clarendon Press, 1930).

development of the *scientie medie*, a theory elaborated by Thomas Aquinas that will be discussed at the conclusion of the present survey.

Aristotle classified the sciences according to their formal object and degree of separation from matter, dividing them into two categories: speculative/theoretical and practical/active.¹⁵ The former are “necessary,” in the sense that they exist independently of human activity; the latter are contingent inasmuch as they depend on human activity. Among the speculative sciences the highest place was occupied by metaphysics, the “first philosophy,” followed by mathematics, and natural science (physics).¹⁶ Metaphysics considered subsistent, immaterial being, mathematics considered number abstracted from matter, and physics considered objects inseparable from matter and change (motion).

Practical philosophy also had three subdivisions, based on the three levels of human interaction: social (politics), domestic (economics), and personal morality (ethics). Aristotle also took cognizance of a third category: the “productive” arts (medicine, gymnastics, grammar, statuary, music, poetics), which produced either an interior modification of the agent or an external object. He had little to say directly about this concept, and it was not taken up in the medieval classifications of knowledge, despite its manifold possibilities for the philosophical reevaluation of *musica*.¹⁷ Though the author of masterful analyses of the art of reasoning in the *Prior* and *Posterior Analytics*, Aristotle excluded dialectic (logic) from true philosophy, considering it only a useful, though not infallible, instrument for the attainment of true knowledge.

Boethius

Boethius is a figure known to music historians almost exclusively for his *De institutione musica*, a treatise derived from Nichomachos of Gerasa (2nd century B.C.). In addition to original philosophical treatises, very well known in the Middle Ages, Boethius translated and commented on several of Aristotle’s works on logic and natural science.¹⁸

¹⁵ *Metaphysics* 6.1–2 (1025b 1–1026a 33); cf. *Metaphysics* 1.1, 980b 25–981b 10.

¹⁶ “Aristote pose seulement le principe qu’une science est plus philosophique si elle est plus théorique et plus universelle” (Hadot, “Les divisions,” 202).

¹⁷ Aristotle mentions “the distinction of the sciences into speculative, practical, and productive” twice in the *Topics* (157a 10 and 145a 15); trans. W. A. Pickard-Cambridge, *The Works of Aristotle*, vol. 1, ed. William D. Ross, (Oxford: Clarendon Press, 1924). In the *Metaphysics* Aristotle argued that, “if all thought is either practical, productive or theoretical, there is a science of nature, and evidently it must be different from both practical and from productive science” (*Metaphysics* 1025b 25; cf. *Metaphysics* 1064a 10 and 16–18).

¹⁸ He had planned to perform the same service for *all* the works of the Philosopher, but his untimely death—not to mention the gigantic scope of the project—prevented him from fully realizing this ambitious plan. A similar project was planned for the works

He had projected a complete cycle of treatises on the seven liberal arts, but only those on mathematics and music, the latter incomplete, survive. Since classifications of knowledge were not dogmatic philosophical positions, it is not surprising to discover in the works of Boethius and many later authors alternate classifications based on different but related principles.¹⁹ The first two of Boethius' classifications of knowledge occur in successive commentaries on Porphyry's *Isagoge* (an introduction to Aristotle's *Categories*). The third (partial) classification appears at the beginning of a theological tractate, *De Trinitate*.²⁰ Due to the unavailability of the texts on which they were founded, particularly Aristotle's works on natural science and metaphysics, Boethius' classifications could not have been interpreted properly in the early Middle Ages.

Boethius' first commentary on the *Isagoge* divided knowledge into (1) theoretical or speculative ("de rerum naturis") and (2) practical or active ("de moribus"), an Aristotelian perspective not surprising in a commentary on the *Isagoge*.²¹ The three subdivisions of theoretical

of Plato. Boethius managed to finish translations of Aristotle's logical works (*Categories*, *Peri Hermeneias* [On Interpretation]): on which he also wrote commentaries—one on the *Categories* and two (elementary and advanced) on the *Peri hermeneias* in addition to the two commentaries on Porphyry's *Isagoge* (Introduction) to the *Categories*. Boethius' original philosophical works include *De divisionibus*, *Ad categoricos syllogismos introductio*, *De differentiis topicis*, *De syllogismo categorico*, and *De syllogismo hypothetico*. Other Latin translations of Aristotle attributed to Boethius—*Analytica Priora* and *Posteriora*, *Topica*, *Sophistici Elenchi* (reprinted in Jacques-Paul Migne, ed., *Patrologia Latina* 64, tomus posterior [1891] hereafter PL)—are the work of the noted translator, James of Venice (ca. 1128). The authentic translations by Boethius, along with his own *De divisionibus* and *De differentiis topicis*, became the core of medieval teaching on logic. This group of treatises came to known as the "logica vetus" to distinguish it from the logical works of Aristotle made available in translation in the last half of the 12th century, though not appreciated—or thoroughly understood—until sometime later. The "logica nova" (*Prior* and *Posterior Analytics*, explaining the theory of the syllogism, *Topica* and the *Sophistici elenchi*.) completed what was known as the *Organon*, i.e. the "instrument" of logical thought applicable to other branches of philosophy. See John Caldwell, "Boethius," *Die Musik in Geschichte und Gegenwart: Personenteil* (New York: Bärenreiter, 1994–), 2:220–28; Calvin Bower, "Boethius," *New Grove Dictionary of Music and Musicians*, 2nd ed. (New York: Grove's Dictionaries, 2000), 2:784–86; Margaret T. Gibson, ed., *Boethius: His Life, Thought and Influence* (Oxford: Blackwell, 1981).

¹⁹ Unlike the view taken in the present essay, Mariétan (*Le problème de classification*) regards all classifications antecedent to that of Thomas Aquinas as somehow insufficient.

²⁰ Leo Schrader ("Music in the Philosophy of Boethius," *Musical Quarterly* 33 [1947]: 188–200) does not seem to discriminate between the *Isagoge* commentaries and *De Trinitate*.

²¹ *In Isagoge Porphyrii Comm. ed. prima*, 1:3–4, ed. Samuel Brand, *Corpus Scriptorum Ecclesiasticorum Latinorum* 48 (Vienna: F. Tempusky, 1906), 7–10; hereafter CSEL. The *Isagoge* has been translated by Edward W. Warren, *Porphyry the Phoenician: Isagoge*, *Mediaeval Sources in Translation* 6 (Toronto: Pontifical Institute of Mediaeval Studies, 1975). See Ralph McInerny, *Boethius and Aquinas* (Washington: The Catholic Univ. of America Press,

philosophy (*de intellectibilis, de intelligibilis, de naturalibus*) correspond to three degrees of abstraction, an Aristotelian principle encountered also in *De Trinitate* and influential in most later classifications.²² *Intellectibile*, the subject of the first and highest classification, is “that which, existing always one and the same and itself in its own divinity, is grasped by none of the senses but by intellect alone.”²³ The mind need not abstract from matter to consider the *intellectibilia*, since by definition matter is absent. The second category of speculative philosophy (*intelligibile*) embraces substances that have degenerated from the purity of *intellectibilia* because of their incorporation into matter.²⁴ This (somewhat puzzling) category includes human contemplation of the intellectible (all the celestial works of the higher divinity) as well as another category of being (“quicquid sub lunari globo beatiore animo atque puriore substantia valet”) more difficult to define, and human souls. The third division of theoretical philosophy (“de naturalibus”) is the equivalent of natural philosophy, which embraces “the natures and properties of bodies.”²⁵

Boethius included another classification of knowledge in the theological tractate *De Trinitate*.²⁶ This classification appears in a theological work, because an understanding of the hierarchy of speculative philosophy is required for the comprehension, insofar as humanly possible, of the most profound of Christian mysteries, the Trinity.²⁷ (Given the context, practical philosophy could be omitted.) The three divisions of this

1990); also Markus Enders, “Zum Philosophie-Verständnis des Boethius ausserhalb der *Consolatio philosophiae*,” in *Was ist Philosophie im Mittelalter?, Akten des X. Internationalen Kongresses für mittelalterliche Philosophie der Société Internationale pour l’Étude de la Philosophie Médiévale*, 25. bis 30. August 1997 in Erfurt, *Miscellanea Mediaevalia* 26, ed. Jan A. Aertsen and Andreas Speer (Berlin: Walter de Gruyter, 1998), 444–51, esp. 445n4. Boethius distinguished the *artes* that produce a product from philosophy, whose activity is “sola rerum primaeva ratio” (CSEL 48:7 [ll. 15–16]).

²² *In Isagog. Porph. Comm., ed. sec.* 3 (CSEL 48:8 [ll. 8–9]). For further discussion see Enders, “Zum Philosophie-Verständnis,” 445–47.

²³ *Intellectibile quod unum atque idem per se in propria semper divinitate consistens nullis umquam sensibus, sed sola tantum mente intellectu capitur*; CSEL 48:8 [ll. 14–16]), trans. McInerny, *Boethius and Aquinas*, 122.

²⁴ *Secunda vero est pars intelligibilis, quae primam intellectibilem cogitatione atque intelligentia comprehendit, quae est omnium caelestium supernae divinitatis operum et quidquid sub lunari globo beatiore animo et puriore substantia valet et postremo humanarum animarum*; *ibid.*

²⁵ *Circa corpora atque eorum scientiam cognitionem versatur, quae est physiologia, quae naturas corporum passionisque declarat* (CSEL 48:9 [ll. 6–9]).

²⁶ On the sources see Enders, “Zum Philosophie-Verständnis,” 450n29; on *De Trinitate*, see McInerny, *Boethius and Aquinas*, 121–24; Weisheipl, “Nature, Scope,” 476.

²⁷ Ancius Manlius Severinus Boethius, *De Trinitate*, ed. Hugh F. Stewart, Edward K. Rand, and S. Jim Tester, *Boethius: The Theological Tractates*, revised ed. (Cambridge: Harvard Univ. Press, 1973 [1990]), 8–12. The brief chapter (2) from *De Trinitate* is also translated in Armand Maurer, *The Division and Methods of the Sciences*, 3–4; see also Grabmann, *Die scholastische Methode*, 1:163–77; Michael Bernhard, “Boethius im mittelalterlichen

classification are arranged in an ascending order according to the dignity of the object and the degree of abstraction, thus “distinguishing between the way things are and the way they are considered by us.”²⁸ On the lowest level of speculative philosophy, *naturalis* (physics) deals with bodies that cannot be separated from matter and motion (“quae a corporibus actu separari non possunt, quae corpora in motu sunt”).²⁹ At the second level of the classification, the obscure category of *intelligibilia* of the *Isagoge* commentary is replaced with *mathematica*: forms (number, line, geometric figures) abstracted from matter but not entirely separate from it (“sine motu inabstracta . . . quae formae cum in materia sunt, ab his separari non possunt”).³⁰ The highest realm is *philosophia theologica*, which contemplates beings entirely separate (and not merely separable) from matter both in the intellect and in reality (“sine motu abstracta atque separabilis”).

In *De institutione musica* Boethius tried to balance the views of Plato and the Stoics vs. Aristotle with respect to the relationship between number and musical sound.³¹ He seems to endorse the Aristotelian empirical position that sense perception can provide the basis for intellectual abstraction: “the whole origin of this discipline is taken from the sense of hearing” (a sensu aurium huiusce artis sumatur omne principium), but Boethius still warned that “we should not grant all judgment to the senses” (ut non omne iudicium sensibus demus). Like a true Pla-

Schulunterricht,” in *Schule und Schüler im Mittelalter: Beiträge zur europäischen Bildungsgeschichte des 9. bis 15. Jahrhunderts*, eds. Martin Kintzinger, Sönke Loraenz, and Michael Walter (Cologne: Böhlau, 1996), 11–27. James Weisheipl (“The Nature,” 471) provides a schematic classification chart that “represents the way [Boethius] was read during the later Middle Ages.”

²⁸ McNerny, *Boethius and Aquinas*, 124; Thomas Aquinas, *In Boethii De Trinitate*, q 5, a 1, sed e contra, ed. Decker, *Expositio super librum Boethii De Trinitate*, 163–64; Maurer, *The Division and Methods of the Sciences*, 12; Jacques Maritain, *Philosophy of Nature*, trans. Imelda C. Byrnel (New York: Philosophical Library, 1951), 12–31 (“The Orders of Abstractive Visualization”); see Enders, “Zum Philosophie-Verständnis,” 448–51. Aristotle’s principles of division are stated in *Metaphysics* 6.1 (1026a 7–33) and 11.7 (1064a–1065a 5).

²⁹ The philosophical concept of “motion” implies change, not solely, or even primarily, physical relocation.

³⁰ Although not listed here, the four disciplines of the quadrivium constitute the subject matter of this division of philosophy. Matthias Lutz-Bachmann, “Die Einteilung der Wissenschaften bei Thomas von Aquin: Ein Beitrag zur Rekonstruktion der Epistemologie in Quaestio 5, Artikel 1 des ‘Kommentars’ von Thomas zum Trinitäts-traktat des Boethius,” in “*Scientia*” und “*Disciplina*”: *Wissenschaftstheorie und Wissenschaftspraxis im 12. und 13. Jahrhundert*, 235–47. On the problem caused by Boethius’ translation of two separate Aristotelian concepts by the single “inabstracta,” see McNerny, *Boethius and Aquinas*, 127–28.

³¹ On the reception of Boethius previous to the 12th century, see Calvin Bower, “The Role of Boethius’ *De institutione musica* in the Speculative Tradition of Western Musical Thought,” in *Boethius and the Liberal Arts: A Collection of Essays*, ed. Michael Masi, Utah Studies in Literature and Linguistics 18 (Bern: Peter Lang, 1981), 157–74.

tonist, he evoked the difference of opinion that results “de errore sensuum” and proclaimed the primacy of intellectual apprehension: “although the basic elements of almost every discipline—and of life itself—are introduced through the impression of the senses, nevertheless there is no certain judgment, no comprehension of truth in these if the arbitration of reason is lacking.”³² Nevertheless, in chapter 3 of *De institutione musica* Boethius defended a physical definition of music: “consonance, which governs all setting out of pitches, cannot be made without sound; sound is not produced without some pulsation and percussion; and pulsation and percussion cannot exist by any means unless motion precedes them.”³³ Ambivalence about the relationship between sense perception and abstract contemplation will be encountered again and again in the medieval classifications of knowledge, which gradually tilt away from a Pythagorean perspective toward an Aristotelian one.

While Boethius’ commentaries on Porphyry and the *De Trinitate* tractate are significant texts for establishing his conception of the classification of knowledge, it was the authoritative *De institutione musica* that most influenced the treatment of music in medieval classifications of knowledge.³⁴ *Musica*, an indispensable part of the quadrivium, was taken over by the classifications and situated at the second level of abstraction. In part, this was a “default” situation, for Aristotle had expressed himself only rarely about music and never in a manner that conformed to its Pythagorean status as part of mathematics. Boethius, as the only Latin author of Late Antiquity who wrote about music, could not be ignored by medieval classifications of knowledge. Most importantly, Boethius had formulated the definitive classification of

³² Nam licet omnium paene artium atque ipsius vitae momenta sensuum occasione producta sint, nullum tamen in his iudicium certum, nulla veri est comprehensio, si arbitrium rationis abscedat; *Anicii Manlii Torquati Severini Boethii De institutione arithmetica libri duo, De institutione musica libri quinque*, ed. Gottfried Friedlein (Leipzig: Teubner, 1867), 196 [1.9] (hereafter Friedlein). The treatise on music has been translated into English with copious annotations by Calvin Bower, *Fundamentals of Music* (New Haven: Yale Univ. Press, 1989), 17 (all English translations are taken from this volume). Helpful also is the Latin-French edition of Christian Meyer, *Boèce: Traité de la Musique* (Turnhout: Brepols, 2004), 44–47. Most of chap. 9 of the first book of *De institutione musica* is taken up with the “deception of the senses” as it relates to the definition and study of music. Boethius’ ambivalence is discussed in Eva Hirtler, *Die Musica als scientia mathematica von der Spätantike bis zum Barock*, Europäische Hochschulschriften, series 36, vol. 137 (Frankfurt: Peter Lang, 1995), 25–45.

³³ Consonantia, quae omnem musicae modulationem regit, praeter sonum fieri non potest, sonus vero praeter quendam pulsum percussionemque non redditur, pulsus vero atque percussio nullo modo esse potest, nisi praecesserit motus; *De institutione musica* 1.3; ed. Friedlein, 189; trans. Bower, 11.

³⁴ As Michael Bernhard has observed, “die Bedeutung der Werke des Boethius für das mittelalterliche Geistesleben kann kaum überschätzt werden”; see “Boethius im mittelalterlichen Schulunterricht,” in *Schule und Schüler im Mittelalter*, 11.

musica into *mundana*, *humana*, and “*quae in quibusdam constituta est instrumentis*,” a distinction repeated innumerable times throughout the Middle Ages, not only in music treatises but also in philosophically oriented literature. The relevant passages from *De institutione musica* are outlined in Table 1.³⁵ Each of the three genera of music is subdivided into three subdivisions, a parallelism that cannot be entirely accidental. These were repeated *ad infinitum* in the music theory and philosophical literature of the Middle Ages, so there is little reason to tarry here with an explanation of them.

Cassiodorus and Isidore

Two additional sources of information about music used by authors of medieval classification systems were the *Institutiones divinarum et saecularium litterarum* of Cassiodorus (ca. 485–ca. 580) and the *Etymologies* of Isidore of Seville (ca. 560–636). Cassiodorus proposed a classification of philosophy based on the bipartite Aristotelian model (speculative-practical). After defining music as a mathematical discipline that speaks of numbers related “*ad aliquid*” (i.e. proportion), Cassiodorus subdivided it into *armonica*, *rithmica*, and *metrica*—a division that will be encountered frequently in medieval classifications of knowledge, though with the frequent substitution of *melica* for *armonica*. These three categories refer, respectively, to the pitch of sounds, to melody rhythmically shaped by the words, and to the judgment about how well the two fit together (“*utrum bene sonus an male cohaereat*”). “*Metrica*” refers to the musical settings of metric texts—an explicitly verbal orientation.³⁶ In the *Etymologies*, Isidore repeated the words of Cassiodorus in his treatment of the three *partes* of music. He followed this, however, with a different threefold division of music (“*De triformi musicae divisione*”): *harmonica*, *organica*, and *metrica*. The first is defined as “*modulatio vocis*,” the second is generated “*ex flatu*” (subsequently, several wind instruments are listed), and the third is music that “*receives its numbers by the stroke of the fingers*” (a reference to plucked string instruments and percussion). Each of these divisions serves as a basis for further definitions, as was Isidore’s wont.

³⁵ *De institutione musica* 1.2; ed. Friedlein, 187–88; trans. Bower, 9–10.

³⁶ *Musicae partes sunt tres: armonica—rithmica—metrica. Armonica est scientia musica quae decernit in sonis acutum et gravem. Rithmica est quae requirit incursionem verborum, utrum bene sonus an male cohaereat. Metrica est quae mensuram diversorum metrorum probabili ratione cognoscit*; Roger A. B. Mynors, ed., *Cassiodori Senatoris Institutiones* (Oxford: Clarendon Press, 1937), 142–50 (2.5); trans. Leslie Webber Jones, *An Introduction to Divine and Human Readings* (New York: Columbia Univ. Press, 1946; repr. 1966), 190–91. Cf. Aurelian of Réôme, *Musica Disciplina* 4, ed. Lawrence Gushee, *Corpus Scriptorum de Musica* 21 (n.p.: American Institute of Musicology, 1975), 66–68 (hereafter CSM).

TABLE 1

Musica in the De institutione musica of Boethius

Et primum ea, quae est <i>mundana</i> , in his maxime perspicienda est, quae in ipso caelo vel compage elementorum vel temporum varietate visuntur.	The first kind, the cosmic, is discernible especially in those things which are observed in heaven itself or in the combination of elements or the diversity of seasons.
Qui enim fieri potest, ut tam velox caeli machina tacito silentique cursu moveatur?	For how can it happen that so swift a heavenly machine moves on a mute and silent course?
<i>Humanam</i> vero musicam quisquis in sese ipsum descendit intellegit.	Whoever penetrates into his own self perceives human music.
Quid est enim quod illam incorpoream rationis vivacitatem corpori misceat, nisi quaedam coaptatio et veluti gravium leviumque vocum quasi unam consonantiam efficiens temperatio?	For what unites the incorporeal nature of reason with the body if not a certain harmony and, as it were, a careful tuning of low and high pitches as though producing one consonance?
Quid est aliud quod ipsius inter se partes animae coniungat, quae, ut Aristoteli placet, ex rationabili irrationabilique coniuncta est?	What other than this unites the parts of the soul, which, according to Aristotle, is composed of the rational and the irrational.
Quid vero, quod corporis elementa permisceat, aut partes sibimet rata coaptatione contineat?	What is it that intermingles the elements of the body or holds together the parts of the body in an established order?
Tertia est musica, quae in <i>quibusdam consistere dicitur instrumentis</i> . Haec vero administratur aut intentione ut nervis, aut spiritu ut tibiis, vel his, quae ad aquam moventur, aut percussione quadam, ut in his, quae in concava quaedam aerea feriuntur, atque inde diversi efficiuntur soni. (<i>De institutione musica</i> 1.2; ed. Friedlein, 187–88)	The third kind of music is that which is said to rest in various instruments. This music is governed either by tension, as in strings, or by breath, as in the aulos or those instruments activated by water, or by a certain percussion, as in those which are cast in concave brass, and various sounds are produced from these. (trans. Calvin Bower, 9–10)

The Musical Writings of Al-Fārābī

Fundamental to Al-Fārābī's conception of the quadrivium is the distinction between *scientia musicae activa* and *scientia musicae speculativa*.³⁷ He distinguished two kinds of *musica activa*: that made *per naturam* (the human voice) and that generated *per artem* (musical instruments).³⁸ Al-Fārābī's distinction could have led to parity between theoretical and practical music, but the weight of the western speculative tradition was too strong, and Latin philosophers paid little attention to practical music. Although Arabic science exercised a powerful influence on 12th- and 13th-century thought, music was not one of the subjects that underwent a transformation under this influence. Authors of the medieval classifications knew of Arabic music theory exclusively through the Spaniard Dominicus Gundissalinus, whose translations and original works will be discussed below.

Medieval Classifications of Knowledge

New classifications of knowledge were needed in the 13th century, because the traditional framework of knowledge, the trivium and quadrivium, could not absorb the vast breadth of the Aristotelian corpus, whose true scope began to be absorbed only towards the end of the 12th century. To the *logica vetus* (works of Aristotle in Latin translation and original works of Boethius that were known in the earlier Middle Ages) had been added translations of hitherto unavailable works of the Philosopher, a process completed by the first half of the 13th century. Though 13th-century learning came to be dominated by Aristotelian logic, natural science, and metaphysics, the unique contents of the *artes liberales* and the sheer weight of tradition they embodied assured them a place in the new classifications of knowledge.³⁹

³⁷ *De scientiis* (early 10th c.), see Guy Beaujouan, "The Transformation of the Quadrivium," in *Renaissance and Renewal in the Twelfth Century*, ed. Robert L. Benson and Giles Constable (Cambridge: Harvard Univ. Press, 1982), 463–87, esp. 464–65. Beaujouan observed that 11th-century education in arithmetic and music made use of the pupil's hand, and that, until the spread of solmisation, the monochord was the favored instrument for teaching intervals. One might note as well that the abandonment of the monochord further separated music from mathematical principles.

³⁸ For this reference I am indebted to Frank Ll. Harrison, "Music at Oxford before 1500," in *The History of the University of Oxford 2: Late Medieval Oxford*, ed. Jeremy I. Catto and Ralph Evans (Oxford: Clarendon Press, 1992), 347–68.

³⁹ Philippe Delhaye characterized the development as "une certaine permanence des arts libéraux comme éléments de synthèses très différemment orientées" in his "La place des arts libéraux dans les programmes scolaires du XIII^e siècle," in *Arts libéraux et philosophie au moyen âge*, 161; see also Gordon Leff, "The Trivium and the Three Philosophies," in *A History of the University in Europe 1: Universities in the Middle Ages*, 308.

The quadrivium was less of a problem than the trivium for the new classifications, since it fit conveniently into the mathematical division of speculative philosophy, even though its contents had to be adapted to an Aristotelian conception of knowledge. With respect to music this presented a problem. Since music was obviously *sound*, why should it not be considered part of natural science (a branch of knowledge very important to Aristotle) or even one of the *scientie mechanice*, since these involved notions of making (*opus*) and activity (*operatio*) that seemed to be applicable to music? How could the honorable place of music among the mathematical disciplines be justified, while accommodating its physical component?

The surviving medieval classifications vary considerably in degree of comprehensiveness. Some of the most important ones (Hugh of St. Victor, Dominicus Gundissalinus, Robert Kilwardby) are large, independent treatises that explain in detail the *raison d'être* of the classification and comment extensively on each of its parts. Shorter classifications are found in commentaries on authoritative texts, either as introductory matter or embedded in the commentary itself (e.g. William of Conches on *Timaeus*, Raoul de Longchamp on *Anticlaudianus*, Thomas Aquinas on Boethius *De Trinitate*).⁴⁰ Still others, like the anonymous *Tractatus quidam* (containing four classifications), are outlines of study or “introductions to philosophy” that would have been of use to university students.⁴¹ A classification of knowledge is implied in a famous set of “examination questions” that can be associated with the University of Paris.⁴² It was a custom for regent masters at Paris, particularly those embarking on this role for the first time, to commence a course of lectures with a comprehensive statement that presented their view of the scope and interconnectedness of human knowledge. Most of these masters’ introductions (*principia*) have undoubtedly been lost, others await transcription and publication. Those available offer a representative

⁴⁰ Olga Weijers, *Le maniement du savoir*, 192. She notes the frequency with which the introductions to commentaries on Porphyry’s *Isagoge* contained such classifications.

⁴¹ Gilbert Dahan, “Une introduction à la philosophie au XII^e siècle: Le *Tractatus quidam de philosophia et partibus eius*,” *Archives d’histoire doctrinale et littéraire du moyen âge* 49 (1982): 155–93. There is an edition of four representative introductions by Claude Lafleur, *Quatre Introductions à la philosophie au XIII^e siècle: Textes critiques et études historiques* (Montréal: Institut d’Études Médiévales, 1988). These will be discussed below.

⁴² For references to the extensive literature on this collection see Claude Lafleur with Joanne Carrier, eds., *L’enseignement de la philosophie au XIII^e siècle: Autour du “Guide de l’étudiant” du ms. Ripoll 109*, *Studia Artistarum* 5 (Turnhout: Brepols, 1997), esp. the “plan détaillé” on p. xiv–xvii. Publication of Prof. Lafleur’s edition of the “Guide” is anticipated in the Corpus Christianorum Continuatio Medievalia series. Some aspects will be discussed in my “University Examinations and Questions on Music in Thirteenth-Century Paris” to be published in *Studies in Music from the University of Western Ontario* (2007).

sample of the varieties of classification.⁴³ Few of the classifications are notably discursive; the various alternatives can be reduced to a small number of prototypes. Even the vast *Speculum doctrinale* of the encyclopedist Vincent of Beauvais (ca. 1190–ca. 1264) has little new to offer. Though it catalogues no fewer than ten definitions of philosophy, all of the classifications of knowledge are derived from earlier sources.⁴⁴

Since I propose to explore the place occupied by *musica* in the *divisiones scientiarum*, I will not take into account the music theory treatises that explain intervals, modes, psalmody, and (later) rhythm with a practical intent.⁴⁵ Rarely do traces of the new philosophical learning appear in these treatises. One might credit only Lambertus (quidam Aristoteles), Egidius of Zamora, Johannes de Grocheio, Engelbert of Admont, Jacques de Liège, Johannes de Muris [Jehan de Murs], Marchetto of Padua, and Ugolino of Orvieto with an effective understanding of Aristotelian philosophy and its methodologies, some of which they applied to musical matters.⁴⁶ On the other hand, philosophers would not have bothered to consult works devoted to music theory: their pragmatism would have rendered them unsuitable for philosophical purposes. (Not surprisingly, there are no references to contemporary music making in the classifications of knowledge.) For a philosopher to consider *musica*, the tangible, perceptible aspects of the object had to be sublimated or “abstracted,” a process described by Jacques Maritain as one that “con-

⁴³ Grabmann, *Die scholastische Methode*, 2:42–58; Gilbert Dahan, “Les classifications du savoir aux XII^e et XIII^e siècles,” in *L’enseignement philosophique* 40/4 (1990): 5–27; idem, “Le classificazioni delle scienze e l’insegnamento universitario nell’XII secolo,” in *Le Università dell’Europa: Le Scuole e i Maestri. Il Medioevo*, eds. Gian Paolo Brizzi and Jacques Vergier (Milan: Silvana, 1994), 19–43.

⁴⁴ Gottfried Göller, *Vinzenz von Beauvais O.P. (um 1194–1264) und sein Musiktraktat im Speculum Doctrinale*, Kölner Beiträge zur Musikforschung 25 (Regensburg: Gustav Bosse, 1959), 60–62 and 92–93. *Speculum doctrinale* 1.14–18. The most recent comprehensive study is Monique Paulmier-Foucart with Marie-Christine Duchenne, *Vincent de Beauvais et le Grand miroir du monde* (Turnhout: Brepols, 2004), which refers to a dissertation by Serge Lusignan, “Le *Speculum doctrinale*, livre III: Étude de la logique dans le Miroir des sciences de Vincent de Beauvais” (Ph.D. diss., Université de Montréal, 1971, 117–39).

⁴⁵ On the presence of philosophical concepts in theory treatises see Joseph Dyer, “Chant Theory and Philosophy in the Late 13th Century,” in *Cantus Planus: Papers Read at the Fourth Meeting—Pécs, Hungary, 3–8 September 1990*, ed. László Dobszay (Budapest: Hungarian Academy of Sciences-Institute for Musicology, 1992), 99–118.

⁴⁶ Hermann Abert, *Die Musikanschauung des Mittelalters und ihre Grundlagen* (Halle an der Saale: M. Niemeyer, 1905; repr. Tutzing: Schneider, 1964) takes up in detail only the church Fathers and the music theorists, as does Gerhard Pietzsch, *Die Klassifikation der Musik von Boetius bis Ugolino von Orvieto*, Studies zur Geschichte der Musiktheorie im Mittelalter 1 (Halle an der Saale: M. Niemeyer, 1929); see also Frank Hentschel, *Musik—und die Geschichte der Philosophie und Naturwissenschaften im Mittelalter: Fragen zur Wechselwirkung von ‘Musica’ und ‘Philosophia’ im Mittelalter*, Studien und Texte zur Geistesgeschichte des Mittelalters 62 (Leiden: E. J. Brill, 1998).

sists in the extraction of the intelligible type by which we separate what belongs to the essence or formal *ratio* of an object of knowledge from the contingent and material data.”⁴⁷ A far cry from ecclesiastical modes and psalm tones!

Classifications of Knowledge from the School of Chartres

Before the rise of the universities in the latter part of the 12th century, the cathedral school at Chartres enjoyed high prestige as a center of learning.⁴⁸ Receiving its initial impetus from Fulbert, chancellor of the cathedral and subsequently bishop of Chartres (1006–28), an inspiring leader who attracted a large number of pupils,⁴⁹ its intellectual foundations were laid a century later by Bernard (d. ca. 1130), a Platonist by inclination, whose vast learning was praised by John of Salisbury.⁵⁰ The classifications of knowledge produced by the Chartrains and their followers in the 12th century hewed rather closely to the traditions of the liberal arts, only slightly influenced by the new Aristotelian texts arriving on the scene during the last half of the century. The most important Chartrain authors of *divisiones scientiarum* were Thierry of Chartres, William of Conches, Hugh of St. Victor, and Richard of St. Victor. Following in their footsteps—and important for its treatment of music—is the anonymous *Tractatus quidam* (second half of the 12th century) that was mentioned earlier.

William of Conches (ca. 1080–ca. 1154) developed a classification of knowledge in the prologue to his commentary on Plato’s *Timaeus*, a text of central importance to the Chartrains and the only work of Plato known to the western Middle Ages in Latin translation.⁵¹ William did

⁴⁷ Jacques Maritain, *Philosophy of Nature*, 16.

⁴⁸ [Jules] Alexandre Clerval, *Les écoles de Chartres au Moyen Âge: du Ve au XVIe siècle* (Paris: A. Picard et fils, 1895; repr. Frankfurt am Main: Minerva Verlag, 1965); Raymond Klibansky, “The School of Chartres,” in *Twelfth-Century Europe and the Foundations of Modern Society*, ed. Marshall Clagett, Gaines Post, and Robert Reynolds (Madison: Univ. of Wisconsin Press, 1961), 3–14; Richard W. Southern, *Medieval Humanism and Other Studies* (Oxford: Oxford University Press, 1970), 61–85; Jean Châtillon, “Les écoles de Chartres et de Saint-Victor,” in *La scuola nell’Occidente latino dell’alto medioevo*, Settimane di studio sull’alto medioevo 19, 2 vols. (Spoleto: Centro Italiano di Studi sull’Alto Medioevo, 1972), 2:798–801.

⁴⁹ His character is eloquently portrayed in Richard W. Southern, *The Making of the Middle Ages* (New Haven: Yale Univ. Press, 1953), 199–206.

⁵⁰ Winthrop Wetherbee, “The School of Chartres,” in *A Companion to Philosophy in the Middle Ages*, ed. Jorge J. E. Garcia and Timothy B. Noone (Oxford: Blackwell, 2003), 37–39; Wetherbee contests the position of Richard Southern, who had denied that the scholars of Chartres were harbingers of new learning, but only “the last of the Carolinian grammarians.”

⁵¹ PL 172:247. Steven P. Marrone remarks that “a Platonic worldview did shape most approaches to nature in western Europe in the 12th century” in “Medieval Philosophy

not venture far beyond the classical view of the liberal arts as the core of knowledge—ultimately in the service of theology. His classification is based on a pedagogical model (“ordo vero discendi”) that corresponds to the Platonic-Stoic scheme: dialectic, ethics, and physics. William’s program of study begins with *eloquentia*, made up of the disciplines of the trivium (grammar, dialectic, rhetoric). Practical science includes (personal) ethics and economics (family relations), both well known from Platonic and Stoic classifications.

Special emphasis is allotted to the quadrivium, which occupies the place that will be reserved for natural science in later classifications of knowledge. William’s classification of music follows the threefold Boethian division, but the subdivisions of *musica instrumentalis* have been borrowed from the *musicae partes* (armonica-rithmica-metrica) of Isidore or Cassiodorus, except for the substitution of “melica” for *armonica*.⁵² As Herbert Schueller suggests, this may be merely an attempt to introduce greater clarity for the benefit of contemporary readers, not a change in basic meaning. Cassiodorus’ definition of the deleted *armonica* was “scientia musica quae decernit in sonis acutum et gravem,” essentially melody, as the term was construed by Isidore of Seville, who described it as “modulatio vocis.” For William, the culmination of knowledge, to which all previous studies lead, is the study of divine revelation in the Scriptures.

20

Hugh of St. Victor

A characteristic product of the Chartrain milieu and one of the most influential of medieval classifications of knowledge is the *Didascalii-*

in Context,” in *The Cambridge Companion to Medieval Philosophy*, ed. Arthur S. McGrade (Cambridge: Cambridge Univ. Press, 2003), 26; see also Schueller, *The Idea of Music*, 351–53. Edouard Jeanneau, ed., *Guillaume de Conches: Glosae super Platonem* (Paris: J. Vrin, 1965); Carmelo Ottaviano, *Un brano inedito della Philosophia di Guglielmo di Conches* (Naples: A. Morano, 1935), 26ff. William also published a treatise on natural science, *Philosophia mundi* (PL 90:39–102 [there attributed to Honorius of Autun]). The final chapter (“Quis sit ordo discendi”) contains an implied classification of knowledge (PL 90:100–102) that culminates with *divina scientia*: “quippe per cognitionem creaturae ad cognitionem creatoris perveniamus.”

⁵² *Musicae partes sunt tres, id est, harmonica, rythmica, metrica. Harmonica est, quae decernit in sonis acutum et gravem. Rythmica est, quae requirit incursionem verborum, utrum bene sonus an male cohaereat. Metrica est, quae mensuram diversorum metrorum probabili ratione cognoscit, ut verbi gratia heroicon, iambicon, elegiacon, et cetera. Isidore de Seville, *Etymologiarum sive originum libri XX*, 2 vols., ed. William M. Lindsay (Oxford: Clarendon Press, 1911), 3.18; cf. Cassiodorus, *Institutiones* 2.5.5 (*musicae partes sunt tres: armonica—rithmica—metrica*), ed. Mynors, 144. Cassiodorus’ division of *musica instrumentalis* was *percussionalia—tensibilia—inflatilia*, a division not unlike that of Boethius.*

con de studio legendi of Hugh of St. Victor (1096–1141).⁵³ The *Didascalicon* presents a comprehensive classification of knowledge that embraces theoretical philosophy, practical philosophy, mechanics (*adulterinae scientie*), and logic. Hugh's classification is fourfold.⁵⁴ Theoretical/speculative philosophy is divided into the three familiar categories: (1) theology (more properly metaphysics: forms separate from matter, but not including Christian *divina scientia*, knowable only from revelation), (2) mathematics (the quadrivium), and (3) physics.⁵⁵ Practical philosophy encompasses the conventional categories (personal, family, political). Logic and the *scientiae sermocinales* (grammar, dialectic, rhetoric) complete the presentation of the liberal arts, but are not, strictly speaking a part of philosophy. Hugh also allotted a place to the *scientie mechanice*, a point that would not go unnoticed in later classifications that borrowed from the *Didascalicon*. Table 2 is an analysis, by no means exhaustively detailed, of Hugh's classification.

Music occupies its traditional place as a part of mathematics, inserted as a block under *philosophica theorica* in the classification.⁵⁶ Although there is no extended discussion of music in the *Didascalicon*, Hugh's analysis of its components is very detailed.⁵⁷

The broad outlines of the classification of music (mundana, humana, instrumentalis) stem from Boethius (see Table 1), each subdivision

⁵³ *Didascalicon de studio legendi*, book 2 ("De discretione artium"); ed. Charles Henry Buttner, *The Catholic University of America Studies in Medieval and Renaissance Latin 10* (Washington: Catholic Univ. of America Press, 1939); trans. Jerome Taylor, *Didascalicon: A Medieval Guide to the Arts* (New York: Columbia Univ. Press, 1962). In *De sacramentis christianae fidei*, Hugh placed the quadrivium and physics at the service of the allegorical and tropological senses of Scripture (Chap. 6: "Quomodo omnes artes subserviunt divinae sapientiae;" PL 176:185). See also the discussion in Weisheipl, "The Nature," 474, and idem, "Classification of the Sciences in Medieval Thought," 65–66 ("a successful combination of the Boethian and Stoic classifications of science"); Weijers, *Le maniment*, 189–90; Schueller, *The Idea of Music*, 348–51 and Appendix C (outline), 439–41; Dahan, "Tractatus," 173; Pietzsch, *Die Klassifikation*, 75–77. Hugh's sources are listed in Baur, *De divisione*, 361–62. One finds the same perspective in Gundissalinus, prol.; ed. Baur, *De divisione*, 15–17.

⁵⁴ *Philosophia dividitur in theoreticam, practicam, mechanicam et logicam: hae quatuor omnem continent scientiam; Didascalicon 2.1*, ed. Buttner, 24.

⁵⁵ Hugh, following Boethius, distinguishes these three as *intellectibilia*, *intelligibilia*, and *naturalis*; see *Didascalicon 2.18*, ed. Buttner, 37. Cf. Boethius, *In Isagog. Porph. Comm.*, ed. sec. 3 (CSEL 48:8ff.).

⁵⁶ In the two alternate divisions of *scientia theorica* mentioned in the *Didascalicon* mathematics (briefly defined in *Didascalicon 2.11*; ed. Buttner, 32) falls either under the category of *scientia* (1) "intelligibilis" or (2) "doctrinalis."

⁵⁷ The definition of music draws on a frequent etymology: "musica ab aqua vocabulum sumpsit, eo quod nulla euphonia, id est bona sonoritas, sine humore fieri possit." On this etymology see Noel Swerdlow, "Musica dicitur a Moys, quod est aqua," *Journal of the American Musicological Society* 20 (1967): 3–9.

TABLE 2

Classification of Knowledge in Hugh of St. Victor:
Didascalicon de studio legendi

Theorica (speculativa)

Theology (forms separated from matter, but not divina scientia)

Mathematics (quantity abstracted from matter)

arithmetic

music

mundana

elementa: pondus, numerus, mensura

planete: situs, motus, natura

tempora: dies, menses, anni

humana

corpus: vegetatio, humores, operationes

anima: virtutes, potentie

connexus utriusque:

instrumentalis

in pulsu

in flatu

in voce

geometry

astronomy

Physics

Practica (activa, moralis)

ethica

economica

politica

Scientie mechanice (adulterine)

lanificum

armatura

navigatio

agricultura

venatio

medicina

theatrica

Logica (sermocinalis)

grammar

ratio disserendi

demonstrativa

probabilis

dialectica

rhetorica

sophistica

being duly noted.⁵⁸ *Musica mundana* encompasses the earth, the planets and temporal change. Each of these three categories is in turn subdivided in three. The “elementa” of *musica mundana* are the three mathematical principles (weight, number, and measure) used by God in creating the world (Wisdom 11:21)—a felicitous correspondence between biblical text and ancient learning.⁵⁹ The second subdivision of *musica mundana* (“planets”) includes the location and motion of celestial bodies. What might be implied here by the term “natura” is not self-evident. It is not likely that it refers to the physical composition of the celestial bodies, since medieval astronomy knew nothing of this. The last division of *musica mundana* encompasses the passage of time, measured by solar and lunar cycles, which determines the length of days, months, and years.

For *musica humana*, Hugh still follows the lead of Boethius, but he understands the three parts of the concept more simply as body, soul, and the combination of the two in the human person. Under *corpus* are subsumed the vegetative functions of the body, the four humors, and activities that supply human necessities. “Anima” is the seat of both moral virtues (justice, piety, temperance) and potencies or appetites (reason, emotion, desire). Finally, body and soul are joined by “that natural friendship through which the soul is joined to the body, not by carnal bonds but by certain affections” (*illa naturalis amicitia qua anima corpori non corporeis vinculis, sed affectibus quibusdam colligatur*).⁶⁰ Hugh borrowed the terminology for the subdivisions of *musica instrumentalis* from Isidore of Seville.⁶¹ It is exclusively sounding music, generated either by striking (percussion, strings) or the movement of air (flutes, organs), or vocal music, which consists of songs and

⁵⁸ *De institutione musica* 1.2; ed. Friedlein, 187–89; trans. Bower, 9–10 (with references to Boethius’ sources). There is a summary of Hugh’s (Boethius’) classification of music in the *Liber Excerptionum* (PL 177:198 [Appendix ad Hugonis Opera Dogmatica]). The ternary subdivisions were repeated in later sources; see F. Alberto Gallo, “Die Musik in der Einteilung der Wissenschaften bei Egidius Romanus und Johannes Dacus,” *International Musicological Society: Report of the 11th Congress, Copenhagen 1972*, ed. Henrik Glahn, Søren Sørensen, and Peter Ryom, 2 vols. (Copenhagen: Wilhelm Hansen, 1974), 1:388–90.

⁵⁹ Boethius mentioned four elements without discussion of them in the context of *musica mundana*; see Bower, 9n37.

⁶⁰ *Didascalicon* 2.12; ed. Buttimer, 33.

⁶¹ *Symphonia est modulationis temperamentum ex gravi et acuto concordantibus sonis, sive in voce, sive in flatu, sive in pulsus; Etym.* 20.2 (italics added); cf. Cassiodorus: “*symphonia est temperamentum sonitus gravis ad acutum vel acuti ad gravem, modulationem efficiens in voce sive in flatu sive in percussione;*” *Institutiones* 2.5.7, ed. Mynors, 144–45.

cantilena (“in carminibus et cantilenis”).⁶² The phrase “tibiis et organis” may refer to either (1) wind instruments in general (cf. Isidore’s “organum vocabulum est generale vasorum omnium musicorum,” *Etylm.* 21.2) or (2) the pipe organ, the latter an unlikely solution, since the organ was a rather exceptional instrument at the time.

Hugh posited the origins of the sciences in usage that, upon reflection, was codified into sets of principles: “omnes enim scientiae prius erant in usu quam in arte.”⁶³ Before there was *musica*, Hugh reasons, there was singing. (The myth of Pythagoras’ discovery of musical proportions from the sound of hammers might have also been cited.) As did all the schoolmen, Hugh maintained a division between theory and practice: the philosopher understands the principles, while the practitioner carries out his task without necessarily any knowledge of them.⁶⁴ This distinction between *scientia* (*disciplina*) as embodying fixed principles, on one hand, and *ars* as contingent goes back to Aristotle.⁶⁵

Hugh distinguished three types of *musicici*: (1) the creators of songs, (2) the performers of instrumental music (presumably improvised), and (3) those who judge both of the foregoing. Although this distinction is Boethian in origin, Hugh abstains from making the value judgments found in Boethius (1.34) and (more invidiously) in the *Regule rithmice* of Guido of Arezzo.⁶⁶ In Hugh’s scheme, the scholar with an in-

⁶² *Musica instrumentalis alia in pulsu, ut fit in tympanis et chordis, alia in flatu, ut in tibiis et organis, alia in voce, ut in carminibus et cantilenis*; *Didascalicon* 2.12, ed. Buttimer, 33. Boethius listed instruments in the order: string, wind, percussion (1.2; ed. Friedlein, 189; trans. Bower, 10).

⁶³ *Didascalicon* 1.prol., ed. Buttimer, 21; cf. “ars dici potest scientia, quae artis praecipis regulisque consistit” (*Didascalicon* 2.1; ed. Buttimer, 23).

⁶⁴ Potest namque idem actus et ad philosophiam pertinere secundum rationem suam, et ab ea excludi secundum administrationem. Verbi gratia, . . . agricultura ratio philosophi est, administratio rustici (*Didascalicon* 1.4; Buttimer, 11); see also Daniel F. Blackwell, “The *artes liberales* as Remedies,” *Theologische Zeitschrift* 45 (1989): 117 [115–24].

⁶⁵ *Metaphysics* 1.1 (980a 25–981b 10); cf. Cassiodorus, *Institutiones* 2.20; ed. Mynors, 130.4–8. Particularly helpful are the opening pages of Notker Schneider, “*Experientia—ars—scientia—sapientia*: Zu Wesen und Arten des Wissens im Anschluß an Aristoteles und Thomas von Aquin” in *Scientia und Ars im Hoch- und Spätmittelalter*, 1:171–88; see also in the same collection Verena Epp, “*Ars und scientia* in der Geschichtsschreibung des 12. Jahrhunderts,” 2:829–45.

⁶⁶ *De institutione musica* 1.34; ed. Friedlein, 223–25; trans. Bower, 50–51. *Regule rithmice* 8–10, ed. Dolores Pesce, *Guido d’Arezzo’s Regule rithmice, Prologus in antiphonarium and Epistola ad Michaelem: A Critical Text and Translation*, *Musico logical Studies* 73 (Ottawa: The Institute of Mediaeval Music, 1999), 331–33. John of Afflighem, quoting Guido, is just as insulting (“to whom should I better compare the singer than to a drunken man”); *De Musica cum tonario*, ed. Joseph Smits van Waesberghe, *CSM* 1 (Rome: American Institute of Musicology, 1950), 52; trans. Warren Babb, *Hucbald, Guido, and John on Music: Three Mediaeval Treatises*, ed. Claude V. Palisca, *Music Theory Translation Series* 3 (New Haven: Yale Univ. Press, 1978), 105. Pesce notes Guido’s more conciliatory remarks in the prologue to *Micrologus*, ed. Joseph Smits van Waesberghe, *CSM* 4 ([Nijmegen]: American Institute of Musicology, 1955), 85; trans. Babb, 58.

tellectual understanding of the mathematical basis of music or a broad knowledge and esthetic appreciation of composition evidently commands no higher status than do singers and instrumentalists: they are all *musici*. Given the lesser status of instrumentalists, who presumably had little formal training, this view is remarkably broadminded—and perhaps a salutary corrective to Guido’s waspish scorn for the humble cantor.

Hugh added seven *scientie mechanice* generally not included in philosophy,⁶⁷ a nod in the direction of Aristotle’s “productive” sciences. Though placed between practical philosophy and logic in the *Didascalicon*, they would be last in the order of study—if they were studied at all. By definition, the mechanical sciences either produce an external object, modify it, or supply a useful human service. They include weaving, the production of armaments, navigation, agriculture, hunting, medicine, and theatrical arts (Table 2). Music does not occupy an autonomous place among the *mechanice*: it merely forms a subset of *theatrica*, defined as the “scientia ludorum a teatro ubi populus ad ludendum convenire solebant.” These diversions are said to take place in theaters, *in gabulis*,⁶⁸ in gymnasia, in amphitheaters, etc. Hugh alludes to several kinds of practical music making: “at banquets they sing with poems, and odes, and musical instruments, and they play at dice; in the temples at a solemn moment they chant praises to the gods.”⁶⁹ Though

⁶⁷ *Didascalicon* 2.20–27; ed. Buttimer, 38–44; cf. also the anonymous Victorine *Exceptionum allegoricarum libri XXIV*, 1.21 (PL, 177:201). On the *artes mechanice* see Guy H. Allard and Serge Lusignan, eds., *Les arts mécaniques au moyen-âge*, Cahiers d’Études Médiévales 7 (Montréal: Bellarmin, 1982), and Mariken Teeuwen, *The Vocabulary of Intellectual Life in the Middle Ages*, Études sur le Vocabulaire Intellectuel du Moyen Âge 10 (Turnhout: Brepols, 2003), 367–69. *Mechanica* was classified as one of the seven subdivisions of physics (arithmetic, astronomy, astrology, mechanics, medicine, geometry, music) in a 12th-century classification (Munich, Bayer. Staatsbibl., clm 14516) mentioned by Ludwig Baur (*De divisione*, 357) and by Bernhard Bischoff, “Eine verschollene Einteilung der Wissenschaften,” *Archive d’histoire doctrinale et littéraire du moyen âge* 25 (1958): 5–20; repr. in *Mittelalterliche Studien: Ausgewählte Aufsätze zur Schriftkunde und Literaturgeschichte*, 3 vols. (Stuttgart: Anton Hiersemann, 1966–81), 1:275–76; both observed the same arrangement in Hrabanus Maurus, *De universo* 15.1 (PL 111:413). Even earlier, Aldhelm of Malmesbury (ca. 640–709) had divided the seven “philosophorum disciplinae” that followed grammatical studies into arithmetic, geometry, music, astronomy, astrology, mechanics [*mechanica*], and medicine; *Aldhelmi Malmesbiriensis Prosa de Virginitate cum glosa latina atque anglosaxonica*, ed. Scott Gwara based on the edition of Rudolf Ewald, 2 vols., Corpus Christianorum Series Latina 124–124A (Turnholt: Brepols, 2001), as quoted in Bischoff, 276.

⁶⁸ The meaning of *gabulum/gabula* is unclear. It seems to signify a place set aside for entertainment or athletic activity. The *Lexicon Latinitatis Nederlandicae Medii Aevi* cites a passage from the *Commentum supra veterem artem Aristotelis . . .* by Gerardus de Harderwijk (Cologne, 1486): “ludorum alii fiebant in gabulis, alii in gymnasiis, alii . . . in gabulis ubi choreas ducebant et saltabant gymnasiis ubi luctabantur,” p. 6, B 12.

⁶⁹ In conviviis rhythmis et musicis instrumentis et odiis psallebant, et alea ludebant; in fanis tempore solemnii deorum laudes canebant; *Didascalicon* 2.27, ed. Buttimer, 44.

this mixed bag cites both secular and sacred music, the terms employed give the passage a pseudo-classical air. Songs and instrumental music for games, banquets, and gambling do not, moreover, imply a very elevated esthetic value, and the presence of a classical expression like “fanum,” not to mention the singing of praises to the “gods” (plural!), place this passage in a (perhaps contrived) Greco-Roman ambiance.⁷⁰ In the Middle Ages quadrivial music would never be associated with these pastimes—one reason why *musica* never migrated to the *scientie mechanice*. Later classifications derived from the *Didascalicon* regularly omit “theatrica” from the *scientie mechanice*.⁷¹

Hugh did not regard music as a written, physical artifact like a painting or a statue, even though musical notation was well known in cultural centers like Paris in the late 12th century. In Hugh’s terms, music did not produce a tangible *opus* like weaving or the manufacture of armaments. It did involve a distinctive *operatio*, but one that ceased to exist as soon as the performer stopped. In this respect it was akin to navigation or some forms of medicine, both of which implied a transformation: locomotion in one case, or (ideally) restoration of health in the other.

26

Tractatus quidam de philosophia et partibus eius

A slightly later Chartrain classification of knowledge, known as *Tractatus quidam de philosophia et partibus eius*, treats the topic of music far more expansively than did Hugh, though its exposition is clearly modeled on the *Didascalicon*. The modern editor of the *Tractatus*, Charles Dahan, places its origin in the second half of the 12th century (and thus subsequent to Hugh’s classification), a judgment based partially on its syncretistic tendencies.⁷² The treatise presents no fewer than four alternative classifications of knowledge, but the fourth merely supplements the divisions of the first classification (*physica, ethica, theologia*) with a *scientia theorica*. The third classification incorporates all seven liberal arts in their role as “accessus ad predictas scientias” (physics and, making an exceptional appearance in the classifications, theology and

⁷⁰ I have not been able to find a model for this passage in the Patrologia Latina or CETEDOC databases.

⁷¹ Gilbert Dahan, “Une introduction à la philosophie au XII^e siècle: Le *Tractatus quidam de philosophia et partibus eius*,” 166–68.

⁷² Dahan, “Une introduction à la philosophie au XII^e siècle”; the *Tractatus* is also discussed by Grabmann, *Geschichte der scholastischen Methode*, 2:45–48; extracts are published by Franco Alessio, “La filosofia e le ‘*artes mechanicae*’ nel secolo XII,” *Studi Medievali*, 3rd ser., 6/1 (1965): 156–57 (an edition of “De mechanicis in generali” from the *Tractatus quidam*, BNF, lat 6570, fol. 57r–58r).

law).⁷³ A disproportionate part of the second classification is devoted to *musica*, elaborating and analyzing concepts already encountered in Hugh of St. Victor's classification (Table 3).⁷⁴

The second classification of the *Tractatus* defines *musica* in general as the "science of considering proportions towards understanding the harmony and discord of things" (*scientia perpendendi proportiones ad cognitionem concordie et discordie rerum*), a definition that does not explicitly restrict the proportions considered to those that form musical consonances. The immediately following definition of *musica instrumentalis* as the "*scientia perpendendi proportiones ad cognitionem consonantie et dissonantie*"⁷⁵ makes a distinction new to the classifications of knowledge. Both definitions relate music to proportion. While *Musica* embraces all mathematical proportions, *musica instrumentalis* concerns exclusively musical ones. *Musica instrumentalis* is still not the domain of the ordinary performer—cantor or secular instrumentalist—but that of the mathematically skilled musicus.

As is customary in all medieval classifications of knowledge, the Boethian division of *musica* into *mundana*, *humana* and *instrumentalis* determines the outline of music in the *Tractatus*, Cassiodorus being put under contribution again for additional modifications. *Musica mundana* comprises (1) the terrestrial globe, (2) the planets and stars of the celestial vault, and (3) the passage of times and seasons. The first subdivision, that "*consistat in epemeritis*," must correspond to Hugh's *elementa* and Boethius' "*compages elementorum*" (Table 1). The term itself is curious; Dahan cautiously refers it to *ephemeris*, the tables of mathematical calculations of sidereal movements, but that explanation does not seem likely, given the context. This subdivision considers the properties of "weight, number, and measure" by which God created all things (Wisdom 11:21). In the second subdivision of *musica mundana* (*planete*) the meanings of "motion" and "location" are clear enough, but the other two terms could have benefited from more precise definition. "Natura" (found also in the *Didascalicon*) and "effectus" might allude to the belief that the stars and their movements influenced human fate and behavior, but one cannot be sure. The "times" (*tempora*)

⁷³ Dahan believes that the *Tractatus* is an example of the fact that "le haut moyen age tend à privilégier les sept arts et à faire d'eux toute la philosophie, tendance qui coëxistera au XII^e siècle avec un effort pour redonner au *trivium* et au *quadrivium* leur rôle plus modeste d'introduction à la science" (p. 166). The text dealing with *musica* is found on pp. 182–89 and Dahan's valuable discussion of this section on pp. 169–77. See also Grabmann, *Geschichte der scholastischen Methode*, 1:31–40 (*divisio* of Bamberg: *theoretica, practica, mechanica*).

⁷⁴ Other parts of the classification have been omitted.

⁷⁵ *Tractatus*, ed. Dahan, 182–87.

TABLE 3

Musica in the Tractatus quidam de philosophia et partibus eius
(2nd classification)

Musica mundana

- epmerita
 - numerus
 - pondus
 - mensura
- planete
 - motus
 - situs
 - natura
 - effectus
- tempora
 - anni
 - menses
 - ebdomade
 - vicissitudo lucis et noctis

28

Musica humana

- corpus
 - humores
 - sanguis
 - colera
 - melancholia
 - flecma
 - complexiones
 - calor
 - frigus
 - humor
 - siccitas
- anima
 - facultates
 - vires
 - virtutes
- compactio utriusque

Musica instrumentalis

- metrica (in certa pedum dimensione)
- ritmica (certis sillabarum, distinguitur numeris)
- melica (in melodiis consideratur)
 - diatonica (2T, 1ST): autentus protus, plaga proti, etc.
 - chromatica (1 ½T, 2ST)
 - enarmonica (ditone + diesis=minor pars limatis)

of *musica mundana*, arranged in descending order of length (year, month, week, and days and nights of varying length), are familiar components of this division derived from Hugh of St. Victor.

The first subdivision of *musica humana* in the *Tractatus*, elaborating Boethius' teaching, lists the four humors and four paired "qualities" (*complexiones*); these (heat/cold, moisture/dryness) correspond to the medieval understanding of human physiology. The author explains that they can be combined in four possible ways, albeit two contrary combinations (heat+cold, moisture+dryness) are by definition impossible. The *complexiones* apply likewise to the elements (earth, water, air, and fire) and the seasons of the year.⁷⁶ An apparent digression on the six (*secundum alios*, four) ages of humankind is justified, since the author of the classification regards the entire span of human life and the changing balance of humors as an expression of *musica humana*.⁷⁷ The discussion halts at this point without treatment of *anima* (announced at the beginning of the section).

The threefold division of *musica instrumentalis*—*metrica*, *ritmica*, *melica*—is familiar from Cassiodorus (with the customary substitution of *melica* for *armonica*), but the order is exceptional. For Cassiodorus, as we have seen, these were the three "musicae partes," but the *Tractatus* relocates all of them to the narrower field of *musica instrumentalis* and reverses the usual order. The author notes that an argument is made by "certain people" (the *quidam* of philosophical disputation) that neither *musica metrica* nor *ritmica* belong under *musica instrumentalis*. He counters that, while *artificial* instruments are not involved, these two kinds of (vocal) music involve nine *natural* instruments: two lungs, tongue, throat, four principal teeth, and two lips.⁷⁸ The listing of the parts of *musica melica* combines the three Greek tetrachords with the four authentic and four plagal modes. Examples of the effects of music—enharmonic, chromatic—derive from ancient legends about behavioral modification that were common knowledge among medieval writers on music.

Raoul de Longchamp: Commentary on Anticlaudianus of Alain de Lisle

A detailed classification of knowledge that includes 16 *capitula* devoted to music forms part of the commentary (ca. 1215) by Raoul

⁷⁶ Dahan ("Une introduction," 174) traces this concept back to William of Conches, *De philosophia mundi* and his glosses on Plato's *Timaeus*.

⁷⁷ Dahan ("Une introduction," 174–75) illustrates the derivation of the sixfold classification from Isidore of Seville (*Etym.* 11.2); the fourfold division comes from Horace, *Ars poetica*, ll. 158–74.

⁷⁸ Ed. Dahan, 186. There is also a sidelong glance toward the nine Muses.

(Radulph) de Longchamp on *Anticlaudianus* of Alain de Lisle (ca. 1116–1202/3).⁷⁹ The base text, broadly inspired by Martianus Capella's *De nuptiis Philologiae et Mercurii*, is an allegory of the “good and perfect man” in which a Christian perspective interacts with philosophical contemplation—an unlikely vehicle for a learned commentary that supplies a mundane counterpoint to Alain's studied verses.⁸⁰ Several manuscript sources of Raoul's commentary transmit a graphic representation of his classification scheme, which divides knowledge (*scientia*) into four principal categories: *philosophia* (theoretical and practical), *eloquentia* (the trivium), *poesis* (history and literature), and *scientia mechanica*.⁸¹ Raoul devotes a series of short *capitula* to each discipline of the trivium and quadrivium, rhetoric and astronomy receiving by far the most attention.⁸² The commentary necessarily follows the base text's emphasis on the liberal arts, a decidedly un-Aristotelian foundation, at least with respect to music.

The classification of *musica* appears in the commentary that accompanies the appearance of the “fifth sister,” who comes forward playing the cithara, revealing both the power of music and its mathematical foundation.⁸³ Table 4 is a schematic outline of the musical portion of the commentary with explanatory phrases drawn from it.⁸⁴ The broad outline is patently Boethian, and the immediate subdivisions derive fairly directly from those of *De institutione musica* (cf. Table 1). The subdivisions of *musica mundana* and *humana* are similar to those encountered in the previous divisions, and Raoul makes sure that proportion figures prominently in each. The explanation of *musica humana* sim-

⁷⁹ The modern edition of Raoul's commentary is *In Anticlaudianum Alani commentum*, ed. Jan Sulowski, *Źródła do Dziejów Nauki i Techniki* 13 (Warsaw: Zakład Narodowy im. Ossolińskich, 1972); for the *capitula* concerning the classification system and music see pages 39–41 and 189–97, respectively.

⁸⁰ Ed. Robert Bossuat, *Alain de Lille, Anticlaudianus, Texte critique avec une introduction et des tables* (Paris: Vrin, 1955); trans. James J. Sheridan, *Anticlaudianus, or the Good and Perfect Man* (Toronto: Pontifical Institute of Mediaeval Studies, 1973).

⁸¹ Martin Grabmann argued that Raoul's classification of knowledge represents a Neoplatonic perspective grafted onto a fundamentally Aristotelian system; *Die Geschichte der scholastischen Methode*, 2:53.

⁸² The *divisio scientiarum* diagram (an uncommon feature in manuscripts of medieval *divisiones scientiarum*) is reproduced in Weijers, *Le maniement*, 201 (Ill. 16). There is another (poorly reproduced) illustration of the diagram in Max Haas, *Musikalisches Denken im Mittelalter: Eine Einführung* (Bern: Peter Lang, 2005), 89 (part of observations on “Die Einteilung der Wissenschaften”).

⁸³ Dum citharam manus una gerit, manus altera chordas / sollicitat, dulcemque soni parit illa saporem, / auri dans epulas, oculisque premia somni (One hand holds a cithara, the other plucks its strings and produces a sweet delight of sound that is a feast for the ears and a prelude to slumber for the eyes); PL 210:516; trans. Sheridan, 109–10.

⁸⁴ Table 4 is adapted from from Grabmann, *Geschichte der scholastischen Methode*, 2:52.

TABLE 4

Musica in the Commentary of Raoul de Longchamp
on *Anticlaudianus* of Alain de Lille

Mundana	elementaris (proportiones elementorum) planetica (proportiones temporum) temporalis
Humana	corporalis (proportiones humorum) spiritualis (proportiones et consonantias virium animae et successionem sive ordinem apprehendendi) mixta (proportiones et consonantias inter corpus et animam)
Instrumentalis	artificialis (proportiones et consonantias sonorum instrumentorum artificialium) lirica pentaphonica et huiusmodi naturalis (proportiones vocum quae proferuntur ab animali) metrica (proportiones pedum in metro) melica chromatica (per proportiones semitonorum) ditonica (proportiones tonorum) enarmonica (quasi extra nomina vel harmoniam) rhythmica (proportiones et consonantias syllabarum . . . quantum ad rhythumum)

plifies Boethius' teaching, a tendency seen in the previous two classifications. Only the definition of the "spiritualis" subdivision of *musica humana* could have benefited from more than a mere definition. It seems to refer to the powers of the soul in the act of apprehension. Raoul says that he explained all of this in a (now lost) treatise entitled *De speculis*.

The twofold division of *musica instrumentalis* (artificial and natural) is unconventional only with respect to the subdivision of "artificialis" into *lyrica* and *pentaphonica*. One would have expected a threefold division, but perhaps "et huiusmodi" (and things of this type) is intended to suffice for this. (One might have expected wind, string, and percussion, including plucked strings.) A clue to the intended meaning of "pentaphonica" occurs in a chapter entitled "De diversis effectibus musicae" (g). Raoul derives the word music from "mutare" (to change),

because music can change listeners' moods,⁸⁵ and it is claimed the "pentaphonia citharae" stimulates laughter. Insofar as Raoul had a real instrument in mind, it would have been one whose tuning was "pentaphonic" —perhaps a vielle tuned in fifths that he imagined in the hands of an entertainer. The naturalis subdivision is obviously an adaptation of the Cassiodorean *musicae partes*, again with the substitution of "melica" for "armonica."⁸⁶ The "melica" category of natural music lists the three Greek genera in an order that departs from the normal one.

Dominicus Gundissalinus: De divisione philosophiae

Dominicus Gundissalinus (Domingo Gundisalvo, fl. 1144–64) wrote his comprehensive *De divisione philosophie in partes suas et parcium in partes suas secundum philosophos* towards the middle of the 12th century.⁸⁷ He had previously collaborated on the translation from the Arabic of Al-Fārābī's *De scientiis*, a treatise that heavily influenced his own work, including (most notably from our perspective) his treatment of music.⁸⁸ For the first time, in the writings of Gundissalinus the newly translated works of Aristotle, primarily the "new" logic, the books on natural science, and the Arabic philosophers were incorporated systematically into a classification of knowledge.⁸⁹ His classification is intended to be truly comprehensive, for (as the author says) "there is no knowledge that is not some part of philosophy" (*nulla est scientia que philosophie non sit aliqua pars*). Only *divina scientia* lies outside the realm of philosophy and is thus omitted from *De divisione philosophie*.

In the prologue to *De divisione philosophie* Gundissalinus explained at length his definition(s) of philosophy.⁹⁰ The objects of *philosophia theorica*, which involve only mental cognition ("in sola cognitione mentis") are distinguished according to their degree of abstraction from

⁸⁵ *In Anticlaudianum Alani commentum*, Music 9, ed. Sulowski, 192. As examples of chants of lament Raoul mentions those "qui sunt de morte nobilium et in morte nobilium, quos cantus praecipue faciunt in Gallaecia."

⁸⁶ Boethius (*De institutione musica*, 1.15) lists them in the order diatonic, chromatic, enharmonic (ed. Friedlein, 200–210; trans. Bower, 22).

⁸⁷ Edited in Baur, *De divisione* (n1 above). As is clear from Table 5, the Boethian divisions were not neglected; see Alexander Fidora, "Die Rezeption der boethianischen Wissenschaftseinteilung bei Dominicus Gundissalinus," in "*Scientia*" und "*Disciplina*," 209–22.

⁸⁸ Domingo Gundisalvo, *De Scientiis*, ed. Manuel Alonso Alonso (Madrid: Imp. y Editorial Maestre, 1954).

⁸⁹ Fernand Van Steenberghen, *La philosophie au XIII^e siècle*, Philosophes Médiévaux 9 (Louvain: Publications Universitaires, 1966), 122.

⁹⁰ Baur, *De divisione*, 3–19; Anton-Hermann Chroust, "The Definitions of Philosophy in the *De divisione philosophiae* of Dominicus Gundissalinus," *The New Scholasticism* 25 (1951): 253–81. There are six definitions.

matter—or absolute separation from it in the case of metaphysics.⁹¹ Since mere understanding is insufficient “ad consequendam futuram felicitatem,” there exist the practical sciences, which guide the behavior of men and women in three separate spheres: in society, (for which grammar, poetics, rhetoric and civil law are necessary), within the family, and individually. Human nature needs both “the knowledge of the true and the love of the good” to attain its final perfection.

Chapter 10 of *De divisione philosophie*, devoted to music, draws from Greek music theory, Boethius, and the ideas present in Al-Fārābī’s classification of music, a circumstance that elicits a very broad and distinctive treatment, the most elaborate of any medieval classification of knowledge (Table 5). One of the most striking features of the classification is the methodical distinction made in each subdivision between theoretical and practical music, a format derived from Al-Fārābī’s *Grand Book on Music*. (For no apparent reason, the order of treatment of these two categories varies from section to section.)

Gundissalinus’ comprehensive treatment of music has been discussed by Ludwig Baur in his edition of *De divisione philosophie*, and the following summary is indebted to him.⁹² There would not seem to be an overriding scheme but there is a consistent plan that subdivides most of the divisions into a theoretical and a practical component. Both definitions of music: (1) “pericia modulacionis sono cantuque consistens” (Isidore, *Etym.* 3.15) and (2) “scientia de modulacione vocis, arte vel natura,” lay emphasis on its practical aspects. The author makes it quite clear that the definition of *musica* does not involve either *musica mundana* or *musica humana*, and a clear distinction is made between *sonus* and *cantus*. The former includes everything that can be heard (quicquid auditu percipi potest), whether the sound is produced by living things or by other natural causes. *Cantus*, on the other hand, is restricted to the “movement of the voice” (vocis inflexio), consistent with a definition borrowed from Isidore.⁹³ Gundissalinus insists on restricting the term “vox” to sounds made by living beings.

The three *musicae genera* that introduce the classification are copied from Boethius (Table 1), but their impact is dwarfed by what follows. The definition of the *genus* music emphasizes sounding music,

⁹¹ Partes philosophie theorice tres sunt: scilicet aut speculacio de hiis que non sunt separata a suis materiis nec in esse nec in intellectu; aut est speculacio de hiis que sunt separate a materia in intellectu non in esse; aut speculacio de hiis que sunt separata a materia in esse et in intellectu (Baur, 14–15).

⁹² Baur, *De divisione*, 96–102 and 240–48. The text of chapter 10 may be accessed in the Thesaurus Musicarum Latinarum [TML] database at GUNDDIV; www.chmml.indiana.edu/tml/star.html.

⁹³ Cantus est inflexio vocis . . . precedit sonus cantum; *Etymol.* 3.20.8.

TABLE 5

Musica in Dominicus Gundissalinus: *De divisione philosophiae*
(ca. 1150)

[Musicae genera (Boethius)]

- mundana (elementorum in compositione mundi corruptibilis)
- humana (elementorum in complexione corporis animalis)
- instrumentalis (sonorum armonia sensibilis)

Genus (scientia armoniace modulationis que ex concordantia plurimorum sonorum vel ex compositione vocum conficitur)

Materia (tonus = acuta enuntiatione vocis)

Partes (15 Greek tonoi)

Partes aliae

practica

- de acuto sono
- de gravi sono
- de medio sono

theorica (from Al-Fārābī)

- de principiis et de primis
- doctrina de dispositionibus
- doctrina de conveniencia . . . instrumentorum artificialium
- doctrina de speciebus casuum naturalium
- doctrina de compositione armoniarum

Species

practica (diversitates instrumentorum)

- in voce (homo)
- in tactu (psalterium)
- in pulsu (cithara)
- in flatu (tibia)

theorica

- melica (discernit in sonis acutum et gravem et medium)
- rithmica (utrum sonus an bene an male cohereat)
- metrica (genera diversorum metrorum)

Species ("secundum alios" = Al-Fārābī)

- melos (ad proporcionandos partes acuitatis et gravitatis)
- metrum (ad proportionandos intellectus inciviles dictionibus)
- gestus (confirms visually the correctness of the above)

Instrumentum

practice

- naturale (vocal mechanism)
- artificiale (musical instruments)

theorice [lacuna]

TABLE 5 (*continued*)

Artifex	practice (format neumata et armonias)
	theorice (qui docet hec omnia secundum artem fieri)
Officium	theorice (comprehendere cognitionem specierum armonicarum)
	practice (cantilenas secundum artem componere)
Finis (end [of officium])	theorice (scientia comprehendere)
	practice (docta exercere)
Musica	etymology
	inventors (Tubalcain, Pythagoras, Linus of Thebes, Amphion)
	utilitas (moral, therepeutic, military, work, palliative, etc.)

instrumental or vocal, as does the identification of the *materia* of music as “acuta enuntio vocis.” The “partes” mentioned at this point in the classification, the fifteen Greek transposition scales (*tonoi*), of which only the highest and the lowest are named, cannot have had much practical significance.

The *practica* section of the “partes aliae” division merely separates the gamut into high, middle, and low. Its long *theorica* subdivision is derived entirely from Al-Fārābī. Except for minor alterations in the first category, the text merely repeats the five “partes magnae” of music in Al-Fārābī’s *De scientiis*.⁹⁴ Most of the topics are themselves subdivided. Difficult of interpretation, the text has been analyzed in detail by Don Randel on the basis of Al-Fārābī’s *Grand Book on Music*.⁹⁵ Briefly stated, the

⁹⁴ *De scientiis*, ed. Alonso Alonso, 105–7.

⁹⁵ Don M. Randel, “Al-Fārābī and the Role of Arabic Music Theory in the Latin Middle Ages,” *Journal of the American Musicological Society* 29 (1976): 173–88. On Al-Fārābī’s musical writings, see Henry George Farmer, *Al-Fārābī’s Arabic Latin Writings on Music* (Glasgow: The Civic Press, 1934). Farmer compares translations of the section on music in Al-Fārābī’s *De scientiis* by Gerard of Cremona and John of Seville with other Western sources that borrowed from the same source (pp. 20–31); Farmer also edits the chapter “Dictio de cognoscenda causa unde orta est ars musicae” from Al-Fārābī’s *De ortu scientiarum* (pp. 42–51). Jerome of Moravia [Moray (Scotland)?] quoted this passage in his *Tractatus de Musica*, ed. Simon Cserba, *Freiburger Studien zur Musikwissenschaft* 2 (Regensburg: F. Pustet, 1935), 22–23 (“Divisio musicae secundum Alphorabium”) from the *Speculum doctrinale* of the encyclopedist Vincent of Beauvais; see Gottfried Göller, *Vinzenz von Beauvais O.P. (um 1194–1264) und sein Musiktraktat im Speculum Doctrinale*, Kölner

five topics are: (1) first principles, (2) intervals, (3) the same applied to artificial instruments, (4) natural rhythms, and (5) the composition of melodies.

Gundissalinus borrowed the *practica* category of the first of the “species” divisions from his countryman, Isidore of Seville.⁹⁶ He distinguishes among the “varieties of instruments” (*diversitates instrumentorum*) that make music: voice, string, percussion, and wind. The *theorica* segment of *species* derives obviously from Cassiodorus. A second, alternative division, called “species secundum alios,” borrows once more from Gundissalinus’ translation of Al-Fārābī’s *De scientiis*. The first two subdivisions (*melos* and *metrum*) relate to comparable terms in the Cassiodorean division. In this case, “metrum” may include both rhythmic and metric texts. (The peculiar “incivilis” in the definition of “metrum” may result from an error in translation from the Arabic; other manuscripts of *De divisione philosophiae* replace it with “civilis” or “rationalis.”) Gundissalinus explains *gestus*, the last category of *species secundum alios*, as some sort of visual control over the previous two categories, which involve the sense of hearing only.⁹⁷ It may refer to beating time.

According to Ludwig Baur, the natural-artificial distinction under “instrumentum” is also taken from Al-Fārābī, but it seems to be merely a practical one with none of the cosmological connotations the two words had earlier in the Middle Ages.⁹⁸ Natural music is simply defined as that performed by the voice, while instrumental music is “artificial.” A lacuna in all the sources deprives us of a discussion of “instrumentum theorice,” but probably no more than a sentence or two has been lost, since the treatise moves immediately to the next topic announced in the prologue.

The following three categories of the classification (*artifex, officium, finis*) continue to balance the theoretical and the practical, albeit limited to brief definitions and distinctions. Performance involves two kinds of people, one who performs music and another who teaches the performer what to do (both called “artifex”). The following two divi-

Beiträge zur Musikforschung 25 (Regensburg: Gustav Bosse, 1959), 60–62 and 92–93. On Jerome’s geographical origin, see Michel Huglo, “La *Musica* du Fr. Prêcheur Jérôme de Moray,” in *Max Lütolf zum 60. Geburtstag*, ed. Bernhard Hangartner and Urs Fischer (Basel: Fischer, 1994), 113–16; reprinted in Michel Huglo, *La théorie de la musique antique et médiévale*, Variorum Collected Studies Series (Aldershot: Ashgate, 2005), XV, Addenda and Corrigenda, 12.

⁹⁶ See n61 above.

⁹⁷ *Gestus autem subiectus est sensui visus, qui institutus est ad confirmandum se metro et sono motibus consimilibus et comparationibus competentibus*; ed. Baur, *De divisione*, 99.

⁹⁸ Calvin Bower, “Natural and Artificial Music: The Origins and Development of an Aesthetic Concept,” *Musica Disciplina* 25 (1971): 17–33.

sions (*officium-finis*) are related in a similar vein. The “*officium*” of the practitioner is to compose *cantilenae* after the method taught him by the “theorist,” while the “end” of music, related to Aristotle’s final cause, is the reason for which something is done. In the case of the theorist, the end to be attained is understanding; in the case of the practical musician, it is properly executing what has been learned. There seems to be no value judgment implied.

Gundissalinus closes the treatment of music in *De divisione philosophiae* by extolling its usefulness. To its power to affect behavior by evoking a variety of moods in peace and war is added a reference to its therapeutic value: “*utilis est ad salutem corporis.*” Despite a remarkably detailed and intellectually perceptive analysis of *musica*, Gundissalinus regarded it, as stated earlier in the treatise, as merely “useful, although not necessary for the acquisition of wisdom,”⁹⁹ an assessment not too different from what seems to be at the heart of the treatment of music in 12th- and 13th-century divisions of knowledge.

Robert Kilwardby: De ortu scientiarum

A century later, one of the most important and detailed classifications of knowledge produced in the 13th century, *De ortu scientiarum*, was written by the English Dominican, Robert Kilwardby.¹⁰⁰ Little is known of Kilwardby’s life before his election as prior provincial of the English Dominicans in 1261, an office that proved to be the beginning of a distinguished ecclesiastical career. He later became archbishop of Canterbury and, a year before his death in 1278, Pope Nicholas III named him cardinal-bishop of Porto. Kilwardby studied and later taught at the University of Paris (presumably between 1237 and 1245) before joining the Dominican order and returning to his native England. There, for the benefit of the younger members of his order at Oxford, he wrote *De ortu scientiarum*, a treatise that aimed to analyze the entire range of human knowledge. Because of its length (over 220 pages in the modern edition) and discursive character, topics granted only brief

⁹⁹ *De divisione philosophiae*, p. 39, ll. 10–14.

¹⁰⁰ Robert Kilwardby, *De ortu scientiarum*, ed. Albert G. Judy, *Auctores Britannici Medii Aevi* 4 (London: The British Academy, 1976). The extracts available at TML:KILDOS must be read in conjunction with the complete text. See also D. E. Sharp, “The *De ortu scientiarum* of Robert Kilwardby (d. 1279),” *The New Scholasticism* 8 (1934): 1–30. My outline is based on Van Steenberghen, *La philosophie au XIII^e siècle*, 127. For other schematic reductions of Kilwardby’s classification see Weisheipl, “The Nature,” 480 [chart] and Weijers, *Le maniment*, 194. A listing of each chapter and brief summary of contents may be found in Baur, *De divisione*, 369–80. Kilwardby wrote commentaries on Donatus, Priscian, the entire Aristotelian *organon*, Porphyry, Boethius, and the *Sex principia*. Cf. Arnoul de Provence, *Divisio scientiarum* (below), for a similar scheme.

reference in most of the classifications of knowledge heretofore discussed are here accorded more ample treatment. Since *De ortu* exemplifies the full impact of Aristotelian thought on the classification systems, it forms an excellent focal point for analyzing how the quadrivium (*musica* in particular) was integrated into the Aristotelian matrix.

Kilwardby's classification of knowledge into speculative and practical (*de rebus humanis*) philosophy maintains the Aristotelian distinction between the necessary (those things not subject to change by human volition) and the contingent (things subject to change by human volition).¹⁰¹ He divided speculative philosophy according to the usual three levels of abstraction (*naturalis*, *mathematica*, *metaphysica*); practical philosophy also receives a threefold division: *ethica*, *mechanica*, *sermocinalis*. While the twofold division of mathematics into continuous and discrete quantity is easily recognized as deriving from Boethius, now optics (under geometry) has attained equal status with the traditional quadrivial disciplines.

Kilwardby emulated Hugh of St. Victor by introducing the *scientie mechanice* as a part of practical philosophy, since they pertain to caring for the necessities of human life.¹⁰² As we have seen, they were not a fixed part of the classifications of knowledge: their presence or absence depended on the inclination of the author of the classification. Kilwardby first reports the division of the *mechanice* proposed by Hugh of St. Victor, but then presents his own, "somewhat different [from Hugh's], and perhaps better" (*parum aliter quam prius, et forte melius*).¹⁰³ As noted above, Hugh had mentioned certain kinds of practical music in the *theatrica* division of the *scientie mechanice*. Kilwardby rejected this "science of entertainment" (*scientia ludorum*) as "not worthy to be considered among Catholics, but rather to be scorned and resisted."¹⁰⁴ Music absented itself from Kilwardby's classification of the *scientie mechanice*,

¹⁰¹ Cf. the distinction made by Giles of Rome between "*scientia de entibus causantibus nostram scientiam*" and "*scientia de entibus causatis a nobis*" (as quoted in Baur, *De divisione*, 384).

¹⁰² *Ipsa est ars vel scientia operativa circa res humanas corporales propter necessitates humanas corporales tollendas*; *De ortu* 37 (§ 361), ed. Judy, 128. On the *mechanice* see Guy H. Allard, "Les arts mécaniques aux yeux de l'idéologie médiévale," in *Les arts mécaniques*, 13–31; Marie-Dominique Chenu, "Arts mécaniques et oeuvres serviles," *Revue des sciences philosophiques et théologiques* 29 (1940): 313–15; Franco Alessio, "La filosofia e le 'artes mechanicae' nel secolo XII," *Studi Medievali*, ser. terza, 6/1 (1965): 71–161.

¹⁰³ Kilwardby's seven *mechanica* (also *adullerina*) are: *terraecultus*, *cibativa seu nutritiva*, *medicina*, *vestiva vel cooperativa*, *armatura vel armativa*, *architectonica*, *mercatura*; *De ortu* 40, ed. Judy, 131–33. The first three relate "ad interius corporis," the last four "ad exterius corporis."

¹⁰⁴ In substantia, quia theatrica non videtur mihi ponenda apud catholicos, sed magis detestanda et impugnanda; *De ortu* 40 (§ 373), ed. Judy, 131.

because it already had a secure and far more distinguished place in the scheme of medieval learning as one of the “liberal” arts.

Music in De ortu scientiarum

Several chapters of *De ortu* explore the place of music in the grand scheme of knowledge, examining its subject and definition (18, 20), the distinction between harmonic and natural science (21), and the relationship of the *scientiae (artes) practicae* to philosophy (41, 42, 44). The title of chapter 18 (“De ortu musicae et subiecto et fine proprio ac definitione”) reveals its purpose to examine the origins of music, its subject, end (*fnis*), and definition.¹⁰⁵ Since sense experience precedes abstraction, Kilwardby theorizes that the attractiveness of musical sound stimulated philosophers to seek ways of understanding it and duplicating *per artem* the natural pleasure experienced. But the short-lived nature of musical sound rendered the discovery of fundamental truths about the object of hearing (*obiectum auditus*) difficult.¹⁰⁶ The conventional legends about Pythagoras’ experiments with hammers, differing string tensions, and differing reed lengths, which established *musica* as a quadrivial art of proportion, are cited. It was Pythagoras who first “discovered how to reduce the inequality of sounds to concord in numerical proportion” (*inequalitatem sonorum ad concordiam reduci in proportione numerali*).¹⁰⁷ Audible music is said to be “de sono harmonice numerato vel de numero sonorum harmonico,”¹⁰⁸ a definition that places *sound* at the forefront, not sounding *number* of the Pythagorean tradition.

Conventional allusions to the ethical power of music are culled from Boethius (Proemium of *De institutione musica*) and Isidore (Saul and David; *Etyim.* 3.17). Kilwardby justifies the traditional meaning of *musica humana* with the observation that only *harmonia* could possibly hold together the diverse and contrary elements that make up the human body, either considered in its material existence or body and soul as a unity—a decidedly non-Aristotelian point of view. *Musica mundana*

¹⁰⁵ Kilwardby’s treatment of music receives due attention in Eva Hirtler, *Die Musica als scientia mathematica*, 67–86.

¹⁰⁶ Humana curiositas in sonis esse sibi oblectamentum quaesivit causam eius ut sibi posset per artem huiusmodi delectationes fingere et efficere . . . et propter multam difficultatem inveniendi sonorum harmoniam, quia transeunt et non manent, difficilis et longa fuit inquisitio circa hanc scientiam; *De ortu* 18 (§ 127 and 131), ed. Judy, 51 and 53.

¹⁰⁷ *De ortu* 18 (§ 127), ed. Judy, 51.

¹⁰⁸ *De ortu* 18 (§ 128), ed. Judy, 52. But Hirtler (*Die Musik als scientia mathematica*, 67 and 69) claims that Kilwardby defined music “streng neuplatonisch als ‘numerus harmonicus.’”

likewise the four humors in harmonic proportion, as well as the time and seasons of the sensible world, essentially the view of Boethius and his medieval *seguaci*.

Towards the end of chapter 18, Kilwardby summarizes his conclusions with respect to the subject, proper end, and definition of music (§ 132–33).

Subject: harmonic number or a harmonic thing adapted to proportion.

End: the knowledge of such things and of such number, or the perfection of part of the speculative soul by means of knowledge of this type.

Definition: speculative science perfective of the human aspect in the knowledge of sounding harmony or of sounds harmonically congruent according to something of this type.

Subiectum: numerus harmonicus vel res harmonica proportione coaptae.

Finis: talium rerum et talis numeri cognitio, sive perfectio partis animae speculativae per cognitionem huiusmodi.

Definitio: scientia speculativa humani aspectus perfectiva cognitione harmoniae sonorae vel sonorum harmonice convenientium secundum quod huiusmodi.¹⁰⁹

Philosophical investigation required that a scientia have a single subject, for only from a single subject could true conclusions be derived, and Kilwardby proposes such a single subject. His definition of the end of *musica* remains squarely within the domain of speculative philosophy: knowledge of proportions and consonances that perfect the intellect, irrespective of their usefulness—a question obviously derived from the four Aristotelian “causes.” Kilwardby closes the discussion with a further definition of *harmonia* as “a concord of diverse things adapted and modified among themselves” (*rerum diversarum concors ad invicem coaptatio sive modificatio*). Gundissalinus, following Isidore, had said that music was “the skill consisting of making melody in sound and song” (*peritia modulationis sono cantuque consistens*),¹¹⁰ but Kilwardby stands by his definition as more complete.

Chapter 20 (“*Verificatio eius quod dictum est de subiecta arithmeticae et musicae*”) adds further clarification to the topics covered in chapter 18. Kilwardby notes that in *De institutione arithmetica* and *De in-*

¹⁰⁹ *De ortu* 18 (§ 132, 134), ed. Judy, 53.

¹¹⁰ *De ortu* 18 (§ 134), ed. Judy, 53.

stitutione musica Boethius defined arithmetic as “*numerus absolutus*” and music simply as “*numerus relatus*.”¹¹¹ While Boethius’ formulation was not incorrect, according to Kilwardby, it lacked a necessary precision. Kilwardby noted (as did his contemporaries) that not all numerical proportions are harmonic proportions; hence he proposes restricting the definition: “it should not be said broadly that music is *numerus relatus*, but [number] related harmonically, that is, solely of such a relationship as is consistent with being combined harmonically” (non debet dici ita large quod musica sit de numero relato, sed quod sit de relato harmonice, id est de tali relato et solo qui harmonice componi congruit).¹¹² Thus music should more properly be called “de numero *harmonice* relato vel de rebus harmonica proportione invicem aptatis.”¹¹³ The material component that distinguishes music from the mere study of arithmetical proportion cannot be ignored: “[by] harmonic relation is to be understood concreteness and materiality present in the numbers that the musicus considers.”¹¹⁴

Chapter 21 (“De diversitatem inter harmonicam et naturalem scientiam, et quomodo ipsa est mathematica et abstractior quam naturalis”) grapples with several question, most particularly the relationship between music and natural science. Kilwardby asks how music can be a mathematical science, given that its subject is natural: “sounds and musical pitches (*voces*) are natural things and their number is natural number, concrete and not abstract (this I say of sounding or instrumental music).”¹¹⁵ This was a lively question at the time, and it will be explored more fully below. Since music depends on arithmetic for its mode of demonstration, it must therefore be subalternated to arithmetic (“*harmonica est sub arithmetica et quod descendit arithmetica demonstratio in harmonicam*”), as Aristotle had taught.¹¹⁶ In the philosophical

¹¹¹ While music is not expressly mentioned in either of the passages to which Kilwardby makes reference, Boethius distinguishes between quantity *per se* and one quantity referred to another quantity (*ad aliquid*), which is the proper subject of quadrivial *musica*.

¹¹² *De ortu* 20 (§ 139, 141), ed. Judy, 567, and earlier, 51–52 (§ 128). Cf. Boethius, *De institutione arithmetica* 1.21–24; ed. Friedlein, 45–51.

¹¹³ *De ortu* 29 (§ 143), ed. Judy, 57.

¹¹⁴ Volens per *harmonicam relationem* intelligi concretionem et materialitatem quae inest numeris de quibus considerat musicus; *De ortu* 20 (§ 143), ed. Judy, 57.

¹¹⁵ Soni enim et voces res naturales sunt et eorum numerus est numerus naturalis et concretus et non abstractus, et hoc dixi de musica sonora sive instrumentali; *De ortu* 21 (§ 144), ed. Judy, 57.

¹¹⁶ *De ortu* 21 (§ 145), ed. Judy, 57. Kilwardby had anticipated this conclusion in a previous chapter (17), where he called upon the authority of Aristotle to prove that music, while subalternated to arithmetic, was nevertheless a separate science with its own *genus* and *natura*: “Quia enim subiectum unius est ex appositione respectu subiecti alterius, ideo descendit demonstratio ab una in aliam, et quia oppositio est rei alterius generis et naturae, ideo constituit scientiam diversam;” *De ortu* 16 (§ 112), ed. Judy, 46–47. Cf. Aristotle, *Posterior Analytics* 1.13 (78b 32–39).

language of the time this means that arithmetic provides the *propter quid* explanations for musical phenomena, which themselves provide only *quia* explanations. (This principle will be explained in the excursus on page 44 below.)

Taking up a familiar line of argument, Kilwardby says that, while the musicus considers natural things, he does not do so “ut naturales.” By definition, natural science considers what is mutable, and sounding music is unarguably contingent: air is disturbed to create sounds that vary from moment to moment.¹¹⁷ But the musicus considers immutable proportional relationships, which as *numerus abstractus* are “more absolute and prior in consideration with respect to natural science.” Each has its proper sphere. The priority of number thus demonstrates that music is not (exclusively) a natural science, since it is more abstract than natural science.¹¹⁸ Kilwardby concludes that music is more mathematical than natural. A similar observation is applied to *musica mundana* and *humana*, but the author confesses that “[they] are very obscure and for the most part unknown to man.”¹¹⁹ Nevertheless, they fall within the purview of the musicus.

Kilwardby repeats Boethius’ three kinds of *musica instrumentalis*: the playing of instruments (which also includes the “natural” instrument of the voice), the composition of *carmina*, and judgment of the previous two. The first two categories are “devoid of all speculation” (*totius speculationis expertes*); hence he assigns their activity to the domain of the *scientie mechanice*, but he makes no mention of music in his discussion of the *mechanice*.¹²⁰ Kilwardby’s term “*musici mechanici*” does not, however, imply any sense of disparagement: he had already said (approvingly) that they “sing with the voice and make songs.”¹²¹ The *musicus mathematicus*, on the other hand, concerns himself with the judgment of music and with explaining the mathematical proportions that are the proper subject of the discipline.

¹¹⁷ Cf. *De ortu* 21 (§ 146) and 19 (§ 137), ed. Judy, 58 and 55.

¹¹⁸ Quod igitur ad motum activum et passivum spectat, considerat naturalis; quod autem ad harmonicam modulationem, musicus; . . . et quia dicta consideratio musicus absolutior est et prior consideratione naturali; *De ortu* 21 (§ 150), ed. Judy, p. 59.

¹¹⁹ Quod ista musica, scilicet humana et mundana, quae consistit in homine et partibus eius et in mundo et partibus eius, valde occulta est et homini ignota pro maxima parte; *De ortu* 21 (§ 150), ed. Judy, 59.

¹²⁰ *De ortu* 21 (§ 151), ed. Judy, 60. Cf. Boethius’ judgment of instrumental musicians: “a musicae scientiae intellectu seiuncta sunt; . . . nec quiquam afferunt rationis, sed totius speculationis expertes” ([they] are excluded from the comprehension of musical science; . . . none of them make use of reason: rather they completely lack speculative capability); *De institutione musica* 34, ed. Friedlein, 224–25, trans. Bower, 50–51.

¹²¹ Musici autem mechanici et poetae est cantare vocaliter et carmina facere; *De ortu* 21 (§ 151), ed. Judy, 60.

Chapter 42 (“De distinctione scientiarum speculativarum et practicarum penes speculationem et praxim”) continues to refine the relationship between the theoretical and the practical sciences as well as the relationship of music to the *scientie mechanice*. Kilwardby notes that there is an interpenetration, for even the practical sciences have a speculative component (“speculative non sine praxi sunt”) and vice versa; the practical usefulness of the ability to perform mathematical calculations or the usefulness of geometry for building cannot be denied. After all, he asks, “does not *musica* teach string playing and flute playing and similar things?”¹²² It is mainly a question of the intent of the agent. Even though the performer might have an excellent command of the speculative explanations of his discipline for their own sake, his intention is to produce something, not speculate about it.¹²³ The distinction between the speculative and the practical rests, therefore, in the *finis* (end) of each, as explained by Aristotle: “finis scientiae speculativae est veritas, et finis scientiae operativae est actio.”¹²⁴ Kilwardby resolves the possible contradiction by denying that there is an inevitable opposition between practical and speculative science, maintaining that “the speculative [sciences] are practical and the practical speculative.” Although the *ars citharizandi* is mechanical, its relationship to *scientia musica* can be said to be governed by the *propter quid/quia* principle. Speculative mathematics gives the *propter quid* explanations for the practicals’ *quia*. One is *speculativa*, the other *operativa*.

Chapter 44 (“De appropriatione istorum vocabulorum: *practicum, activum et operativum; et proprietate ac differentia*”) differentiates between *operatio* and *opus*, distinguishing between music and other arts on the basis of their respective “products.” In this chapter Kilwardby depends heavily on the commentary on the *Nicomachean Ethics* by Eustratios, bishop of Nicaea, who flourished in the early part of the 12th century.¹²⁵ An *opus* is something that remains, like a table or a chair, after the artisan has completed his work (*opus autem est affectus manens postquam desierit operatio*). Music, however, produces an *operatio sola*:

¹²² Item nonne musica docet citharizare et canere tibia et huiusmodi? *De ortu* 42 (§ 393), ed. Judy, 138.

¹²³ Operantes enim licet considerent in eo quod agunt, tamen non perscrutantur de causa propter seipsam sed respectu eius quod agunt; *De ortu* 40 (§ 394), ed. Judy, 138.

¹²⁴ *De ortu* 42 (§ 394); cf. Aristotle: “the end of theoretical knowledge is truth, while that of practical knowledge is action;” *Metaphysics* 2.1 (993b 20), trans. Ross, *The Works of Aristotle*, vol. 8.

¹²⁵ The citations from Eustratios are supplied by Judy, *De ortu*, 143–44; for the same in context see H. Paul F. Mercken, *The Greek Commentaries on the Nicomachean Ethics of Aristotle in the Latin Translations of Robert Grosseteste, Bishop of Lincoln (†1253)*, *Corpus latinum commentariorum in Aristotelem Graecorum* 6/1 (Leiden: E. J. Brill, 1973), 12–15 and 32; book 1 was translated by Robert Grosseteste.

“the end of music is to sing concordantly or to make use of a musical instrument harmoniously according to the reckonings handed down by *musica*” (*musicae finis est cantare concorditer vel organo uti harmonice secundum traditas rationes a musica*).¹²⁶ Kilwardby, as all contemporary philosophers, considered practical music exclusively as performance, not as a composed artifact inscribed and preserved on parchment. This distinction, as well as *musica*'s association with the quadrivium, helps to explain why music was not transferred to the *artes mechanicae*—it would not have been an elevation of its status.

EXCURSUS: *Propter quid vs. quia explanations and the theory of subalternation*

Two concepts important for the understanding of how *musica* was regarded in 13th-century classifications of knowledge are expressed by the terms *propter quid* and *quia* as well as by the related principle of subalternation. Both concepts were derived from principles expounded in Aristotle's *Posterior Analytics*. A “*quia*” description of phenomena, although true and informative in its own delimited sphere, cannot provide the causal demonstration that the “*propter quid*” explanation does. Thus, *quia* might be translated as “what,” i.e. merely descriptive, and *propter quid* as “why,” i.e. explaining the fundamental principles on which the phenomenon is based. A similar distinction was expressed in a more homely fashion by Guido of Arezzo in the famous distich “*Musicorum et cantorum magna est distantia / isti dicunt, illi sciunt que componit musica*.”¹²⁷ Only those who “know” can provide *propter quid* explanations for musical phenomena. Music theorists, even Guido, who thought better of himself, would almost invariably be seen by philosophers as offering only *quia* explanations.¹²⁸ They were unable to probe the principles underlying their teaching.

¹²⁶ Cf. the commentary of Eustratios: “sunt autem operativae artes quae post operationem per artem factam non relinquunt opus manens;” *De ortu* 44 (§ 412), ed. Judy, p. 144, n. 3. A completely faithful translation of *ratio* has its difficulties; see G. E. Demers, “Les divers sens du mot ‘ratio’ au moyen âge: Autour d’un texte de Maître Ferrier de Catalogne (1275),” in *Études d’histoire littéraire et doctrinale du XIII^e siècle*, Publications de l’Institut d’Études Médiévales d’Ottawa 1 (Paris: Institut d’Études Médiévales, 1932), 105–39.

¹²⁷ Ed. Pesce, *Guido d’Arezzo’s Regule rithmice*, 330–31.

¹²⁸ While the distinction between *propter quid*/*quia* explanations and the theory of subalternation are generally absent from the music theory treatises of the period, Johannes de Muris, in the prologue to *Notitia artis musicae* (1321), declared that “*experti enim ipsum quia sciunt, sed propter quid nesciunt*,” thus framing in philosophical terms the musicus-cantor distinction that always gave precedence to the former. Here, the *experti* are practitioners, perhaps of genuine accomplishments, who do not understand the causes of what they do. Only *theorici* are competent to teach: “in any art the theorists are able to teach, but the practitioners cannot . . . therefore we consider the *artifices* wiser

A similar paradigm for classifying the relationship between the speculative world of mathematics and sounding music, while still maintaining a distinction between the two, was the theory of subalternation. The higher science (arithmetic, for example) was the “subalternating” science, while the lower science (music) was “subalternated” to it. Aristotle had explained this relationship in the first book of the *Posterior Analytics*,¹²⁹ and Albert the Great’s commentary on this work chose music to explain the principle that the subalternated science depends on the subalternating:

Demonstration descends from one genus to another, as was said above, that is, from the subalternating science to the subalternated; just as harmonic variability [*passio*] is at times demonstrated by arithmetic, inasmuch as harmonic science consists of proportional number of notes related to each other.¹³⁰

Albert observed that the subalternating and the subalternated sciences were “almost” alike, yet he maintained that a real distinction existed and that they could not be simply classified together:

Even though harmonic mathematics or *musica* and that which is perceived by the sense of hearing from strings, fiddles and musical instruments is almost the same [*ferè univocae*], still in all such things *quia* knows the sensible phenomena, that is, the sensible subject and its changeable aspects, but it belongs to mathematics to consider the *propter quid*; this does not consider the sensible, but abstracts from the sensible according to defining reason, which is the middle [term] in the demonstration.¹³¹

than the *experti* (in qualibet autem arte theorici docere possunt, practici vero non . . . ideoque artifices expertis sapientiores esse opiniamur); *Notitia artis musicae et Compendium musicae practicae*, ed. Ulrich Michels, CSM 17 ([Rome]: American Institute of Musicology, 1972), 47 (prologue). See also Max Haas, “Musik zwischen Mathematik und Physik: Zur Bedeutung der Notation in der ‘Notitia artis musicae’ des Johannes de Muris,” in *Festschrift Arno Volk*, ed. Carl Dahlhaus and Hans Oesch (Cologne: Gerig, 1974), 31–46.

¹²⁹ The reason why differs from the fact in another way, in so far as each is studied by a different science. These are the cases which are related to each other in such a way that the one falls under the other, e.g. optics to geometry, mechanics to solid geometry, harmonics to arithmetic, star-gazing to astronomy; *Posterior Analytics* 1.13 (78b 35), trans. Barnes, 22–23.

¹³⁰ Tunc descendit demonstratio de genere in genus, sicut superius dictum est, scilicet a subalternante scientia in subalternatam; sicut harmonica passio aliquando demonstratur per arithmeticam; eo quod harmonica consistit ex proportionali numero notarum taliter se habentium, *Lib I Poster. Analyt.* 2.17; *Beati Alberti Magni Ratisbonensis Episcopi Ordinis Praedicatorum Opera Omnia*, ed. Auguste Borgnet, 38 vols. (Paris: Louis Vivès, 1890–95), 2:66.

¹³¹ Etiam sic fere univocae sunt harmonica mathematica sive musica, et illa quae est secundum auditum in chordis et fidibus et instrumentis musicis; hoc enim in omnibus

While mathematics provides causative explanations for the quantitative aspects of things (music, perspective, astronomy, etc.) that fall within its proper domain, it is also possible to look to the physical part of the science for a comparably complete explanation of those matters that fall into its domain: in such cases “the higher science [mathematics] does not pronounce the propter quid, but the lower [e.g. music] does.”¹³²

The music theorist Jacques de Liège (ca. 1260–after 1330) affirmed the general principle that *musica* belonged under theoretical science rather than “sub practica”; he proposed a revision of the three *genera musicae* of Boethius to coordinate them with the three levels of abstraction of theoretical philosophy propounded by Aristotle.¹³³ Jacques placed “heavenly music” under metaphysics and *musica mundana* and *humana* under natural science. Instrumental music is part natural and part mathematical, but “principalius . . . sub mathematicali.”¹³⁴ Ugolino of Orvieto (ca. 1380–1452) took a very different view, subalternating music to natural science. Ugolino does not suppose that music is primarily about number, but about “time, motion, sound, quantity, number, high and low pitches.”¹³⁵ By the early 15th century, then, physical science, not mathematics, was considered best capable of explaining musical phenomena.

talibus ipsum quia est scire sensibilium, hoc est, subiectum sensibile et passiones considerantium, sed propter quid considerare habent mathematicae quae non considerant sensibile, sed abstractum a sensibili secundum rationem diffinitivam quae medium est in demonstratione, *Lib. I Poster. Analyt.* 3.7; ed. Borgnet, 2:85.

¹³² In illis non dicit propter quid scientia superior, sed inferior; *Lib. I Poster. Analyt.* 3/7; ed. Borgnet, 2:85–86.

¹³³ Jacques refers to the fifth book of the *Metaphysics*, but the “three parts of theoretical science” are explained in *Metaphysics* 6.1 (1026a 7–33) and 11.7 (1064a–1065a 5).

¹³⁴ Nam *musica coelestis* vel *divina* sub *metaphysica* reponitur; *mundana* sub naturali, similiter et *humana* continentur. *Instrumentalis* vero vel *sonora* partim sub naturali, partim sub *mathematicali* scientia collocatur, *principalis* tamen sub *mathematicali*, *Speculum musicae* 1.8.2; CSM 3/1:29. A similar view is expressed in the anonymous *Compendium musicae*: “Primum genus musicae considerant mathematici [sic], secundum phisici, tertium uero sibi appropiant musici.” (Paris, BNF, lat. 14741, fols. 2r–6v; TML:ANOQUAE). One of the anonymous *Questiones mathematicales* edited by Frank Hentschel assigned the contents of Boethius’ *musica mundana* to natural science and reinterpreted *musica humana* as “de proportione vocis humanae”; see Frank Hentschel, *Sinnlichkeit und Vernunft in der mittelalterlichen Musiktheorie: Strategien der Konsonanzwertung und der Gegenstand der Musica sonora um 1300*, Beiheft zum Archiv für Musikwissenschaft 47, (Stuttgart, F. Steiner, 2000), 310 and 220–30.

¹³⁵ Sed *musica subalternatur philosophiae naturali* sumendo philosophiam in communi, nam primo posteriorum dicit Aristoteles quod illa scientia subalternatur alteri quae habet principia probata in illa sibi superiore, ut perspectiva geometriae supponitur. Sed *musica* habet principia sua probata in philosophia naturali sumendo eam in communi, igitur subalternatur illi. *Musica* enim considerat tempus, motum, sonum, quantitatem, numerum, voces graves et acutas, intensionem et remissionem vocum, similiter earum velocitatem et tarditatem; *Declaratio musicae disciplinae*, ed. Albert Seay, CSM 7/1 ([Rome]: American Institute of Musicology, 1959), 20.

Classification of Music in the “Introductions to Philosophy”

Claude Lafleur has identified a number of texts that he describes as “introductions to philosophy.” These define philosophy, discuss in greater or lesser detail its several parts, analyze the structure of learning, and encourage its study, though the arrangement is invariably systematic rather than pedagogical. Lafleur has linked these texts with the teaching activities of the University of Paris and has edited four of them.¹³⁶ The earliest of the group, *Accessus philosophorum*, which dates from the 1230s, offers two alternative divisions of speculative philosophy and a separate treatment of the quadrivium (Table 6). The next in order of composition, *Philosophica disciplina*, can be dated ca. 1245 (Table 7). Both were known to Arnoul de Provence when he devised his own *Divisio scientiarum* at mid-century (Table 8). The fourth text, *Compendium circa quadrivium* (early 1240s), is, as the name supplied by Lafleur indicates, more limited in scope and unrelated to the previous.

Accessus philosophorum VII artium liberalium

The introduction to philosophy known as the *Accessus philosophorum* (ca. 1240) is a rather extensive text (65 pages in the modern edition), a large portion of which (more than 700 of the 1036 lines in Lafleur’s edition) is devoted to the quadrivium.¹³⁷ What the author calls “philosophia mechanica” merits no more than a brief definition, but “philosophia liberalis” (i.e. speculative philosophy) receives no less than three alternative classifications, albeit brief ones. The first division is the familiar speculative-active that distinguishes between those things that are not subject to human volition and those that are. The subject of the second division (“Item speculativa”) is described as a threefold consideration of being (*ens*): natural (metaphysics, physics, mathematics), rational (*sermocinalis*), and active (moral).¹³⁸ The third division

¹³⁶ Claude Lafleur, *Quatre Introductions*; see the comments in Ruedi Imbach, “Einführungen in die Philosophie aus dem XIII. Jahrhundert. Marginalien, Materialien und Hinweise im Zusammenhang mit einer Studie von Claude Lafleur,” *Freiburger Zeitschrift für Philosophie und Theologie* 38 (1991): 471–93; Claude Lafleur, “Les ‘Guides de l’étudiant’ de la faculté des arts de l’Université de Paris au XIII^e siècle,” in *Philosophy and Learning: Universities in the Middle Ages*, ed. Maarten J. F. E. Hoenen, Jakob Hans Josef Schneider, and Georg Wieland (Leiden: E. J. Brill, 1995), 137–99; Olga Weijers, *Le maniement du savoir*, 30–32 (“la littérature d’introduction”).

¹³⁷ Lafleur, *Quatre Introductions*, 177–253. On the introductory functions of the “accessus” genre, see Edwin A. Quain, “The Medieval *accessus ad auctores*,” *Traditio* 3 (1945): 215–64; Teeuwen, *The Vocabulary of Intellectual Life*, 215–17.

¹³⁸ The *mathematicae discipline* (“coniuncte sunt motui et materie secundum esse, abstracte vero sive separate secundum diffinitionem vel intellectum”) are described, on the authority of Ptolemy (*Almagest* 1.1) as “res medie” between metaphysics and natural science; *Quatre Introductions*, 184.

(theorica-practica) seems at first glance to duplicate the first, but the author of the *Accessus* points out that in the second division the emphasis was on the knower (“in quantum est cognoscentis”), in the third it falls on the object of knowledge (“prout est cognoscibilis”).¹³⁹ The top half of Table 6 outlines these three divisions, with (in parentheses) the brief definitions provided in the text of the *Accessus*.

Exceptionally among 13th-century classifications of knowledge, treatment of the quadrivium in the *Accessus* stands outside its normal place under speculative science. While the four disciplines of the quadrivium are familiar, the analysis of music leans toward an Aristotelian, not a Boethian, perspective, a procedure consistent with the type of “prologue aristotélicien” found in the 13th-century academic genre known as *accessus ad auctores*.¹⁴⁰

Of the two traditional definitions of *musica*, discreta quantitas ad aliquid relata, and/or consonantia, the first is found to be defective, inasmuch as it lacks sufficient precision.¹⁴¹ Since not every proportion is a musical proportion, music can truly consist of *only* those proportions that form a musical consonance—a familiar restriction, to which other 13th-century sources add “ad sonoritatem” to emphasize that musical proportions are perceptible to the senses. The definition of music as “de numero sonoro” is rejected with the comment that “principaliter sonus intenditur,” again stressing the physical phenomenon that lies at the root of the discipline, not number existing in a (Platonic) world of ideal Forms. As we have seen, this emphasis on physical sound as the basis of music characterizes many of the 13th-century classifications of knowledge that define music with sufficient precision.

The *Accessus* applies the Aristotelian principle of causation (explanation of how things came to be what they are) to the analysis of music. Applied to the first two books of Boethius’ *Musica*, the formal cause is the idea existing in the mind of the creator of the work, or, as applied to music “the intentions of the principal books and chapters of the first two books of Boethius’ *Musica*.”¹⁴² In Book 1 of *De institutione musica* it is said that Boethius set out “the principles, species, and types of musical consonance,” while in Book 2 he set forth “the organization of the art of music, by which habits and concepts the intellect of the

¹³⁹ *Accessus*, 183 (ll. 45–56); as Lafleur points out, this classification and the distinction is borrowed from the *Divisio scientiarum*, 321–22 (ll. 295–305).

¹⁴⁰ Lafleur, *Quatre Introductions*, 181 and 184–88; see also Weijers, *Le maniement du savoir*, 58.

¹⁴¹ This passage is abbreviated in the *Divisio scientiarum* (ll. 379–82) of Arnoul de Provence; ed. Lafleur, *Quatre Introductions*, 326–27.

¹⁴² *Causa formalis est modus agendi sive qualitas operis que consistit in intentionibus librorum et capitulorum principalium*; *Accessus*, 203–4 (ll. 430–31).

TABLE 6

 Accessus philosophorum (1230–40)

Philosophia mechanica (subvenitur humane nature . . . ex parte corporis)	
Philosophia liberalis (subvenitur humane nature . . . ex parte anime)	
[Prima] subdivisio philosophie liberalis	
Speculativa (quoad scientias per cognitionem rerum)	
Activa (quoad virtutes)	
Item speculativa (in quantum est cognoscentis)	
Naturalis (ens preter nostrum opus: naturalis philosophia)	
Metaphysica	
Mathematice discipline	
Phisica sive naturalis	
Sermocinalis philosophia sive rationalis (principium et forma entis quod sermo dicitur)	
Activa sive moralis (principium entis quod est operatio)	
Item speculativa . . . alio modo (ex parte cognitionis prout est cognoscibilis)	
Theorica (substantia rei quo ad suas causas unversales secundum se)	
Practica (quo ad qualitates sive modus operandi)	
[Quadrivium]	
Arismetica	
Musica (discreta quantitas ad aliquid relata vel consonantia)	
causa formalis (modus agendi sive qualitas operis)	
causa finalis vel utilitas musicæ	
theorica (informatio intellectus humani in cognitione causarum)	
practica (moral effects of music)	
natural instruments (voice)	
artificial instruments	
causa efficiens (Boethius)	
[elements of music = causa materialis?]	
intervals/consonances	
musica mundana, humana, instrumentalis	
three genera (diatonic, chromatic, enharmonic)	
five tetrachords of the Greater Perfect System	
Geometria	
Astrologia	
Boethius: <i>De consolatione philosophiæ</i>	
Plato: <i>Timæus</i>	
Rethorica	

listener advances more easily to those things that are of the essence of the art.”¹⁴³ In short, the second book embodies a demonstration of what is described in the first. Boethius said as much in the first sentence of book 2: “The preceding book laid out all the things that I now propose to demonstrate very carefully.”

The final cause is defined as the sake for which something is done (or the utility of music). The *Accessus* distinguishes among *musica theorica*, *musica practica* (vocal and instrumental performance), and the moral effects of music. The first of these (*theorica*) is the intellectual satisfaction afforded by the comprehension of harmonic consonances, the “causes and reasons of all those things from which harmonies are composed” (*informatio intellectus humani in cognitione causarum et rationum omnis [one ms: omnium] eius ex quo armonie componuntur*). This leads to “the knowledge of universal being” (*ad cognitionem esse universi*), since the substance of all things rests on harmonic number (in *compositione harmonica*), a reflection of Plato’s doctrine in *Timaeus* that the creation of the universe was patterned after harmonic number.¹⁴⁴ The final cause of music is not merely pleasure but the modification of behavior, a principle already enunciated by Boethius: “*musica non solum speculationi deservit, set moralitati coniuncta est.*”¹⁴⁵

50

The efficient cause is described by a single word: “Boethius,” a term consistent with the “*diversi philosophi*” mentioned as the efficient causes in the general description of the quadrivium.¹⁴⁶ One might have expected the singer or instrumentalist who creates the sounding phenomenon to be declared the efficient cause, but the *Accessus* focuses principally on the authoritative *De musica* text of Boethius.

A material cause that would complete the Aristotelian tetralogy is not mentioned, but the *Accessus* continues with a listing of the elements of music: the six species of consonance and their respective proportions, the three species of music (*mundana*, *humana*, *instrumentalis*—out of place and minimalized *vis-à-vis* earlier classifications), the three genera (*diatonic*, *chromatic*, *enharmonic*), the five tetrachords (*hypaton*, *meson*, *synemmenon*, *diezeugmenon*, *hyperboleon*) and the fifteen “*chordae*” of the Greater Perfect System (not named individually).

¹⁴³ *Intentio primi libri est determinare de principiis et speciebus et modis musicæ consonantiæ secundum viam narrationis. In secundo vero libro determinatur primo de dispositionibus artis musicæ, quibus scilicet habitis et cognitis facilius provehitur intellectus auditoris ad ea que sunt de essentia artis*; Lafleur, *Accessus*, 204 (italics indicate the words borrowed from Boethius, *Musica* 2.1; ed. Friedlein, 227; trans. Bower, 52).

¹⁴⁴ *Timaeus* 34b–36d; trans. Barker, *Greek Musical Writings*, 2:58–61.

¹⁴⁵ The *Accessus* does not, however, continue to quote Boethius, who cited approvingly Plato’s view that “the soul of the universe was joined together according to musical concord” (*hinc etiam internosci potest, quod non frustra a Platone dictum sit, mundi animam musica convenientia fuisse coniunctam*, ed. Friedlein, 180, trans. Bower, 2).

¹⁴⁶ Lafleur, *Quatre Introductions*, 188.

At first glance, might these intervals, the building blocks of musical compositions, be considered by implication the “material” cause? Possibly, but intervals are hardly unformed matter like the bronze transformed by the efficient cause (sculptor, artisan) into either a statue, a vessel, or a coin: intervals have concrete reality apart from their possible contexts.

A brief statement about the four “causes” of music that differs in certain particulars from the treatment of the subject in the *Accessus philosophorum* also appears at the beginning of a summary that its editor, Christian Meyer, calls an “abrégé universitaire” of the first two books of *De institutione musica*.¹⁴⁷ The efficient cause, Boethius, is the same as the *Accessus*, and the “abrégé,” like the *Accessus*, identifies a double formal cause: the *forma tractandi* and the *forma tractatus*. The *forma tractandi* is described as a “modus agendi” (a term used also in the *Accessus*), which is itself twofold: part “narrative” and part “denominative,” terms that might be compared with the *Accessus*’ statement that book 1 of *De institutione musica* sets out topics that will then be explicated in book 2. The *forma tractatus* is simply the division of the books of the treatise. According to the “abrégé,” the final cause is also twofold, internal and external. The internal cause concerns the understanding of musical consonances, while the external cause is not distinguished from that shared by the “other mathematical” (aliamum mathematicarum). The material cause, so uncertain in the *Accessus*, is the Boethian definition of *musica*: “multitudo relata ad sonos.”

Philosophica disciplina

The introduction to philosophy known from its opening words as *Philosophica disciplina* offers a comprehensive analysis of the structure of knowledge as understood about the middle of the 13th century. Table 7 outlines the three separate classifications of philosophy that fall under “scientia humana.” Though this category also embraces “mechanica” and “magica,” these receive only the briefest treatment at the end of the treatise. The author’s disdain for the mechanical arts is evident from the comment that they teach the spirit to serve the flesh, rather than the other way around, which is more proper (docet enim spiritus servire carni, quamvis e converso debeat esse).¹⁴⁸ Magic includes various methods of divination, encompassing horoscopes and the flight of birds.

¹⁴⁷ Christian Meyer, “Un abrégé universitaire des deux premiers livres du *De institutione musica* de Boèce,” *Archives d’histoire doctrinale et littéraire du moyen âge* 65 (1998): 91–121, esp. 109.

¹⁴⁸ Lafleur, *Quatre Introductions*, 285–87.

TABLE 7

Philosophica Disciplina (ca. 1245)

Scientia divina (theologia)	
Scientia humana	
Philosophia speculativa (docet cognoscere necessarium . . . et intellectum speculantium informat)	
	scientie speculative rerum
	naturalis
	mathematica
	methafisica
	sermocinales scientiae
	gramatica
	poetica
	dyalectica
	rectorica
Philosophia practica (docet cognoscere bonum . . . et informat intellectum practicum)	
Philosophia (aliter)	
	naturalis
	mathematicus
	divinus
	methafisica
	ethics (de eis que ordinant hominem et coniungunt bonitati divine fruende)
	accidentalis (sermocinalis)
Philosophia	
Naturalis (corpus mobile)	
secundum partes integrales (<i>Physics</i>)	
corpus mobile	
motus, forma, materia, privatio	
infinitum, tempus, locus et eorum causa efficiens	
secundum partes subiectivas	
de corpore mobili ingenerabile et incorruptibile (<i>De celo et mundo</i>)	
de corpore generabili et corruptibili	
simplex (<i>De generatione</i>)	
compositum	
inanimatum (<i>Meteora</i>)	
animatum (<i>De anima</i> , etc.)	
Mathematice (res existentes in materia absque materia: multitudo and magnitudo)	
Arismetica (disciplina quantitatis numeralis secundum se)	
theorica (numerus in se secundum suam essentiam)	
practica (numerus in materia; <i>Algorismus</i>)	

TABLE 7 (*continued*)

Musica (scientia proportionum in sonis)	
mundana (non . . . ex collisione corporum supracelestium, . . .	
set ex radiis istorum corporum intersecantium)	
humana (proportiones sonorum generatorum ex motu	
spirituum ad vocalem arteriam)	
melica (proportio sonorum in cantu)	
rimica (proportio soni rimici)	
metrica (proportio soni metrici)	
instrumentalis (ex collisione duri cum duro)	
Geometria (disciplina magnitudinis immobilis)	
theorica (quantitas vel magnitudo)	
practica (altimetria, planimetria, stereometria)	
Astronomia (scientia mobilis magnitudinis)	
Scientie sermocinales	
gramatica (scientia recte loquendi recteque scribendi)	
poetica (scientia componendi carmina metricae)	
rhetorica (ars dicendi apposite ad persuadendum [Quintilian])	
logica (ars bene disputandi [Augustine], ratio disserendi diligens	
[Cicero])	
Mechanica (7 categories)	
Magica (divination of various types)	

The first classification of knowledge is the familiar speculative-practical one, but on the authority of Averroës the author posits that every science has both a speculative and a practical component (a distinction that Arnoul de Provence refers to Avicenna). For example, logic has its own subject (the syllogism), but it is also a practical methodology for proving propositions in other sciences. This point is not developed in the first classification, but there is a hint of it in the mathematical of the third classification.

Philosophica disciplina distinguishes among the objects of speculative philosophy that are either (1) “joined with motion and matter both in their essence and in the intellect” (natural science), (2) “joined in essence but not in the intellect” (mathematics), or (3) “entirely separate [from motion and matter].”¹⁴⁹ The author comments that these three along with the four *scientie sermocinales* constitute a quasi-equivalent to the traditional schema of the liberal arts.¹⁵⁰ Practical science, mentioned

¹⁴⁹ Res enim de quibus est philosophia speculativa aut sunt coniuncte motui et materia secundum esse et cognitionem [natural science], aut coniunctum secundum esse, non tamen secundum cognitionem [mathematics], aut omnino separate [metaphysics]; Lafleur, *Quatre Introductions*, 261. Cf. Aristotle, *Metaphysics* 6.1 (1026a 18–19).

¹⁵⁰ Et ideo tantum sunt tres scientie speculative rerum, que quidem cum .IIII^{or}. sermocinalibus, que sunt grammatica, poetica, dyalectica et rhetorica, possunt facere septem artes liberales; ed. Lafleur, *Quatre Introductions*, 261.

only briefly, “teaches [us] to recognize the good that is to be done and informs the practical intellect” (docet cognoscere bonum quod est operandum et informat intellectum practicum), the traditional definition of ethics.¹⁵¹

The second classification of knowledge (*aliter*) calls upon the authority of Aristotle, who in the sixth book of the *Metaphysics* proposed three “theoretical philosophies”—mathematics, physics, and theology (in that order).¹⁵² The *Philosophica disciplina* adds to these an “accidental mode of philosophy” (*accidentalis autem modus philosophie*), which turns out to be the *sermocinalis* of the foregoing classification. This interpretation of “accidentalis” was not quite Aristotle’s intent, but a discussion of this point will be taken up in connection with the classification of Arnoul de Provence.

Only in the third, and far more elaborate, classification of knowledge, which occupies the lower half of Table 7, does music receive a notable share of the author’s attention. This classification divides philosophy into natural, mathematical, and sermocinalis. The parts of natural philosophy are supplied with references to the Aristotelian text proper to each subdivision.

54

Mathematics treats of quantity abstracted from matter, “sicut testatur Boethius in *Arismetica*,” pairing the disciplines that concern *multitudo* (arithmetic, music) and those that concern *magnitudo* (geometry, astronomy). Arithmetic and geometry are here not entirely abstract, as usually considered, for to each is attributed a practical component. The practical applications of arithmetic are taught by *Algorismus* (probably the manual of John of Holywood, not the classic work of Al-Khwārizmi), while practical geometry applies its principles to the measurement of elevations (*altimetria*), surveying (*planimetria*), and the measurement of solids (*stereometria*). Music is about number, but only “inasmuch as [number] receives a certain difference of another kind upon it (for example, sounds).”¹⁵³ A reminder that not all proportions are musical ones is followed by an explanation of the threefold Boethian division: *musica mundana, humana and instrumentalis*.

Boethius had maintained (though without proof) that the motions of the immense celestial bodies *must* make some sound (see Table 1). Our author notes that Aristotle in *De celo et mundo* (2.9; 290b 12–291a 6), had rejected the existence of a heavenly music generated by the motion of celestial bodies, and that would seem to eliminate it from consideration under mathematics. Our anonymous author supplies an

¹⁵¹ Lafleur, *Quatre Introductions*, 260 (ll. 58–59).

¹⁵² *Metaphysics* 6.1, 1026a 18–19.

¹⁵³ Prout recipit aliquam differentiam alterius generis supra ipsum, sicut sonorum, et de hac est musica; Lafleur, *Quatre Introductions*, 265 (ll. 172–73).

alternative theory: that there does exist a “musica mundana,” albeit unsuitable (“improprius”) for our ears, generated by the light rays emanating from heavenly bodies as these rays strike each other and cut through the air.¹⁵⁴ Although unheard, the effects of this “music” are similar to those produced by the sounds of perceptible music; their effect refreshes and stimulates nature.¹⁵⁵

Philosophica disciplina redefines musica humana, which is said to consider “the proportions of the sounds generated by the movement of air through the vocal passage” (proportiones sonorum generatorum ex motu spirituum ad vocalem arteriam). While paying obeisance to the idea of proportion, the definition completely transforms Boethian musica humana to bring it more in line with an Aristotelian, empirical view of “human” music, in this case vocal music. The subdivision of this musica humana are the *musicae partes* of Cassiodorus: melica, rimica [sic], and metrica, terms that cover (1) melody and the proportions of sung pitches (high and low), (2) the proportions of syllables and phrases, and (3) metric proportion. Musica instrumentalis is generated from friction or percussion (ex collisione duri cum duro, ut in instrumentis, cithara et aliis).

The author of *Philosophica disciplina* is well aware that his interpretation of Boethius with respect to musica mundana and musica humana does not correspond to what Boethius taught. In the case of musica mundana, he could rely in part on the superior *auctoritas* of Aristotle, and there was a ready (if not more convincing) alternative. He had no such recourse for musica humana, however. He could only allege (somewhat weakly) that we do not really know what Boethius would have said about this, since the *De institutione musica* is incomplete, Boethius having been prevented from completing it by his untimely death.¹⁵⁶ Our author reasons that, if death had not intervened, Boethius would have endorsed the theory proposed in *Philosophica disciplina*—a rather presumptuous argument *ex silentio Boethii*!

Arnoul de Provence: Divisio scientiarum

The *Divisio scientiarum* compiled by Arnoul de Provence about the middle of the 13th century draws on the (virtually contemporaneous)

¹⁵⁴ Ex radiis istorum corporum intersecantium se et distrahentium partes aeris; *ibid.*

¹⁵⁵ Sic et iste sonus nature operanti in rebus obicitur, et ipsa ex proportione talis soni quidam delectatione reficitur et movetur ad operandum; Lafleur, *Quatre Introductions*, 268–69 (ll. 214–16).

¹⁵⁶ For revealing insights into what Boethius might have said about musica mundana and humana, see David S. Chamberlain, “Philosophy of Music in the *Consolatio* of Boethius,” *Speculum* 45 (1970): 80–97.

Philosophica disciplina and the anonymous *Accessus philosophorum*, discussed earlier.¹⁵⁷ Arnoul offers multiple definitions of philosophy, wisdom (*sapientia*), and science, derived from both ancient and contemporary (Arabic and Latin) sources in one of the more sophisticated specimens of the classification genre (Table 8, the line numbers in parentheses are those of Lafleur's edition).

After parading before the reader 12 definitions of philosophy, scientia, and sapientia, Arnoul proposes three different classification models, the first of which he calls "communis" (speculative-practical), as indeed it is. The second classification, which he calls "proprius," is attributed to Aristotle. Arnoul claims that, in the sixth book of the *Metaphysics*, the Philosopher divided philosophy into two "modes," one "essential" and the other "accidental."¹⁵⁸ Essential philosophy, comprising natural science, mathematics and divine science (metaphysics), concerns itself with things that are independent of human activity. The "accidentalis" subdivision combines practical (moral) philosophy with verbal disciplines on the grounds that they are all "de rebus humanis" and in this respect contingent or "accidental." The basis of this distinction cannot, however, be derived from the passage in the *Metaphysics* cited by Arnoul. Rather, in book 6 Aristotle explains the fundamental philosophical distinction between essence and accidents. Regarding accident he maintains that "there can be no scientific treatment of it; . . . no science—practical, productive, or theoretical—troubles itself about it."¹⁵⁹

Arnoul's third and by far most comprehensive classification system ("alia divisio philosophie accepta valde large") is based on the twofold mechanical-liberal distinction familiar from Hugh of St. Victor. Both provide remedies for the imperfections of the human condition: mechanical sciences, the listing of which corresponds to that of the *Didascalicon*, minister to internal and external needs of the body, while what he calls "liberal" philosophy addresses the limitations of the spirit. Arnoul leaves no doubt about the relative value of these two: the mechanical sciences, which include the magical arts, are described as no more than "servilis et vilis," and he spends little time on them.¹⁶⁰ The liberal sciences—speculative, practical, rational—have a far more exalted

¹⁵⁷ Arnoul's *Divisio scientiarum* is edited in Lafleur, *Quatre Introductions*, 295–347.

¹⁵⁸ Arnoul here spells out what was only implied in the second division of *Philosophica disciplina*.

¹⁵⁹ *Metaphysics* 6.1, 1026b 3–4; trans. Ross, *The Works of Aristotle*, vol. 8.

¹⁶⁰ Lafleur, *Quatre Introductions*, 316 and 321–47; Arnoul alludes to the not uncommon—and not particularly flattering—medieval etymology that linked *mechanica* with *moechor* (p. 316), thus *adulterina*; see Marie-Dominique Chenu, "Arts mécaniques et oeuvres serviles," *Revue des sciences philosophiques et théologiques* 29 (1940): 313–15.

TABLE 8

 Arnoul de Provence: *Divisio scientiarum* (ca. 1250)

- Modus dividendi philosophie (ll. 190–98; 277–80; 295–305)
 Speculativa (quo ad scientia per cognitionem rerum)
 Practica (quo ad virtutes)
- Modus proprius dividendi philosophiam secundum Aristotelem (199–204)
 Essentialis
 naturalis
 mathematicus
 divinus
 Accidentalibus (de rebus humanis)
 sermone
 virtutes
 vitia
- Alia divisio philosophie accepta valde large (205–23)
 Scientia/philosophia mechanica (subvenitur humane creature quo ad defectus . . . ex parte corporis; 224–45)
 lanificum, navigatio, armatura, agricultura, theatrica, medicina, divinativa, mantice (= 5 species of divinativa; 246–76)
 Philosophia speculativa (perficit intellectum humanum quo ad scientias per cognitionem rerum)
- 57
-
- Philosophia naturalis large sumpta (280–94; 306–33)
 Metaphisica (res . . . a motu et materia omnino separatas; 334–39)
 Mathematice (de rebus separatis secundum intellectum, coniunctis tamen secundum esse; 340–468)
 Arithmetic
 Music
 mundana
 in motibus corporum superiorum
 in compagine elementorum
 in varietate temporum
 humana
 in unione anime cum corpore
 in unione virium anime
 in unione partium corporis
 instrumentalis
 in diversis generibus instrumentorum
 aliter (sonus tripliciter generatur)
 ex collisione duri cum duro (=musica instrumentalis)
 ex collisione spirituum ad vocalem arteriam (=musica humana)
 ex intersectione corporum
 mundano-rum (=musica mundana)

TABLE 8 (*continued*)

Geometry
Astronomy
Philosophia naturalis proprie et stricte sumpta (469–505)
corpus mobile non contractum (<i>Physics</i>)
corpus mobile contractum
ingenerabile et incorruptibile (<i>De celo et mundo</i>)
generabile et corruptibile
simplex (<i>De generatione</i>)
compositum
inanimatum (<i>Metheora</i>)
animatum
vegetativa (<i>De vegetabilis, De plantis</i>)
sensitiva (<i>De animalibus</i>)
intellectiva (<i>De anima, etc.</i>)
Practica (perfecit intellectum humanum quo ad virtutes; 506–50)
politica
yconomica
monostica
Rationalis sive sermocinalis (561–736)
grammatica
logica
rethorica

goal: “to lift humankind from terrestrial cares and elevate it to the love of celestial things.” These are worthy of a more probing investigation, and their treatment takes up more than three-quarters of Arnoul’s *Divisio*. Liberal (i.e. speculative) philosophy falls into the conventional three categories: (1) natural philosophy *large sumpta*, (2) practical philosophy, and (3) rational or verbal (sermocinalis). Arnoul singles out physical science (*philosophia naturalis proprie et stricte sumpta*) for special treatment, naming the Aristotelian text pertinent to each subdivision. Music is mentioned only in the *large sumpta* division among the mathematical.

The terms used by Arnoul in his treatment of music emphasize sensible experience. Music is first defined as “de numero relato ad sonum vel de consonantia numerorum” (ll. 378–79), a dual definition that joins speculative philosophy to sounding music. He denies that music can be merely “de quantitate discreta ad sonum relata” (a view that tends to privilege number in the Platonic sense), but rather consonance and proportion in sound “as it falls under number” (ut cadit sub numero), thus preferring instead to define music as “concerning sound in numbers rather than sounding number” (de sono in numeris quam

de numero sonoro).¹⁶¹ Though from his perspective the physical phenomenon takes precedence over *musica* as a manifestation of ideal number, Arnoul dutifully quotes the definitions of *musica mundana* and *humana* “secundum Boethium.”

As indicated by the entries in Table 8 Arnoul follows closely the traditional Boethian division and definition of *musica mundana*, *humana*, and *instrumentalis* (cf. Table 1). The alternative division (*aliter*) is founded on the three ways in which sound is generated: (1) the striking of hard surfaces, (2) the passage of air through the vocal mechanism, and (3) by the intersection of heavenly bodies.¹⁶² The explanation of these distinctions redefines two of the familiar Boethian divisions and also inverts their normal order. Arnoul associates *musica instrumentalis* with *percussionalia*, and *musica humana* with singing. Though he had previously defined *musica mundana* in the familiar way, here he cites Aristotle’s famous objection to Pythagorean-Platonic celestial music and allows that this unheard sound might be generated “ex intersectione radorum,” just as his model, *Philosophica disciplina*, had speculated. Even though human beings cannot hear this *musica mundana*, it “excitet animalia et plantas ad generationem et pullulationem,” somewhat in the manner that instrumental music can stimulate good or evil behavior in human beings. Arnoul’s treatment of music closes with a conventional list of the six principal consonances.

Compendium circa quadrivium

A brief introductory handbook, called by Claude Lafleur *Compendium circa quadrivium* (ca. 1240), amounts to little more than a string of disconnected statements and definitions, probably designed to help a baccalaureate candidate preparing for potential examination questions.¹⁶³ Music is succinctly defined as “proportio vel consonantia in sonis,” a phrase that would seem to emphasize the aural over the mathematical. A subsequent definition explains this kind of proportion as “the congruence of sounds, high and low” (*convenientia sonorum in acuto et gravi*). The virtually obligatory citation of Boethius’ three genera of

¹⁶¹ Ibid., 327 (l. 382). Lafleur notes that Arnoul prefers “sonus in numero” to “numerus sonorus,” the term favored in *Philosophica disciplina* (“sonus vel numerus sonorus est eius subiectum,” l. 204). The *Accessus philosophorum* equates the two: “musica est de sono in numeris vel de numero sonoro” (l. 424).

¹⁶² Arnoul, true to his model, the *Philosophica disciplina*, duly reports that Aristotle denied the existence of music created by the movement of the heavenly spheres, and he relies on the explanation that the rays emitted by these bodies disturb the air in such a way as to create (still unheard) music.

¹⁶³ Edited in Lafleur, *Quatre Introductions*, 357–74, from the unique manuscript, Madrid, Biblioteca Nacional 3314.

music is followed by a reference to Aristotle's *De anima*, rare in the classification literature, in which Aristotle explained the perception of sound in a manner that concentrates exclusively on physical perception.¹⁶⁴ A final definition of music resolves the conflict by affirming that "music, because it does not consider [sound] on its own account but because of proportion inherent in it, is manifestly a mathematical science, even though it considers sense perception" (*quia non considerat propter se set proportionem in ipso existentem, ideo manifestum est quod musica est scientia mathematica, licet sensum consideret*).¹⁶⁵ This conclusion, here simply stated, was the subject of dispute in the late 13th century. Is music a mathematical discipline, as it had always been considered, or should it rather be considered a natural science?

More Mathematical than Natural

About the beginning of the 14th century, Raoul le Breton (Radulphus Brito) compiled a series of *Questiones mathematice*, one of which asked whether astrology and music should be classified as "more natural than mathematical."¹⁶⁶ The prologue to the questions draws the usual distinction between speculative and practical science based on their respective ends: whether the aim is truth or a "work" (*speculativa scientia . . . finis est veritas, sed finis practice est opus*). Among the quadrivial disciplines, Raoul distinguished between those that are purely mathematical—arithmetic (*quantitas discreta absolute*) and geometry (*quantitas continua absolute*)—and those that are partly mathematical and partly natural (astrology and music). With respect to music, Raoul makes the following observation:

Music concerns number related to sound and the consonances which occur in sound; it does not consider the nature of sound as sensible, nor how it is generated—such things concern natural [philosophy]. Instead, it considers the proportional relationship of sounds to each

¹⁶⁴ *De anima* 2.8 (419b 4–421a 6); trans. Barker, *Greek Musical Writings*, 2:77–80.

¹⁶⁵ Lafleur, *Quatre Introductions*, 374.

¹⁶⁶ The prologue and a list of the *questiones* has been edited in Olga Weijers, *La "disputatio" à la Faculté des arts de Paris (1200–1350 environ): Esquisse d'une typologie*, *Studia Artistarum: Etudes sur la Faculté des Arts dans les Universités Médiévales* 2 (Turnhout: Brepols, 1995), Appendix 2. The questions "Utrum sint tantum quatuor scientie mathematice" and "Utrum astrologia et musica sint magis naturales quam mathematice" as well as the questions on music (nos. 39–42) have been edited by Frank Hentschel, *Sinnlichkeit und Vernunft*, 281–300. Hervé le Breton proposed a similar scheme; see Claude Lafleur, "La 'Philosophia' d'Hervé le Breton (alias Henri le Breton)," *Archives d'histoire doctrinale et littéraire du moyen âge* 61 (1994): 149–226; 62 (1995): 358–442 (edition).

other—how one stands in a sesquialtera [3:2] or sesquitertia [4:3] proportion to another, and similar matters.¹⁶⁷

Determining the question as to whether music (and astronomy/astrology) are “more natural than mathematical” requires that the alternatives be weighed at considerable length.¹⁶⁸ Music considers “number related to sounds, either under the aspect of number or under the aspect of sound” (considerat numerum relatum ad sonos, aut . . . sub ratione numeri aut sub ratione soni). But if it does this only “sub ratione numeri,” it would be indistinguishable from arithmetic; if only “sub ratione soni,” it must be placed under natural science. Solving this conundrum was the ostensible point of the exercise.

This question arose, here and elsewhere in the philosophical literature of the time, in part because of a faulty translation of a passage in Aristotle’s *Physics*, in which the Philosopher seemed to hold that optics, harmonics, and astronomy were “more physical than mathematical.”¹⁶⁹ In fact, his true position was quite different. The *Physics* maintains that “optics, harmonic science, and astrology are the more mathematical of the physicals (τὰ φυσιώτερα τῶν μαθημάτων, οἷον ὀπτική καὶ ἄρμονική καὶ ἀστρολογία).”¹⁷⁰ While this is clear enough from the Greek text, a faulty Latin translation, misunderstanding the genitive of comparison (φυσιώτερα), affirmed exactly the *reverse* of Aristotle’s true position, rendering the text as “que *magis sunt physica* quam mathematica, ut perspectiva et armonica et astrologia.”¹⁷¹ This either misled 13th-century commentators (who might have been further perplexed

¹⁶⁷ Sed de numero relato ad sonum est musica et etiam de consonantiis que fiunt in sono; nec considerat naturam soni secundum quod sensibilis [est], nec unde causatur, sed magis spectat ad naturalem; sed magis considerat proportionem sonorum ad invicem, quomodo unus est in sesquialtera proportione vel in sesquitertia ad alterum, et sic de consimilibus; ed. Weijers, *La “disputatio,”* 166–67.

¹⁶⁸ Hentschel, *Sinnlichkeit und Vernunft*, 288–92.

¹⁶⁹ *Physica (Translatio vetus)*, eds. Fernand Bossier and Jozef Brams, *Aristoteles Latinus* 7/1 (Leiden: E. J. Brill, 1990), 51.

¹⁷⁰ “Similar evidence is supplied by the more physical of the branches of mathematics, such as optics, harmonics, and astronomy;” *Physics* 2.2 (194a 6); trans. Robert P. Hardie and Russel K. Gaye, *The Works of Aristotle*, ed. William D. Ross, vol. 2 (Oxford: Clarendon Press, 1930). For a discussion of Raoul’s reconciliation of geometry and optics see Frank Hentschel with Martin Pickavé, “*Quaestiones mathematicales*: Eine Textgattung der Pariser Artistenfacultät im frühen 14. Jahrhundert,” in *Nach der Verurteilung von 1277: Philosophie an der Universität von Paris im letzten Viertel des 13. Jahrhunderts*, eds. Jan A. Aertsen, Kent Emery, Jr., and Andreas Speer, *Miscellanea Medievalia* 28 (Berlin: Walter de Gruyter, 2001), 632–34.

¹⁷¹ *Aristoteles Latinus* 7.1; *Physica (Translatio vetus)*; ed. Fernand Bossier and Jozef Brams, 51. Regrettably, the current English translation in the widely disseminated Loeb Classical Library edition misinterprets the passage; *The Physics*, ed. Philip H. Wicksteed and Francis M. Cornford (Cambridge: Harvard Univ. Press, 1980), 121.

by Averroës' commentary that understood the text correctly) or caused them to argue against the Philosopher. In his early commentary on the *Physics*, Thomas Aquinas accepted what he (erroneously) thought to be Aristotle's view, but he later rectified the matter in his commentary on Boethius' *De Trinitate*.¹⁷²

Very likely, the accurate translation of the *Physics* was available to Raoul, and he probably knew from Averroës' commentary on book 2 of the *Physics* that Aristotle had maintained that music and astronomy were "more mathematical than physical." Nevertheless, he took up the *questio* as a vehicle of virtuosic demonstration. Having excluded *practica musica*, Raoul advanced the authentic Aristotelian position as his own, a conclusion reiterated several times as contrary opinions are refuted before the *questio* concludes with the determination that music concerns not absolute number, as does arithmetic, but number "ad sonos relativum."¹⁷³ Just as the astronomer considers "magnitudinem in corpore celesti," the musicus considers sound neither as abstract number nor as sound exclusively but under the aspect of "number limited by sounds" and as mathematical proportion.

Two of a collection of anonymous *Questiones mathematicales*, dated by Frank Hentschel between 1323 and 1347, address topics that relate to music.¹⁷⁴ The first inquires about the possibility of the existence of more or less than four *scientiae mathematicae*, and thus concerns music only incidentally. The second asks, as did Raoul le Breton, whether music and astrology are more mathematical than natural.¹⁷⁵ The author first presents six arguments in favor of the "more mathematical than natural" position. First of all, no less an authority than Boethius considered music and astronomy to be mathematical (or at least more mathematical than natural), having included them in the quadrivium. Since music and astronomy make use of mathematical principles to explain the phenomena (quae probant suas passiones per principia mathematica), they are not primarily natural, but mathematical.¹⁷⁶ The third argument states the general principle that sciences like music and

¹⁷² For Thomas' first interpretation, based on the erroneous translation, see *Commentaria in octo libros Physicorum Aristotelis*, cap. 2, lect. 3, in *Sancti Thomae Aquinatis doctoris angelici Opera omnia iussu impensaue Leonis P.M. XIII edita* (Rome, 1884), 2:61–63. In the *Summa* Thomas repeated the teaching of his Boethius commentary; *Summa Theologiae*, 2^a-2^{ae} q.2, ad 3. Kilwardby draws the same conclusion as his fellow Dominican in chap. 21 of *De ortu scientiarum* ("De diversitate inter harmonicam et naturalem scientiam, et quomodo ipsa est mathematica et abstractior quam naturalis"). The musical implications are discussed in Haas, "Musik zwischen Mathematik und Physik," 31–37.

¹⁷³ Hentschel, *Sinnlichkeit und Vernunft*, 290 (25–26) and 292 (45).

¹⁷⁴ Both are edited from the unique source (London, British Library, Harley 1) in Frank Hentschel, *Sinnlichkeit und Vernunft*, 300–313.

¹⁷⁵ Hentschel, *Sinnlichkeit und Vernunft*, 308–13.

¹⁷⁶ *Post. Analytics* 1.13 (78b 35–79a 15), trans. Barnes, 21.

astronomy, whose subject is considered formally under mathematics, are principally mathematical. In music, for example, number is compared with respect to sound (in comparatione ad sonum), either as a physical phenomenon (prout est percussio aeris) or as number. If solely as physical sound, it would not differ from natural science; therefore it *must* be considered “sub numeri.” Likewise, astronomy considers not the physical composition of celestial objects (impossible to know before 20th-century space explorations to the moon and Mars) but their distances, relationships, and aspects.

The fourth argument in favor of placing music and astronomy among the *scientie mathematicae* notes, as did Raoul, that the Commentator (Averroës) says in his commentary on the *Physics* that music and astronomy belong more properly among the mathematical than to natural science. The matter is not further pursued, but it resurfaces at the first argument *in oppositum*. Music, it is argued, considers number principally, but sound (a *res naturalis*) only “ex incidenti”—yet another reason for considering it more mathematical than natural.

Before presenting formal proofs that music is more mathematical than natural, the anonymous author of the *Questiones* introduces four arguments for the contrary position, that it is more natural than mathematical.¹⁷⁷ Having just cited Averroës’ (correct) interpretation of Aristotle’s view in the *Physics*, the author now quotes the faulty translation that has Aristotle maintain that music, astronomy, etc. are “more physical than mathematical” (*magis physica quam mathematica*).¹⁷⁸ He believes that this must have been Aristotle’s authentic position, since the *Physics* immediately draws a contrast (“contrario [$\delta\nu\alpha\pi\acute{\alpha}\lambda\lambda\iota\upsilon$] eodem modo”) between these three (optics, music, astronomy) and geometry, which does not consider the physicality of a line. Secondly, those sciences are more natural that consider a physical object primarily as physical (*per se*) and its mathematical component within that context (*sub illa ratione*). Another objection: musical consonance involves one note compared to another, and each separately, so it cannot be a *single* science. If each number were considered separately, music would not differ from mathematics. Therefore, music (so it is argued) *must* be more physical than mathematical. Thirdly, those sciences whose subjects are limited (*contrahuntur*) by something natural *are* natural. This is the case both with music, which is about “*numerus contractus per sonum*,” and astronomy, which concerns the sun, moon and stars.

¹⁷⁷ Hentschel, *Sinnlichkeit und Vernunft*, 309–10 (ll. 21–36).

¹⁷⁸ Cf. *Physics* 2.2, (194a 5–13). Robert Kilwardby was puzzled that the translation was “amphibologicam;” *De ortu scientiarum*, 81 (l. 23). For other references to this dilemma, see Hentschel, *Sinnlichkeit und Vernunft*, 124n85.

Finally, those sciences are more natural than mathematical that demonstrate their conclusions by means of natural principles. Boethius, speaking of high and low pitches, and Ptolemy (proving that the heavens are round) attested to the physicality of music and astronomy, respectively. These arguments *in oppositum* close with an allusion to “plures alias rationes” that would strengthen the case that music is more natural than mathematical.

The resolution of the question commences with the dry comment that “de ista questione sunt famose opiniones contrarie”! Some of these will be introduced to refute the just presented objections and to prove the primacy of the mathematical over the natural. The discussion opens with a series of definitions of music and astronomy. Those concerning music reinterpret Boethian terminology: *musica mundana* is called “*naturalis*,” and *musica humana* concerns “the proportion of the human voice.” Unaltered is the definition of *musica instrumentalis*. Music can also be divided (after Cassiodorus) into vocal, rhythmic, and metric, the latter two claimed by grammarians for what is material in them—words.¹⁷⁹ The foundation of the determination of the question will be the principle that whatever science considers its subject from a formal point of view (sub aliqua ratione formali) as mathematical will be considered principally mathematical, even though the subject might be material.¹⁸⁰ Such is the case with music, whose subject is *sonus numeratus vel numerabilis*, with astronomy, and some other sciences.

Three *notabilia* introduce the determination of the question. First, the author observes that a philosophical determination can have more than one *scientia* represented; logic, natural science, and mathematics are all utilized in the first book of Aristotle’s *De celo et mundo*, even though the subject of the book is natural science. Thus, just because

¹⁷⁹ Nunc de musicae partibus, sicut est a maioribus traditum, prosequamur. musica scientia est disciplina quae de numeris loquitur, qui ad aliquid sunt his qui inveniuntur in sonis, ut duplum, triplum, quadruplum, et his similia quae dicuntur ad aliquid. Musicae partes sunt tres: *armonica—rithmica—metrica*. armonica est scientia musica quae decernit in sonis acutum et gravem. rithmica est quae requirit incursionem verborum, utrum bene sonus an male cohaereat. metrica est quae mensuram diversorum metrorum probabiliter ratione cognoscit, ut verbi gratia heroicon, iambicon, heleiacon, et cetera; *Cassiodori Senatoris Institutiones* 2.5.4–5, ed. Mynors, 144. Cf. Isidore: Musicae partes sunt tres, id est, harmonica, rythmica, metrica. Harmonica est, quae decernit in sonis acutum et gravem. Rythmica est, quae requirit incursionem verborum, utrum bene sonus an male cohaereat. Metrica est, quae mensuram diversorum metrorum probabiliter ratione cognoscit, ut verbi gratia heroicon, iambicon, elegiacon, et cetera; Etym., 3.18.

¹⁸⁰ His preintellectis, probatur intentum ratione tali: quandoque in aliquibus scientiis subiecta eorum considerantur sub aliqua ratione formali mathematica, ille scientie sunt principaliter mathematicae, licet subiectum esset naturale, quia formalitate considerandi denominantur scientie et per eam distinguuntur, sed in musica, astronomia et sic de similibus est huiusmodi, ergo erunt principaliter mathematicae; ed. Hentschel, *Sinnlichkeit und Vernunft*, 310–11 (47).

Boethius and Ptolemy allude to principles of natural science does not make either music or astronomy thereby a natural science. Secondly, in the case of music the mind abstracts number from sound. Consequently, its primary focus is not practical music (“ad vocem exterius”) but cognition of what is knowable about it (“cognitio sui scibilis”), as is appropriate for a speculative science.¹⁸¹ Boethius had made this distinction clear: the “bonus cantor” is not someone who knows how to sing, but someone who knows the proportions of sounds (*Musica* 1.34).¹⁸² The third and final *notabile* draws the distinction between the material and the formal cause. It also comes close to defining music as a *scientia media*, halfway between speculative and physical science, a topic that will be taken up in conclusion.

The *questio* concludes with four arguments that music is more mathematical than natural. Against the opinion of Aristotle, who had subalternated music to arithmetic, astronomy and optics to geometry, the author of the *Questiones* asserts that all of them are “part mathematical and part natural.” Perspective considers the line “in materia naturali,” but not exclusively according to the material perspective proper to natural science. Music does not regard sound exclusively from the perspective of natural phenomenon (“sub ratione soni”), but under the aspect of number (“sub ratione numerati”). Arithmetic and music thus differ significantly: the former considers “number in itself” (*numerus secundum se*), while the latter considers number “in materia naturale, videlicet in sono.”¹⁸³ The third argument maintains that music does not concern the “numbers of sounds,” but “numbered sound,” for number is an accident of sound, as whiteness is an accident of a white man, not his substance. The final response reaffirms the main conclusion that neither music nor astronomy is principally under natural science but under mathematics.

Music and scientie medie

As we have seen, over the course of the 13th century, the traditional number-oriented conception of *musica* inherited from Boethius and the Pythagorean tradition, though not utterly discarded, yielded to the ever-widening influence of Aristotelian empiricism. Jean Gagné epitomized this shift of perspective as a “tendance effective à ranger

¹⁸¹ Hentschel, *Sinnlichkeit und Vernunft*, 311 (55).

¹⁸² Aristotle made the same point at the beginning of the *Metaphysics* with regard to the difference between an architect and the manual laborers who execute his plans.

¹⁸³ Hentschel, *Sinnlichkeit und Vernunft*, 312 (68–69). See Jacques of Liège: “[musica] instrumentalis vero sub sonora partim sub naturali, partim sub mathematicali scientia collocatur, principalius tamen sub mathematicali” (1.8.2; cf. also 1.21.8).

sous la bannière de la physique ce qui jusque-là était considéré le plus souvent du domaine de la mathématique.”¹⁸⁴ (Not that philosophers needed Aristotle to inform them that musical sound could be *heard*.) Aristotle’s scientific methodology, henceforth the paradigmatic model, depended not at all on mathematical demonstration. Yet music could not easily be stripped of its mathematical component, regardless of how irrelevant it might have seemed to 13th-century philosophers. As just explained, a compromise position was embodied in the view that music was “partim mathematica . . . partim naturalis.”¹⁸⁵ Resolution of the discrepancy between immutable number and the limitless variability of performed music lay in part in the evolution of the concept of *scientie medie*, a reclassification that dislodged music from its exclusive attachment to the quadrivium and rationalized its relationship with natural science. Central to the elaboration of the theory of *scientie medie* were the Dominican theologians Albertus Magnus and his pupil, Thomas Aquinas.

Albertus Magnus (ca. 1200–80) treated a vast array of topics (botany, zoology, mineralogy, etc.) in his works on natural science. A treatise on music is, unfortunately, not among them, but Albert would have had little sympathy for a purely speculative *musica* on the Boethian model. In his commentary on Aristotle’s *Metaphysics* (ca. 1265–70), Albert forcefully attacked “the error of Plato, who said that natural things are founded on mathematics and mathematical things on the divine, and therefore said that the principles of natural being are mathematical, which is utterly false.”¹⁸⁶ Far from being a generative principle enjoying a separate existence, as Plato maintained, number depends on matter, from which it is abstracted by the intellect. From Albert’s perspective, therefore, Plato and his followers had obstinately reversed the

¹⁸⁴ Jean Gagné, “Du quadrivium aux scientiae mediae,” in *Arts libéraux et philosophie au moyen âge*, 978 [975–86]; Gagné also notes parallels in Arabic philosophy.

¹⁸⁵ Raoul le Breton, *Questiones mathematicae*, ed. Weijers, *La “disputatio,”* 166. Cf. the view of Jacques de Liège: “[musica] instrumentalis vero vel sonora partim sub naturali, partim sub mathematicali scientia collocatur, principialis tamen sub mathematicali;” *Speculum Musicae* 1.8.2; ed. Roger Bragard, CSM 3, 7 vols. ([Rome]: American Institute of Musicology, 1955–1973), 1.29; cf. 1.21.8 (1:67): Subest musica enim scientiae naturali quoad sonum et arithmeticae quoad numerum (p. 67).

¹⁸⁶ Cavendum est autem error Platonis, qui dixit naturalia fundari in mathematicis et mathematica in divinis . . . et ideo dixit esse principia naturalium mathematica, quod omnino falsum est (*Lib. I Metaphysics*, tr. 1, c. 1; ed. Borgnet, vol. 6, p. 2b), as quoted in Weisheipl, “Classification of the Sciences,” 82. Albert was only more forcefully expressing the opinion of Aristotle, who claimed that “it is not the ideal numbers that are the causes of musical phenomena . . . the objects of mathematics are not separable from sensible things, as some say, and they are not the first principles” (*Metaphysics* 14.6, 1093b 21–25). The last phrase is the concluding sentence of the *Metaphysics*.

natural order of things.¹⁸⁷ Commenting on the *Posterior Analytics*, Albert assigned a special role to harmonic science. While the arithmetician considers abstract numerical proportion, it belongs to “harmonics” to study their “proportion in chant and in the division of strings” (proportionem in cantu et divisione chordarum). In fact, Albert would relegate mathematics to a position inferior to that of natural science—a view mitigated by Thomas Aquinas.

Thomas developed the theory of *scientie medie* (a term not used by Albert) for sciences that straddle the fence, so to speak, between natural science and mathematics. In his commentary on the *De Trinitate* of Boethius, Thomas pointed to the dual nature of music, astronomy, and sciences like statics (“de ponderibus”) that take their material objects from natural science but their formal objects from mathematics.¹⁸⁸ In studying them, two different points of view must be adopted: “nothing prevents their being concerned with sensible matter insofar as they have something in common with natural science, but insofar as they have something in common with mathematics, they are abstract.”¹⁸⁹

This perspective, which declares that the *scientie medie* “have a closer affinity to mathematics” (magis sunt affines mathematicis) than to natural science, safeguards the primacy of speculative science over natural science. As Thomas explains:

Still other [sciences] are intermediate, and these apply mathematical principles to natural things; for instance, music, astronomy, and the like. These sciences, however, have a closer affinity to mathematics,

¹⁸⁷ Maritain is equally critical of the Platonic system in this regard: “I think it can generally be said that every attempt to explain natural phenomena by the use of mathematical knowledge alone necessitates the recourse to explanatory myths” (*Philosophy of Nature*, 7).

¹⁸⁸ *Scientiae mediae . . . communicant cum naturali secundum id quod in earum consideratione est materiale, differunt autem secundum id quod in earum consideratione est formale*; Thomas Aquinas, *Expositio super librum Boethii De Trinitate*, q. 5 a. 3 ad 7, ed. Decker, 189. See also Siegfried Neumann, *Gegenstand und Methode der theoretischen Wissenschaften nach Thomas von Aquin aufgrund der Expositio super librum Boethii*, Beiträge zur Geschichte des Philosophie und Theologie des Mittelalters, Texte und Untersuchungen 41/2 (Münster in Westfalen: Aschendorff, 1965), 106–13; Eva Hirtler, “Die musica im Übergang von der *scientia mathematica* zur *scientia media*” in *Musik—und die Geschichte der Philosophie und Naturwissenschaften im Mittelalter*, 19–37, esp. 33–37; Hentschel, *Sinnlichkeit und Vernunft*, 132–37 (with many references to related texts). This topic is not taken up in Josef Hermann Burbach, *Studien zur Musikanschauung des Thomas von Aquin*, Kölner Beiträge zur Musikforschung 34 (Regensburg: Bosse, 1966).

¹⁸⁹ Et ideo nihil prohibet, si in quantum cum naturali communicant, materiam sensibilem respiciunt; in quantum enim cum mathematica communicant, abstractae sunt, *In Boethii De Trinitate*, q. 5 a. 3 ad 6; ed. Decker, 189, trans. Armand Maurer, *The Division and Methods of the Sciences* [=introduction and translation of qq. 5 and 6 of *In Boethii de Trinitate*], 4th rev. ed., *Medieval Sources in Translation* 3 (Toronto: Pontifical Institute of Medieval Studies, 1986), 45.

because in their consideration that which is physical is, as it were, material, whereas that which is mathematical is, as it were, formal. For example, music considers sounds, not inasmuch as they are sounds, but inasmuch as they are proportionable according to numbers; and the same holds in other sciences. Thus they demonstrate their conclusions concerning natural things, but by means of mathematics. Therefore nothing prevents their being concerned with sensible matter insofar as they have something in common with natural science, but insofar as they have something in common with mathematics they are abstract.¹⁹⁰

Thomas based his teaching about *scientie medie* on the distinction between the formal object and the material object of a science, an argument already present in a fundamental passage of the *Posterior Analytics* in which Aristotle explained the syllogism and the distinction between *propter quid* and *quia* explanations. A place was reserved for arithmetic as the formal object to be contemplated by the *musicus*, but no less deserving of attention was the material object—what we would regard as “music.” Citing the relationship of optics to geometry and harmonics to arithmetic, Thomas repeated Aristotle’s distinction that “it is for the empirical scientists to know the fact [*quia*] and for the mathematical scientists to know the reason why [*propter quid*].”¹⁹¹

This thesis, that each practical art or science drew on a related speculative science and that each had both a theoretical and a practical aspect, can be traced back to Arabic philosophy.¹⁹² We have already encountered a methodical application of the principle in the classification of Dominicus Gundissalinus. It accorded well with the spirit of an age like the 13th century that, breaking from the Neoplatonic belief in transcendent, immutable forms, emphasized the essential role of sense perception in the acquisition of knowledge. It was an ingrained belief that a distinction had to be made between the theoretical sciences (metaphysics, mathematics, physics) that treated of immutable things

¹⁹⁰ Quaedam vero sunt mediae, quae principia mathematica ad res naturales applicant, ut musica, astrologia et huiusmodi. Quae tamen magis sunt affines mathematicis, quia in earum consideratione id quod est physicum est quasi materiale, quod autem est mathematicum est quasi formale; sicut musica considerat sonos, non in quantum sunt soni, sed in quantum sunt secundum numeros proportionabiles, et similiter est in aliis. Et propter hoc demonstrant conclusiones suas circa res naturales, sed per media mathematica; et ideo nihil prohibet, si in quantum cum naturali communicant, materiam sensibilem respiciunt. In quantum enim cum mathematica communicant, abstractae sunt; q. 5 art. 3 ad 6, ed. Decker, 188–89; trans. Maurer, 45.

¹⁹¹ *Post. Analytics* 1.13 (79a 1); trans. Barnes, 23.

¹⁹² Olaf Pedersen, “Du quadrivium à la physique: Quelques aperçus de l’évolution scientifique au Moyen Âge,” in *Artes Liberales: Von der antiken Bildung zur Wissenschaft des Mittelalters*, 107–23.

not subject to human volition and those that were contingent and dependent on human choice.¹⁹³ Contingency had to occupy a different conceptual sphere.

Conclusions

Medieval classifications of knowledge, intended to demonstrate the interconnectedness of all human knowledge, could not avoid considering *musica*. The quadrivium had found a secure place in Aristotelian classifications of knowledge as the mathematical division of natural science. Were “music” merely the repertoire of liturgical chant, secular song, or polyphony, the issue would not have arisen, for sounding music could have easily been relegated to the sphere of cantors or jongleurs, who understood what they did well enough (*quia*), but were ignorant of the speculative foundations of quadrivial *musica* (*propter quid*).

Thirteenth-century philosophers faced the challenge of reconciling an Aristotelian conception of knowledge with a Boethian foundation that defined the quadrivium in Pythagorean-Platonic terms. *Musica mundana* and *humana* presented one set of problems, *musica instrumentalis* another. Knowing that Aristotle had denied the existence of *musica mundana*, some authors thought that redefining it in terms of “rays” offered an alternative; others simply rejected the whole notion. *Musica humana* was redefined from a physiological perspective as the human voice without actually taking into consideration what was sung. In the case of *musica instrumentalis*, philosophers had to address the physical existence of sound, yet somehow defend music’s place under *mathematica* rather than exclusively under natural science (or even one of the *scientie mechanice*).

Robert Kilwardby undertook that challenge in *De ortu scientiarum*. Rejecting the Platonic doctrine that attributed primacy to number, he declined to define music as “sounding number” (*numerus sonorus*), but proposed instead two related definitions: (1) sound numbered harmonically or (2) harmonic number of sounds, both of which privilege sound, not number. (Similar formulations are to be found in many 13th-century classifications.) *De ortu scientiarum* defends the principle that music, as one of the mathematical, is “more abstract than natural,” arguing that, although the *musicus* considers sound, he does not consider audible phenomena but immutable number. A related explanation held that music was subalternated to arithmetic, from which it derived its principles of demonstration, though both remained separate *scientiae*.

¹⁹³ Hans Martin Klinkenberg, “*Divisio philosophiae*,” in *Scientia und Ars im Hoch- und Spätmittelalter*, 1:3–19, esp. p. 7.

Another way of stating the same relationship drew on the Aristotelian distinction, stated most clearly in the *Posterior Analytics*, between knowing the fact (*quia*) and knowing the reason why (*propter quid*). Only the musician could provide *propter quid* explanations; the performer (or composer) could only describe superficially what he does.

Albertus Magnus and Thomas Aquinas stressed the distinction between the formal and the material object of music. Thomas further refined this distinction as the doctrine of *scientie medie*, bodies of knowledge that were (in a sense) “between” the abstraction of speculative philosophy and the concreteness of physical science. Behind all this intellectual maneuvering lay a necessary reluctance to demote music to the rank of natural science or to consider it as merely one of the *mechanice*. None of the medieval classifications of knowledge considered either of these alternatives seriously. In the end, music retained its place among the *scientie mathematice* even as it accommodated itself to conceptions of knowledge shaped by the Aristotelian principles that guided the construction of medieval classifications of knowledge.

Newton Highlands, Massachusetts

ABSTRACT

Medieval classifications of knowledge (*divisiones scientiarum*) were created to impose order on the ever-expanding breadth of human knowledge and to demonstrate the interconnectedness of its several parts. In the earlier Middle Ages the trivium and the quadrivium had sufficed to circumscribe the bounds of secular learning, but the eventual availability of the entire Aristotelian corpus stimulated a reevaluation of the scope of human knowledge. Classifications emanating from the School of Chartres (the *Didascalicon* of Hugh of St. Victor and the anonymous *Tractatus quidam*) did not venture far beyond Boethius, Cassiodorus, and Isidore of Seville. Dominic Gundissalinus (fl. 1144–64), a Spaniard who based parts of his elaborate analysis of music on Al-Fārābī, attempted to balance theory and practice, in contradistinction to the earlier mathematical emphasis. Aristotle had rejected *musica mundana*, and his natural science left little room for a *musica humana* based on numerical proportion. Consequently, both had to be reinterpreted.

Robert Kilwardby's *De ortu scientiarum* (ca. 1250) sought to integrate the traditional Boethian treatment of *musica* with an Aristotelian perspective. Responding to the empirical emphasis of Aristotle's philosophy, Kilwardby focused on music as audible phenomenon as opposed to Platonic “sounding number.” Medieval philosophers were reluctant to assign (audible) music to natural science or to place it among the

scientie mechanice. One solution argued that music, though a separate *subiectum* suitable for philosophical investigation, was subalternated to arithmetic. Although drawing its explanations from that discipline, it nevertheless had its own set of “rules” governing its proper activity.

Thomas Aquinas proposed to resolve the conflict between the physicality of musical sound and abstract mathematics through the theory of *scientie medie*. These stood halfway between speculative and natural science, taking their material objects from physical phenomena but their formal object from mathematics. Still, Thomas defended the superiority of the speculative tradition by asserting that *scientie medie* “have a closer affinity to mathematics” (*magis sunt affines mathematicis*) than to natural science.

Keywords:

Boethius

divisio scientiarum

classifications of knowledge

quadrivium

musica speculativa

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.