

Motion and the Infinite

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O Creator ineffable, who of the riches of Thy wisdom didst appoint three hierarchies of Angels and didst set them in wondrous order over the highest heavens, and who didst apportion the elements of the world most wisely: do Thou, who art in truth the fountain of light and wisdom, deign to shed upon the darkness of my understanding the rays of Thine infinite brightness, and remove far from me the twofold darkness in which I was born, namely, sin and ignorance. Do Thou, who givest speech to the tongues of little children, instruct my tongue and pour into my lips the grace of Thy benediction. Give me keenness of apprehension, capacity for remembering, method and ease in learning, insight in interpretation, and copious eloquence in speech. Instruct my beginning, direct my progress, and set Thy seal upon the finished work, Thou, who art true God and true Man, who livest and reignest world without end. Amen.

(St. Thomas Aquinas *Oratio ante studium*)

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Infinity is a Live Contemporary Issue

- Empirical method tends toward reductionism.
- Is mobile being really an infinite collection of parts?
- Does infinity account for motion?
 - And not matter-form-privation triads?
- Zeno said motion is impossible because it would require traversing an infinity.
- Etymologically: *in-* = “not”, *finis* = “end” or “bound”
 - ∴ infinity = “unbounded” or “without limits.”

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Infinity is a Live Contemporary Issue

- Anaxagoras: “Mind” separated infinite matter into parts.
- Democritus: Matter an infinity of identical atoms that form matter only by different geometrical arrangements
- Plato: Infinity existed in his “realm of forms.”
- Pythagoras: Infinity in sensible qualities
- Aristotle declared motion eternal (infinite in time).

Infinity is a Live Contemporary Issue

- Descartes defined matter as quantity.
 - Thus, nature can have mathematical infinities
- From Leibniz's *Monadology*:
 - “Each portion of matter may be conceived as like a garden full of plants, and like a pond full of fish. But every branch of a plant, every member of an animal, and every drop of the fluids within it, is also such a garden or such a pond.”



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Infinity is a Live Contemporary Issue

- Newton: universe finite, but Law of Inertia requires an infinite chain of movers
- Kant: Two lines of reasoning, one arguing for and the other against the infinitude of matter, can both be true.
- Among mathematicians:
 - Dedekind & Cantor: numbers points on a line
 - Cantor: “Trans-finite numbers” (\aleph)
 - Creates impression infinite division in matter actually possible, not just potentially
- Is there a “finality in our knowledge of matter,” or is matter “essentially infinite” as Bridgman thought?

Infinity is a Live Contemporary Issue

- Traditional notions of infinity (McWilliams table):
 - Absolute infinity: God as fullness of being
 - Relative infinity:
 - Formally infinite (e.g., human intellect and will)
 - Materially infinite (e.g., prime matter untermiated or “un-finited” by form, second matter, and number)
 - Also called “privative infinite”
 - Aristotle’s definition of it: “that to which something more can always be added”
 - Bolzano’s definition: “a quantity in which the parts are similar to (equal to) the whole”

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Principled by the Infinite, the World Would Be Homogeneous, Potential, and Chaotic

- Realism says form terminates matter’s potencies.
- Matter cannot be composed of both finite and infinite components.
 - Aristotle: impossible for finite air to mix with infinite fire.
- Matter cannot be composed of infinitely many components ∴ it would be undetermined (i.e., “not terminated”).
 - m_1 is state between M and R, m_2 is between R and m_1 , m_3 is between R and m_2 , *ad infinitum*.
 - The limit of m_n , where n goes to infinity, is R!
 - But it never really gets there, so there’s neither motion nor rest!
 - It is indeterminate.

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Principled by the Infinite, the World Would Be Homogeneous, Potential, and Chaotic

- Indeterminacy of infinite regressions applied to being:
 - Dividing being you get being and non-being; ∴, being = non-being?
- Order is stability, so infinitely divided matter would be chaotic.
- Quantum physics says law of chance is basic law of nature.
- Indeterminate particle or universe is purely potential.
- Potency (matter) is the principle of individuation;
 - ∴, a pluralistic universe is chaotic.

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Infinity in Matter Would Forbid Its Motions

- Example: infinitely divided proton + finite electron = hydrogen atom?
- An infinitely divided neutron would be:
 - Purely potential
 - Purely indeterminate
 - The only one ∴ all material reality would be appropriated to it!
- Infinity in matter, according to Aristotle, “will be at home everywhere, then it will not be moved; or it will be moved everywhere, then it will not come to rest.”

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There is No Regression into Infinity

- *Non regreditur in infinitum*.
- Aristotle arrived at Prime Mover.
- \exists relatively prime movers (natures)
 - As opposed to inertias
- If there are an infinitely number of intermediate movers between A and B, A cannot move B because its influence would have to stretch an infinite divide (\exists no proportion between finite and infinite); thus, it cannot move B. Since we observe motion, there cannot be an infinite regression.

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There is No Regression into Infinity

- Modern idea of inertia contains a contradiction:
 - It says: Nothing can move itself from within.
 - This is a denial of natures.
 - So movement requires outside forces.
 - Empiriological physicists call this order.
 - But where do these come from? Thus we have an infinite regress.
- Another argument against infinite regress:
 - If there is no first mover, there cannot be subsequent movers.

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There is No Regression into Infinity

- A third rejection of an infinite series in matter:
- Instrumental cause (*causa vitalis*)
- If no first mover, everything is an instrumental cause.
 - Imagine a paintbrush painting the *Mona Lisa* on its own!
 - “Everything would be wholly *for* something else.”
 - “reception itself would be a form of transmission.”
- Instrumentalism: everything is *for* another and nothing in itself

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Matter is Potentially, Not Actually, Infinite

- Finitism: rejection of the infinite in motions
 - Einstein: universe is “finite but unbounded”
 - Finitists say: Motion is not continuous; \exists a greatest and smallest number; etc.
- “Middle way” between finitist and infinitist extremes:
 - Change is potentially or materially infinite.
 - Actually or formally finite.
- \nexists a “completed infinity.”

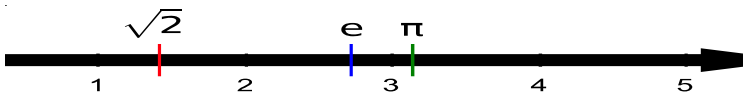
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The Mathematical Infinite is the Potential Infinite

- Cantor’s sets: are there really “orders of infinity”? \exists more rational than irrational numbers?
- Is an irrational number like π or e infinite?
- Number line:



- Can potential points on a line uniquely map to every real number?

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Actual Infinity in Matter is a Substitute for Form

- As V. E. Smith says: “Scientism [i.e., empiriological physics taken as philosophical physics] has made matter’s actual infinity into a shadowy substitute for the Aristotelian notion of unity, nature, relation, number, and order.”
- Since Descartes and Bacon, teleology and form have been abandoned.
 - Where is order, then?
 - It must be sought in the indeterminacy of matter.

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Actual Infinity in Matter is a Substitute for Form

- Consider the following limits as $v \rightarrow \infty$, where C is a constant:
 - $\lim v / C = \infty$
 - $\lim C v = \infty$
 - $\lim C / v = 0$
- Modern mathematical infinity is simply a rule for “determining the indeterminate.”
- Lastly, empiriological physics tends toward studying prime matter.

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References

- V. E. Smith’s *Philosophical Physics*
 - Please read ch. 4 (Motion and the Infinite).
 - We will send out a scanned PDF of this required reading.
- Further reading:
 - Aristotle, *Physics*, Bk. III, chs. 4-8.
 - Aquinas, St. Thomas, *Summa contra gentiles*, Bk. 1, ch. 13.
 - McWilliams, J., *Physics and Philosophy* (Washington, 1945), pp. 8, 135

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