Philosophy's Holy Trinity:

The Dialectic in Mathematical Philosophy

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Prefatory Remark

From my abstract:

The idea of the dialectic, from the Ancient Greek διαλεκτική, is as old as philosophy itself... Later it underwent a renaissance in the German Idealist school of philosophy most notably by Johann Gottlieb Fichte, and George Friedrich Hegel's philosophy of *Absolute Idealism*... In this talk I'll give examples of some ways the dialectic lens might be applied to the philosophy of mathematics. Particular attention will be given to ways Hegel's philosophy of Absolute Idealism might shed light on Eugene Wigner's *Unreasonable Effectiveness of Mathematics in the Natural Sciences*.

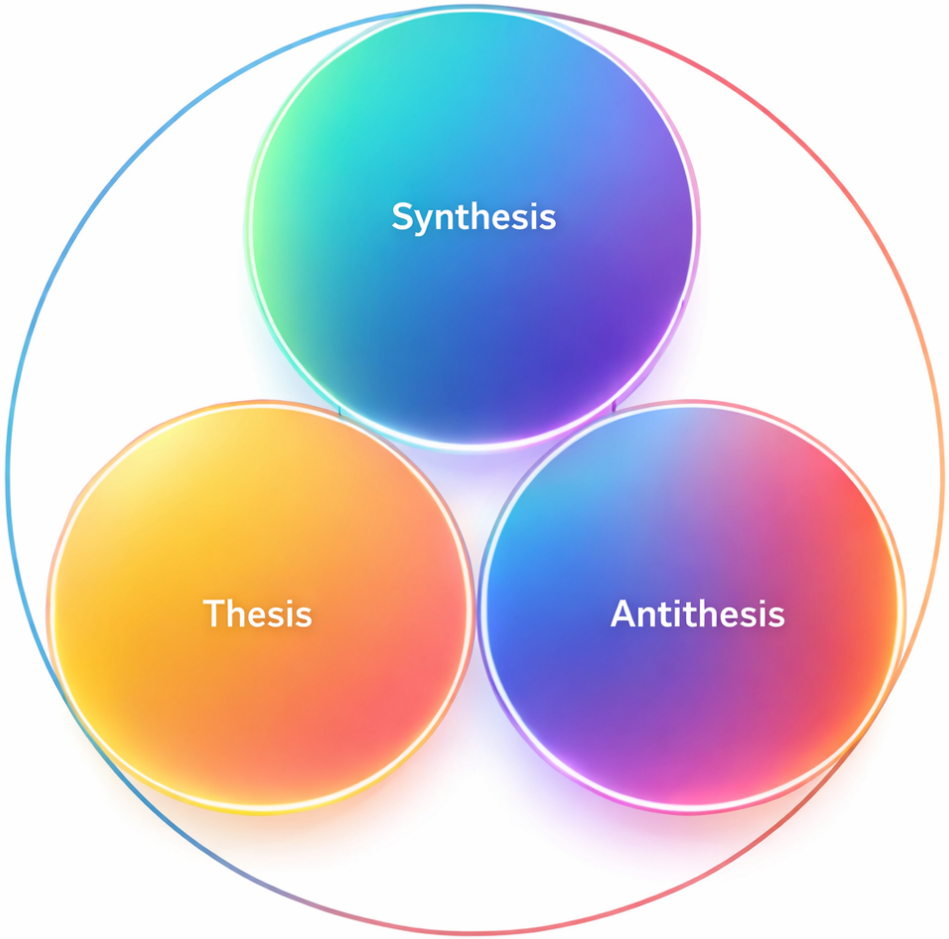
Dialectic in Philosophy of Mathematics:

- Today: Mathematical Ontology: Dialectic and the Metaphysical Nature of Mathematics
- Later: Mathematical Epistemology and Axiology: Dialectic and the Nature of Mathematical Knowledge and Value

What is Dialectic?

- A type of Philosophical Lens (a method) originally associated with J.G. Fichte and G.W.F Hegel
- Often explained as Thesis-Antithesis-Synthesis BUT Hegel himself did not use these terms.

The Dialectic as Triad



Processes are conceptualized as advancing through triadic movements powered by the dialectic. Synthesis also called *Die Aufhebung* or *Sublation* in Hegel.

The Hegalian Trinity

Reality conceived as a process which unfolds through triadic movements powered by the rational dialectic.

Absolute Idealism

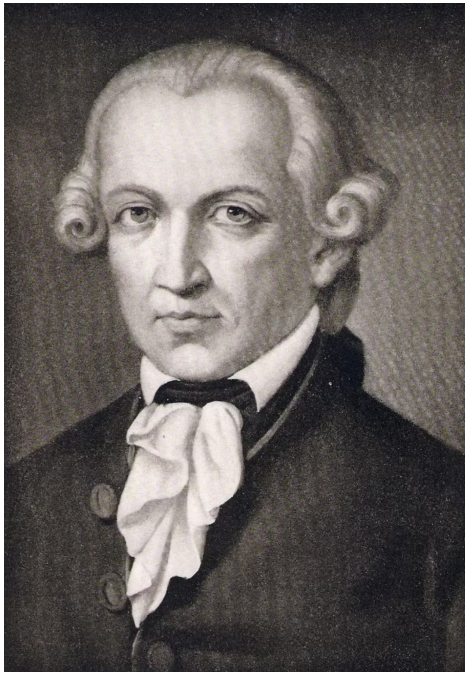
In Hegel:

- The Dialectic process is Mental. Hegel called this Spirit.
- Spirit identified with rationality/reason.
- Mentation can exist (incarnates) on Individual level (Subjective Spirit), the Collective/Societal level (Objective Spirit) and the Collective Humanity level (Culture including, Norms, Mores, Law, Philosophy, Art) (Absolute Spirit)
- Reality itself is a historical, dialectical process. This is Absolute Idealism

Brief Quiz Question:

Do philosophers shape history or does history shape philosophers? Put otherwise: Does human thought determine the way the world is or does the way the world is determine human thought?

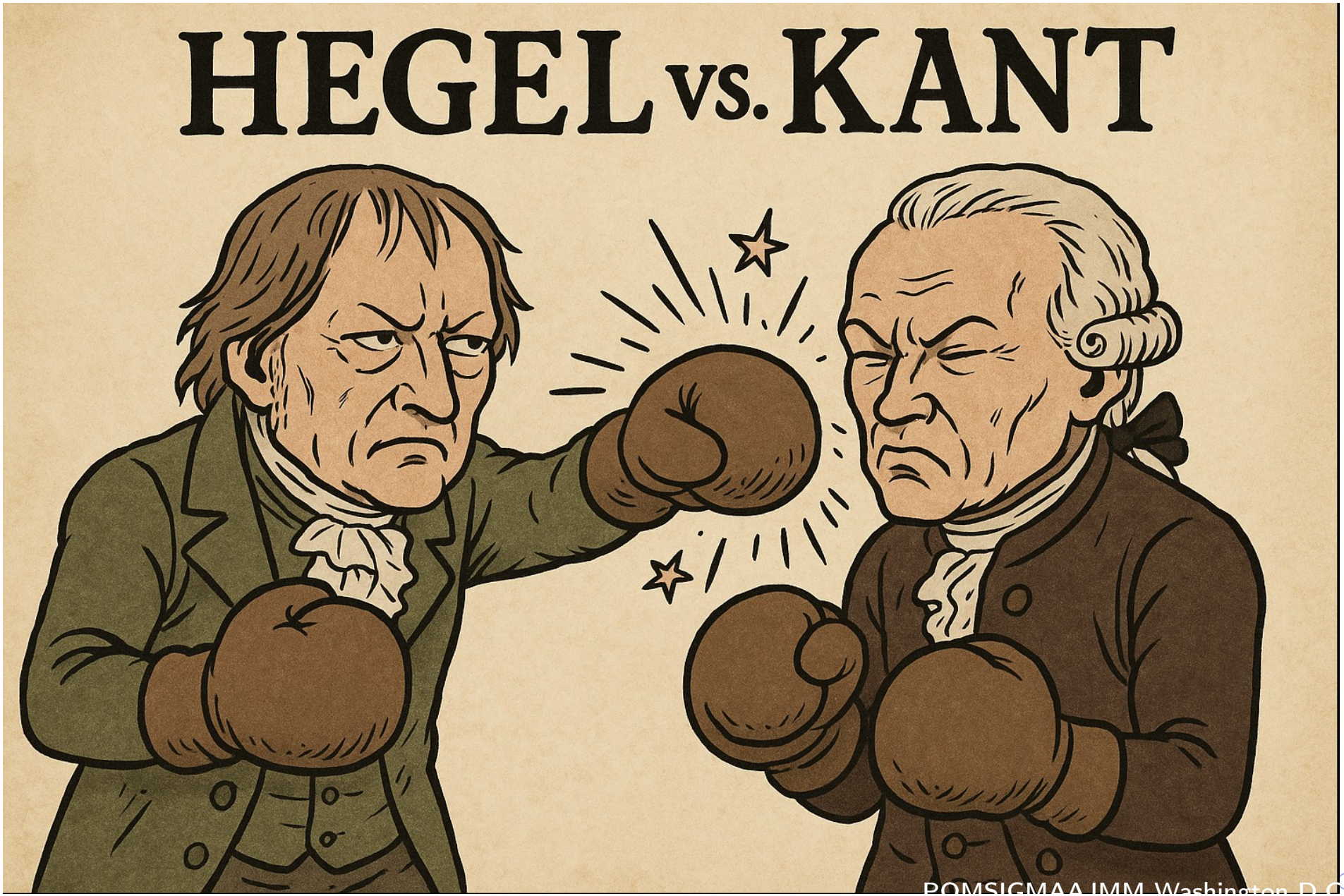
Understanding Hegel through Kant



Transcendental Idealism

- Transcendental Analyic (understanding) / Transcendental Aesthetic (sensory experience)
- Response to David Hume
- Synthesizer of Cartesian Rationalism with Humean Empiricism
- Introduced Noumena/Phenomena dichotomy.

Hegel's response to Kant



Hegel: Posits a Unity or Identity of the Noumenal and Phenomenal Worlds

- Rejection of the separateness of noumena and phenomena.
- If noumenal world were completely separate from the phenomenal world we could never know anything about it. (Note the obvious theological slant here.)
- Any philosophy that attempts to unite that which is in the mind with that outside of the mind necessitates some version of idealism.
- Nota Bene: Assertion of a connection between our mental worlds (where mathematics resides) and the world outside the mind such as the physical world: suggests a nexus between Absolute Idealism and the (reasonable) effectiveness of mathematics in natural science.

Wigner's Unreasonable Effectiveness

Why is mathematics, a purely mental phenonmenon, so uncanny in its ability to describe and predict physical reality?

An Old Truth: God IS A Mathematician

- God is number-Pythagoras
- God Ever geometrizes-Plato
- God Ever arithmetizes-Jacobi
- The Great Architect of the Universe now begins to appear as a mathematician-James Jeans

Wigner's Observations

- Mathematics is a language with uncanny powers in formulating physical theories.
- Mysterious and miraculous. We don't understand why.
- Physics seems most amenable to this. Others sciences less clear (biology, genetics).
- Worries about whether the lens of mathematics might blind us from other, more appropriate theories. *Russell quote: "Physics is mathematical not because we know so much about the physical world, but because we know so little; it is only its mathematical properties that we can discover."*
- Speculates that humans may have an attraction to mathematics because of its aesthetic appeal.
- Aesthetics can lead us astray: Ptolomy's theory of epicycles. (Could String Theory be a contemporary version of this??)

Wigner's Examples

Mathematical Abstractions $\longrightarrow$ physical world phenomena that can be observed/measured

- Calculus, Proportionality Models (inverse square laws), Conic Sections $\longrightarrow$ falling bodies, gravitation, planetary motion
- Bell curve/Gaussian distribution $\longrightarrow$ real world populations
- Maxwell's equations $\longrightarrow$ electromagnetic waves, light, radio, radiation
- Matrices/Linear Operators, Hilbert spaces $\longrightarrow$ Observeables and states in quantum mechanics.

Absolute Idealism and Wigner's Unreasonable Effectiveness of Mathematics in the Natural Sciences: Denouement

How Wigner's Observations and Hegel's Absolute Idealism might inform/complement one another:

- Absolute Idealism posits that ultimate reality is pure rationality.
- Mathematics is a part of that rationality.
- The conformity of the world with our mental models through mathematics is natural because of the unity of the noumenal and phenomenal worlds through Absolute Idealism.
- Wigner's Observations support the philosophy of Absolute Idealism.
- The philosophy of Absolute Idealism support Wigner's Observations.

Postscript: Hegel's View of Mathematics

Hegel viewed Mathematics as inferior to Philosophy

- Hegel understood mathematics as the "science of quantity", now considered outdated. Mathematical things were static and unchanging, unable to dialectically unfold from within.
- Hegel rejected mathematics as a purely formal discipline and thought certain concepts like infinity were misunderstood.
- Hegel did not understand mathematics as having dialectical features, but the highly conceptual nature of present day mathematics can be so argued and is far removed from the science of quantity.

Thanks For Your Time!