DOES KNOWING PHILOSOPHY MAKE A SCIENTIST A BETTER SCIENTIST OR DOES KNOWING SCIENCE MAKING A PHILOSOPHER A BETTER PHILOSOPHER?

Dennis Sansom,
Samford University
dlsansom@samford.edu

Introduction

In this paper I contrast two ways philosophy and science can relate and influence each other. On one side, I present René Descartes' metaphysical defense and justification for 17th century science. On the other side, I present the contemporary philosopher John Heil's claim that metaphysics must be based on the latest findings of fundamental physics. I argue for the second claim, not because science is a superior intellectual pursuit but because of the importance and role of "experience" in both scientific and philosophical inquiry.

Descartes' Metaphysical Foundation for Natural Science—A "Top-Down Ontology"

A deep paradox was felt in the 17th century. It witnessed the tremendous advance in natural-scientific knowledge and also a growing skepticism about the foundations of knowledge. Even though earlier figures as Gian Francesco Pico and Rabelais had introduced the skepticism of Pyrrho to Europe, it was Michel de Montaigne (1533–1592) who exposed it to a wider audience, especially through his Apology of Raymond Sebond. Pyrrhonic skepticism as expressed by Sextus Empiricus and picked up in the 16th century made four primary claims: the first two on humanity's cognitive limitations, and the second two on the proper sapient goals:

1. The problem of relativism: there are conflicting opinions about reality, and each is somewhat rationally defensible, dogmatism about reality is untenable since its ends up begging the question and, particularly, pleading its claim.
2. The problem of foundations: any evidence given to support a dogmatic conclusion about reality also needs evidence, and that evidence needs evidence, and ad infinitum; knowledge cannot be about reality in itself, only appearances.
3. The goal of disbelief: as a consequence of numbers 1 and 2, we should suspend judgments about reality.
4. The goal of tranquility: as a consequence of numbers 1–3, we find wisdom through ataraxy (the general disinvestment of all ultimate concerns) and thereby gain an inner tranquility.

Montaigne asserted, because "of the uncertainty and weakness of our senses" and because "there is no existence that is constant, either of our being or of that of objects." (Montaigne, 542, 553), we cannot believe with epistemological certainty that the form of our ideas accurately matches the form of objects in the world.

Descartes was enough of a modernist to think skepticism could not be dismissed, but he also was enough of a mathematician and natural scientist to think there had to be a type of knowledge that skepticism could not undermine. Descartes promoted the Copernican view of a mechanistic

nature operating by laws. Such a view exemplified his metaphysical claim that all matter is actually "extension governed by force." Matter follows mechanistic laws and thus can be scientifically explained, and because Copernicus had correctly discerned these laws, his view of the solar system must be correct. For Descartes, much was at stake in defending Copernicus.

He wanted to overcome, with metaphysical certainty, the prevalent skepticism of his day. We first need to establish a metaphysical truth and then consider the physical theories consistent with it. We need to link our knowledge of the world to the reality of the world, and Descartes thought he found this evidence in the idea of God as a non-deceiving, Perfect Being. He says, "I must examine whether there is a God as soon as an opportunity occurs, and if I find that there is one, I must also investigate whether he can be a deceiver; for as long as this is unknown, I do not see that I can be certain of anything" (Descartes, Meditations, 35). Only a perfect and infinite being can cause the idea of a Perfect Being to an imperfect and finite thinker, and with this idea, we can trust what we know about the world, because God would not deceive us about the material-spatial dimensions of reality. We are absolutely certain of that, so claimed Descartes. Just as it is certain that we exist because we think, we are certain the world exists and functions as it would be created by a Perfect Being.

Descartes believed he could not base the epistemic certainty of science upon our experience of the world or of what science could present to us (for example, telescopic observations). Montaigne's skepticism taught him that no empirical experience of the world is indubitable. However, Descartes' approach is not totally removing the importance of experience. In his meditations, Descartes experienced and discovered the idea of a perfect being, which he explained cannot be fabricated by the thinking self. The idea of a perfect being shows itself in our pure reasoning, and the thinking-self appropriately responds by explaining that the perfect being cannot by nature deceive and thus cannot deceive us about the reality the world. Even though Descartes did not base his metaphysics on the experience of the world, he did base it on the a priori experience of a perfect being. Our certainty of God's existence provides an epistemic certainty of the world's existence and subsequently provides an epistemological foundation for the laws of nature.

Descartes interests were not only to construct an internally consistent and coherent system of ideas, but he also wanted to overcome skepticism with a coherent and consistent metaphysical system and thus provide a foundation for science. To do this he had to show a connection with reality; to show this he needed probative evidence, and that evidence was the self-evident idea of God as a non-deceiving Perfect Being. Albert William Levi sums up clearly Descartes agenda, "The Cartesian movement from the self to God, and from God to the external world, is less a truly metaphysical speculation in the medieval sense than a hypothesis essential for the validation of all knowledge about the physical world" (Levi, Philosophy as Social Expression, 169). With this metaphysical claim, Descartes believed he established the certainty of science and propelled his era into a modern, scientifically informed culture. This is a "top-down ontology" providing justification for the trustworthiness of science.

John Heil's Physical Basis for Metaphysics— "A Bottom-Up Ontology"

John Heil is a professor of Philosophy at Washington University in St. Louis, Missouri. He specializes in metaphysics, and in 2012 published The Universe As We Find It. His main interest is to articulate and defend what he calls a "fundamental ontology." He uses the traditional vocabulary of metaphysics (that is, substance, properties, causality, etc.) to clarify what represents the building blocks of the way we experience the universe. Metaphysics is not necessarily basic science, but it relies on science to tell it what it needs to clarify conceptually. The business of the metaphysician is not to discover what non-philosophers cannot know but to understand the intellectual implications of what basic science says about the universe. Even though a physicist may not use traditional philosophical terms like substance and properties, these terms help us understand the relationship between our ordinary experiences of the world and the fundamental elements of physical reality. In this sense, a physicist can do science without knowing the vocabulary of metaphysics, even though metaphysical claims are always implied in any description of the way the universe is. However, metaphysical terms are meaningful only if they actually refer to what fundamental physics says is the ground of our physical experiences of the universe.

Of course, Heil acknowledges that not all scientific activities aim (not even all that goes under the name of physics) to uncover the nature of existence per se, but all knowledge claims about the universe rely on what he calls a "truthmaker" about the world. Fundamental physics explores what these truthmakers are and informs us about them. Truthmakers are about what must be for us to know the world truly. They are the ontology of our truthful knowledge of objects and their relationships. Our knowledge is true when there is an internal relationship between our judgments and representations about the world and these truthmakers. By internal, Heil means what makes the judgment and representation coherent with the truthmaker. We do not need to postulate an external reality that makes the judgment true (Heil, The Universe, 9-10). Consequently, when we seek to know truly how the universe is, we need to know (what Heil calls) the "deep story" of the universe, we need to know what the most basic feature of physical reality must be if our knowledge about the world is true. "Fundamental physics provides a glimpse of what lies at the basis of all the world truths: the buck stops with fundamental physics" (Heil, The Universe, 166).

Key to Heil's approach to metaphysics is the use of the word substance. For him, it is the right word to equip philosophy to explore generally about existence as being (Heil, The Universe, 167). The word has a long history, with Plato and Aristotle showing how differently it can be used. For Plato, the substance is the most basic element of reality, and it never is not itself. Thus, a genuine substance (not the mere appearance of it) would not change, being purely formal and not material. Consequently, a substance must be in the "world of Being," not the "world of Becoming," and what we experience in the world only participates with its true substance in an eternal realm. Hence, the truthmaker of any proposition about the world is whether the claim has an eternal implication.

However, Aristotle thought differently. The truthmakers for metaphysics come from physics. Because we want to describe the world, our metaphysical explanations must be traceable back to our experiences of the world made clear by physics. Our understanding of substance as the basic reality must therefore be about how we experience the world. Consequently, because the only world we know changes, substance must also change. Change is

real, not an appearance of reality. Consequently, a substance must be a formed matter that can remain itself as it changes (that is, in shape, place, and time). The metaphysician then relies on physics, and a true proposition about the world is whether it informs us more about the way the world is. In fact, Aristotle writes a book on physics before he writes his book on metaphysics.

Heil is on Aristotle's side. We philosophize about the universe not based on abstract a priori categories of being but upon how we experience the world. Heil thus issues the blunt claim near midway in the book that "When philosophy and science cross swords, only the fool sides with the philosopher. Science rules" (Heil, The Universe, 137). That is, if philosophy wants to use its analytic skills to explain why the world is the way it is, then it needs to know the "deep story" about the physical makeup of the world, and fundamental physics tells that story. Even though philosophy uses the categories of substance and properties to describe being, fundamental physics tells us what the beings are (Heil, The Universe, 25). It is the case that fundamental physics has not settled on what the nature of existence is—for example, a particle, a quantum force, or possible space-time. This uncertainty in fundamental physics does not make metaphysics suspect as an intellectual discipline. Hence, the agenda of the metaphysician is to explain our general experience of the universe with confidence that the substance or substances of the universe are what fundamental physics say they are (Heil, The Universe, 287).

Of course, Heil knows that fundamental physics changes its explanations of the basic physical stuff of the universe and, also, that one of its most captivating theories is the confusing claims of quantum physics. Hence, for intellectual coherence, physics needs the conceptual clarity and stabilizing factor of a basic ontology. Contemporary physics is more often expressed in elaborate mathematical models than in Aristotelean terminology, and Heil is not insisting that physicists adopt Aristotle's vocabulary of substance and properties. Yet, Heil does maintain the vocabulary of substances and properties undergirds both scientific inquiry and our general impressions that the universe is constituted in such a way that we can make truth claims about the universe. The use of the metaphysical terms of substances and properties to refer to the truthmakers provided by fundamental physics can assure us that we are indeed making truth claims about the universe, whether we talk of electrons or red tomatoes (two of his favorite examples). For Heil, the importance of using substance metaphysic is so certain that "If you take away the substances, if you take away the properties and the arrangements, you take away the universe" (Heil, The Universe, 42). Substance really does refer to something. With fundamental physics continually evolving its basic conclusions about physical reality, our use of the metaphysical vocabulary of substance can assure society that regardless of the conclusions of physicists, we have their accounts of the fundamental objects to provide the truthmakers in our efforts to know truly the universe whether in its manifestations of common experiences (for example, red tomatoes and tables) or in its exact and precise scientific renditions (for example, electrons and force fields).

Even though fundamental physics informs us of the truthmakers of the universe, for two reasons fundamental physics, according to Heil, cannot replace the usefulness of ontological descriptions offered by metaphysis. First, "[philosophy] provides an accounting of the basic ontological categories" (Heil, The Universe, 279). This accounting expands the usefulness of the terminology of physics into broader descriptions of the universe and utilizes the insights of fundamental physics to render a systematic, metaphysical explanation of the universe. Second,

with its ontological categories (for example, propertied substances), ontology "[provides] an account of relations among the various sciences, a role no science, including fundamental physics, is equipped to play" (Heil, The Universe, 279). The narrow focus of fundamental physics is not readily applicable to chemistry, biology, astronomy, etc., and, thus, we cannot reduce all sciences to just physics. However, by deeming what fundamental physics says is the basic physics of the universe to be the propertied substance/s of the universe, we are able to correlate the other sciences to physics through the concepts of propertied substances. For example, we can talk of the substance of biological life without conceptually moving past the actual living things to concentrate on the basic physical realities. Just as we can speak meaningfully to each other about red tomatoes and tables without talking about particles, forces, or space-time, we can speak meaningfully about biology and psychology as well. In other words, it would be wrongheaded and incoherent to try to reduce all knowledge of the universe down to fundamental physics.

Heil has critics. For instance, Joseph Baltimore ("Heil's Two-Category of Ontology and Causation") contends Heil has not given a persuasive account how propertied substances actually are able to relate to each other. Javier Cumpa ("Factualism and the Scientific Image,") argues that Heil does not adequately explain how our common experiences actually relates to the findings of fundamental physics. Also, Michael Esfeld ("Factualism and the Scientific Image,") reasons that Heil's over reliance on the Aristotelean language of substance and properties does not provide meaningful ways to describe what contemporary physics is doing. These are serious challenges, and Heil most recent book on metaphysics (What is Metaphysics, Polity Press, 2021), we could say, is his effort to respond to the critiques and explain further his particular approach to doing metaphysics. For instance, throughout the book he addresses what can be called the Sellars' paradox—if the manifest image of a table, for example, does not resemble the scientific explanation of the table (electrons, forces, etc.), then how can they both be true (Heil, What is Metaphysics, 25ff). He develops further the role of truthmakers and his response is serious and worthy of attention, but my main interest in this paper has been Heil's insistence and effort to associate the philosophical enterprise of metaphysics to the pursuits of fundamental physics, to what physicists maintain is our most basic experience of the universe.

Philosophy and Experience

Heil relies on a "bottom-up ontology" to do good philosophy, whereas Descartes bases scientific certainty on a "top-down ontology." Who is right? I think Descartes misuses philosophy in the way he fortifies science against skepticism. He bases his argument on the certainty of God's existence experienced in the reflection on the idea of God as a Perfect Being. For Descartes, we experience the idea, and it is a "clear and distinct idea," indubitable. No doubt, we can think of a God as a Perfect Being, and for Descartes, because it is an experience located in our philosophical reflections, God must exist and must not be a deceiver. Even though there is a lot of philosophical interests in such a possibility (that is, the logic of it and that it is a mental state), Descartes errs in making the certainty of a scientific explanation of the world based upon the certainty of a "clear and distinct idea" experienced in reflecting on the idea of God. If he had concentrated solely on the logical possibilities of God's existence due to the thought of a Perfect Being, Descartes would have stayed within the boundaries of the

philosophical enterprise, but instead, he overstepped those boundaries by believing an experience in philosophical meditation can be the primary experience on which science can be based.

Although Heil utilizes philosophical reflection to talk about the universe as we find it, he uses the vocabulary and analytical skills of philosophy to describe and help explain the primary experience of the universe offered by fundamental physics. I contend that in terms of doing metaphysics his is the right approach, not because physics is a smarter discipline than philosophy or that physics is more culturally indispensable than philosophy, but because Heil uses philosophical analysis more consistently with the nature of doing philosophy. Philosophy is the intellectual reflection on the forceful and consequential experiences of nature. Its task is like the owl of Minerva; it flies at dusk (so said G.W.F. Hegel). That is, the wisdom that philosophy offers comes after we experience arresting and important aspects of nature, morality, beauty, and God.

I think John Dewey's explains well this understanding of the work of philosophy. He states:

> "There is a special service which the study of philosophy may render. Empirically pursued it will not be a study of philosophy but a study, by means of philosophy, of life-experience. But this experience is already overlaid and saturated with the products of the reflection of past generations and by-gone ages. . . If they are not detected, they often obfuscate and distort. Clarification and emancipation follow when they are detected and cast out; and one great object of philosophy is to accomplish this task" (Dewey, Experience and Nature, 34-35).

Of course, there is the mental experience of doing philosophy, but it is a matter of reflection and understanding, not a matter of the objects of the world. For Dewey, we experience the world (which he often used "Nature" to mean) in many different ways (Dewey, Experience and Nature, 24), and we develop unique and specialized ways to explore and explain these experiences. Nature manifests itself in these and through these experiences. For instance, those who study beauty, art, and the aesthetic experiences of them do not create the experiences but reflect on them. The same with morality, religion, etc.

Admittedly, the word experience, though widely used, is vague, used to refer to a physicist's acknowledgement of sub-atomic particles as well as to the mystic's praise of God. Obviously, the type of experiences we have varies with the ways we encounter the objects in the world. Some experiences are clear and quantifiable, whereas others are opaque and impressionistic. However, each experience involves an activity of an aware-self interacting with objects, relations, or the whole of what is possibly experienced. In the various experiences, we respond to what arrests our attention. In physics, we respond to physical aspects of the world. In morality, we respond to forceful obligations. In aesthetic taste, we respond to objects suggestive of beauty or an overall purpose, and so on. Hence, we can say experience refers to the multiple ways humans respond and engage the world.

It is not the task of philosophy to claim a special privilege to these experienceable objects of Nature but to clarify their logical implications for other intellectual pursuits and to explain their importance for culture. Albert William Levi expresses well this Deweyan agenda of philosophy as the critical reflection on primary experiences, "Before there can be philosophy, there must be

experience" (Levi, Varieties of Experience, 4). In Dewey and Levi's approach, even though philosophy often uses abstract language and rigorous logical analysis, its agenda is thoroughly humanistic for it tries to explain the importance of what science, morality, art, religion, etc. say for and about the human condition as evolved in a culture. Philosophy has a long history of serious, insightful, and culturally impactful thinkers with a specialized vocabulary and manner of analyses, but that history displays how to do philosophy as a manner of reflection on the salient and formative experiences raised within a culture, not as though providing the primary experiences for science, art, morality, religion, etc. Philosophy can assist science integrate its purposes and findings into the formation of a culture, but it cannot provide or replace the basic experiences that makes scientific inquiry unique and illuminating of the world. This is Heil's approach, and, though critics are raising serious questions about his accounting of metaphysics, it is an intellectually compelling philosophy of science.

Perhaps I am presenting a too monolithic view of contemporary philosophy. As an academic discipline, philosophy is a coat of many colors, and some philosophers would show little interest in what Heil is doing. There is no one way to do philosophy, but my reason for highlighting Heil's contributions is that if we are looking for ways to clarify the relationship between philosophical metaphysics and science, his approach is fruitful, because he attempts intelligibly to explain (especially with his notion of "truthmakers") the connection between our general experiences of the world and the way science accounts for the universe.

Does this appreciation of Heil's approach rule out any importance we can give to Descartes? No. His focus and clarification of the mental experience of the idea of God as a Perfect Being is provocative in that it may illustrate the uniqueness of the idea of God and a way to apply modal logic to conceive of God. Consequently, we can say that modal reasoning (that is, the relationship of what is necessarily the case to what is possibly the case) about God can possibly logically clarify a fundamental human mental experience.

However, Descartes' fault in offering a philosophy of science was to abstract philosophy out of the cultural confines of his age and to presume he had found a metaphysical experience (that is, "the clear and distinct idea" of God as a Perfect Being) on which science could successfully overcome skepticism. Although Descartes was convinced a mathematical-mechanistic physics is right about the world, his metaphysics does not help us understand what that physics actually describes. He attempted a philosophy of science built on a mental abstraction not derived from the life-experiences of nature. This is where he went wrong. It is wrongheaded, as well as unhelpful to science.

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