God, Science and Theoretical Constructs

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"The beginning is from God . . . truly, the Giver and Architect of Forms" (Francis Bacon, Novum Organon).

This paper is being offered as a response to the question: "Is it academically credible to include the concept of a First Cause (God), with respect to developing a theoretical construct that accounts for the information content in the DNA molecule? For the purpose of clarity and precision, I have taken this question and expanded it in a systematic and cumulative way to include the following questions: What is science? Is there an order to knowledge? What is scientific knowledge? What kind of causes can science discover? Does the idea of a First Cause (God) belong in science?

What is science?

The word *science* literally means "knowledge." It has its origin in the Latin term *scire* (to know). However, science assumes a certain interdependent order of knowledge upon which the entire field of study rests. If that order of knowledge is ignored or abused, the result can—and usually does—undermine the integrity of the discipline itself. Hence, to avoid such an outcome, it is incumbent upon us to ascertain this independent order of knowledge and understand its nature. With respect to its nature, this knowledge can be divided into two realms: the philosophical and the physical.

The Philosophical Realm of Knowledge

The starting point for all knowledge, including scientific knowledge, is philosophical in nature. This knowledge includes logical inferences (inductive and deductive), the analytical truths of mathematics, the correspondence theory of truth, as well as the principles used to develop theoretical constructs formulated from the measured probabilities of experimental research. Yet, what needs to be understood (and is often ignored or not known) is that this first order knowledge is *metaphysical* in nature. (I am using the term *metaphysical* in the same manner after the Greeks; that is, that which deals with what is real, what exists—including the trans-empirical. It is comprised of the most fundamental concepts and beliefs about the basic nature of reality on which many other concepts and beliefs rest.) Hence, this metaphysical knowledge has dominion over all scientific investigations and is referred to as first order knowledge. In this paper, I am primarily concerned with the relationship between the physical realm (sense perception) and the metaphysical realm (logic), by way of valid inductive and deductive reasoning. Although there is much to be said about the other independent areas of first order knowledge upon which science depends, this one takes priority over the rest. Hence, it will be vitally important for us to comprehend the relationship between sense perception and logic, so that we can grasp the meaning of "true" knowledge and gain an understanding of its order or classification.

Is there an order to knowledge?

We live in an age that considers scientific knowledge to be the most reliable, and in many ways, the only "true" form of knowledge. Yet, the knowledge that gave birth to modern science was philosophical knowledge. In fact, the Father of modern science, Francis Bacon, was not a scientist; he was a philosopher-politician. Michael Hart has authored a book that ranks the one hundred most influential people in history. Bacon is included in that ranking because "his writings ushered in a new age of science." Hart noted that Bacon was truly "the first great philosopher to realize that science and technology could transform the world" and that he was an "effective advocate of scientific investigation."[1]

Many scholars consider *Novum Organon* (*New Instrument*) Bacon's most important work. In that work, he called for a more empirical approach to scientific investigation by way of inductive logic, as opposed to Aristotle's deductive method. However, Bacon's approach did not negate Aristotle; he reformulated and functionally transformed Aristotle's conception of science as knowledge of necessary causes by applying his philosophical axioms to the facts of the physical realm in a methodical way. Bacon's inductive approach to knowledge formed the very essence of the method used by science ever since. Taken together this new relationship between logic (first order knowledge) and its application to the physical realm (sense perception) gave rise to what I am referring to as second order knowledge[2] (applied philosophy) by way of measured probabilities through experimental research. "Although Aristotle provided specific axioms for every scientific

[1] Michael H. Hart, *The 100, A Ranking of The Most Influential Persons In History* (New York: Kensington, 1992) 450.

[2] I am using the classification of first order knowledge as defined by classical realism, but not second and third order knowledge.

discipline, what Bacon found lacking in the Greek philosopher's work was a master principle or general theory of science, which could be applied to all branches of natural history and philosophy."[3]

The Physical Realm of Knowledge

We must not forget that when scientists apply Bacon's inductive method to the physical realm to discover the cause of some effect, they are also using the axioms (first principles) delineated by Aristotle. Furthermore, when scientists take what they discover using Bacon's inductive approach and formulate a theory to explain some aspects of physical reality, they are using applied philosophy. This is accomplished by way of Aristotle's deductive method to formulate *theoretical constructs* or third order knowledge. For example, scientists have used the inductive method (Bacon) to discover certain laws of nature. They have also studied certain phenomenon in nature, like black holes in space. When scientists take the laws of nature, coupled with the data from their experimental research and devise a *theoretical construct* to explain their observations, they have reached the tertiary level of knowledge. At this level, scientists are using applied philosophy to "hypothesize" or "theorize" with the goal of accounting for the observational evidence they have accumulated.

The relationship between these two realms of knowledge, the philosophical and physical, constitutes the essence of the problem. What if some physical observation cannot be adequately accounted for by purely natural explanations or causes? If a scientist formulated a theory to explain that phenomenon of nature, and that theoretical construct included the concept of God (a First Cause), should that construct be considered scientific knowledge? In order to answer this question, we must define scientific knowledge and qualify the kinds of causes science is capable of discovering.

What is scientific knowledge?

Immanuel Kant, by way of his transcendental philosophy, attempted to give natural science a certitude and incorrigibility it does not possess. As Mortimer J. Adler noted in his book, *Ten Philosophical Mistakes*, "Kant argued for the exclusion of traditional metaphysics from the realm of genuine knowledge on the grounds that it must employ concepts derived from experience to make assertions that go beyond experience. . . . Where Hume dismissed traditional metaphysics as sophistry or illusion, Kant dismissed it as trans-empirical."[4]

The reason for bringing Kant and Hume into this inquiry is based upon the fact that their theories of knowledge have been embraced (knowingly or naively) by modern scientists. Their views exclude all metaphysics from the realm of scientific knowledge. Almost all, if not all, contemporary objections to invoking the idea of God as an essential aspect of a theoretical construct, have their roots in Kant and Hume. Hence, we must take a moment to examine their theories of knowledge to see if their objections are valid.

The fundamental difficulty with Kant's theory of knowledge is that it is also trans-empirical. Kant is guilty of doing the very thing that he condemns traditional metaphysics for doing—having knowledge of the intrinsically unknowable. In other words, Kant's assertions are not empirically verifiable and ultimately his view of knowledge is self-defeating. Therefore, when a scientist argues that only the empirically verifiable constitutes true knowledge, that proposition is self-defeating because it is not empirically verifiable: it is a metaphysical proposition.

David Hume also had a standard for testing knowledge. Hume said, "If we take in our hand any volume—of divinity or school metaphysics—let us ask, Does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matters of fact and existence? No. Commit it then to the flames; for it can contain nothing but sophistry and illusion."[5] The basic problem with Hume's theory of knowledge is self-evident once we apply his test to his own criteria. What if we were to go to a library and take in our hand a volume of Hume's writings (found in the philosophy section and not the science section) and read what Hume just said—would it pass his own test for knowledge? According to his own criteria, we must ask the following questions: Does Hume's proposition contain any abstract reasoning concerning quantity or number? *No*. Does it contain any experimental reasoning concerning matters of fact and existence? *No*. Commit it then to the flames; for it can contain nothing but sophistry and illusion. Hence, according to Hume's own instructions, we must commit his writings to the flames.

Therefore, since metaphysics is an inescapable aspect of any theory of knowledge, we can think of scientific knowledge as that which results from the proper application of metaphysics to the physical realm; a valid combination of first and second order knowledge. Without a correct understanding of this order of knowledge, a theoretical construct (third order knowledge) is worthless. However, once first and second order knowledge is properly understood and utilized, then

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[3] Stanford University, *Dictionary of Philosophy* (On-Line: http://plato.stanford.edu/entries/francis-bacon).
[4] Morimer J. Adler, *Ten Philosophical Mistakes* (New York: Coller Books, 1985), 98.
[5] David Hume, *An Enquiry Concerning Human Understanding* (New York: Prometheus Books, 1988), 149.

theoretical constructs become a valuable source of scientific knowledge. The question we are concerned with, in the scope of this paper, has to do with the nature and limitations of theoretical constructs. Hence, we must identify and qualify the kinds of causes science is capable of discovering with respect to developing theoretical constructs.

What kind of causes can science discover?

The first principle, or metaphysical axiom, upon which the empirical sciences are built, is known as the *principle of causality.* This principle states that every finite, dependent, and contingent thing (an effect) must have a cause. In *Physics* II, 3, Aristotle proposed that *at least* four kinds of causes apply to anything that exists: its form or essence, its material or substance, its agent and its purpose.[6] We can also consider two more kinds of causes—its pattern and its device. For example, if we were looking for the cause of a house, we would ask certain causal questions depending upon the kind of cause we were seeking to discover. The same is true of molecular biologists as they seek to discover the cause of the DNA molecule. To help clarify what I am saying, I have included the following table:

CAUSATION QUESTION	DESCRIPTION OF CAUSE	HOUSE	DNA
What is the formal cause?	that ***of which*** it is made (its essence)	House-ness	Information
What is the material cause?	that ***out of which*** it is made (its substance)	Wood	Matter
What is the instrumental cause?	that ***through which*** it is made (the device)	Tools	Nucleotides
What is the exemplar cause?	that ***after which*** it is made (the pattern)	Blueprint	Language
What is the final cause?	that ***for which*** it was made (the purpose)	To Live In	Life
What is the efficient (First) cause?	that ***by which*** it is made (the agent)	Carpenter	**???????????**

Now, with respect to the DNA molecule, consider the kind of causes science has discovered listed in the table above. In particular, take note of the formal and exemplar causes: the essence of and the pattern after which the DNA molecule is made—information and language. Furthermore, through the science of *Information Theory*, we now know that the information content of the DNA molecule is mathematically identical to a written language (its pattern or exemplar cause).[7] However, the efficient or First cause of this information remains unknown. But what exactly is science trying to discover? The efficient cause of a house is a carpenter, but what is the efficient cause of the information content, with respect to its essence or form, of the DNA molecule? Since all the causal questions have been answered and there is no more physical material to account for, what is science trying to discover?

For example, consider a computer. Computers are composed of two fundamental components: *hardware and software*. The hardware is the material part of a computer while the software corresponds to the intelligence that gives the computer a certain kind of information; its "knowledge" or instructions. One philosopher of science, David Foster, has aptly said,

> In searching for 'what is behind the DNA' it would seem that we have entered the realm of *software.* Molecular biology can find no trace of further hardware which is upstream from the DNA and since the DNA is known to be coded, *then we are not looking for more physical facts but for mental functions*. Until the invention of electronic computers such an approach might have been considered as pure metaphysics, but the opening up of the computer art tells us that software is both 'real' and as important as hardware. . . . If we now transfer our thoughts from man-made computers to 'what is behind DNA', we have little choice but to imagine that there is a correspondence. Now 'what is behind man-made computers' is not a thing; it is pure logic. In the DNA we have seen the 'thing' or hardware of natural computing, but we need to invent a term for the logic of the system and there seems no more appropriate word than ***LOGOS***. This Greek word means word or reason, the mind-stuff itself.[8]

The idea of looking for the efficient or First cause of the information content in the DNA molecule leads us to our concluding question. This last question has to do with the validity and limits of scientific theoretical constructs.

Does the idea of a First Cause (God) belong in science?

Is it academically credible to include the concept of a First cause (God), with respect to developing a theoretical construct that accounts for the information content in the DNA molecule? I believe that the answer to this question is yes, based

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[6] McKeon, Richard. (ed.), *The Basic Works of Aristotle* (New York: Random House, 1941) 240-41.

[7] See Herbert P. Yockey, "Self Organization, Origin-of-life Scenarios and Information Theory," *Journal of Theoretical Biology*, Volume 91, 1981, 16. [A *Markov process* is a phrase used in the discipline of Statistics. It concerns itself with analyzing a succession of events within certain parameters, each of which is determined by the event immediately preceding it. This process was named after the Russian mathematician, Andrei Markov (1856-1922)].

[8] David Foster, *The Philosophical Scientists*, (New York: Dorset, 1985), 88-89 (emphasis added).

upon what has already been said about the nature and order of knowledge. In fact, there have been many theoretical constructs throughout the history of science that have included the idea of God in the quest for third order knowledge. One contemporary example of a theoretical construct that includes God as the efficient or First cause should suffice.

The idea of God and the ideas concerning the ultimate nature and origin of the universe are not concepts derived from sense-experience. They are, in the strictest sense, theoretical constructs. There is, therefore, nothing invalid about utilizing these constructs, even if such ideas go beyond all the sense-experience available to us. It is important to remember that unlike an empirical concept, a theoretical construct does not and cannot have any perceived particular instances; in scientific terms they are classified as *singularities*. However, *and I cannot stress this point enough*, the validity of such constructs is dependent upon the already established criteria concerning the nature and order of knowledge.

This being understood, one can see why a theoretical construct, such as the one proposed by Stephen Hawking in his book, *A Brief History of Time*, is considered a very significant part of theoretical physics. This is true, even though his construct explicitly includes, and is replete with, the idea of a First cause (God). What is meant by the term God and whether Hawking includes it to confirm or deny God's existence is not the point. The main point here is that Hawking includes the idea of God as a viable aspect of a non-empirical theoretical construct. At the very least, Hawking uses the term as an efficient cause that has intelligence and power. His justification for doing so is based upon the principle of causality (first order knowledge) and the laws of nature (second order knowledge).[9]

Another significant point to remember about a theoretical construct, such as God and the cosmos as a whole, is that these constructs are in the same category as some of the most important theoretical constructs of the twentieth and twenty-first centuries in theoretical physics. These ideas range from the subatomic level (quarks, mesons, Higgs bosons, and sparticles) to the level of deep space (black holes). It is interesting to note that Hawking includes two competing constructs as the basic framework of his book. First, he realized that if Einstein is correct about the theory of relativity, then "There must have been a state of infinite density in the past, the big bang, which would have been an effective beginning of time. . . . At the big bang and other singularities, all the laws [of nature] would have broken down, so God would still have had complete freedom to choose what happened and how the universe began.[10] One of the most famous and quoted statements in Hawking's book is, "So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: it would simply be. What place, then, for a creator?"[11]

In order to avoid a construct that includes God, Hawking hypothesizes an unbounded finite universe. He does so based upon the concept of "imaginary time" and admitted that he used it as a "mathematical device (or trick) to calculate answers about real space-time."[12] Yet, he also realized that "when one goes back to the real time in which we live, there will still appear to be singularities.[13] When Hawking converts his work back into real time, the singularity (the beginning of time and space) and the need for a creator (First cause) reappears. In an effort to avoid this conclusion, Hawking suggests that "the so-called imaginary time is really the real time, and that what we call real time is just a figment of our imaginations."[14] The only problem with this conclusion is that every scientific law and principle must also be figments of our imaginations because they were discovered, understood and developed in real time. Hawking's construct ultimately fails at the third order level of knowledge, because he either overlooked or intentionally did not keep the integrity of first and second order knowledge. Yet, Hawking's conclusion is not the point. The fact that he includes God as the efficient or First cause of the universe as a viable part of a scientific theoretical construct is what needs to be understood and acknowledge by modern scientists.

In conclusion, I see no philosophical or scientific grounds to rule out the idea of God as the efficient or First cause with respect to developing a valid theoretical construct to account for the information content discovered in the DNA molecule. I believe this to be an academically credible construct as long as this efficient cause is consistent with—and is built upon—first and second order knowledge as described in this paper. If so, it ought to be considered a plausible theoretical construct. To think otherwise, is to call all theoretical constructs into question and to ultimately undermine the entire academic field of science and the very essence of the scientific method.

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[9] Of course, Hawking is not the first eminent scientist to include God in a theoretical construct. For example, consider the ultimate theoretical constructs of Galileo, Copernicus, Kepler, Pascal, Bacon Newton, Pasteur, Maxwell and Einstein.
[10] Stephen W. Hawking, *A Brief History of Time* (New York: Bantam Books, 1988), 173.
[11] Ibid. 140-41.
[12] Ibid. 134.
[13] Ibid. 139.
[14] Ibid. 139.