God and the Big Existential Questions

By

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Preface

Existential questions are deep and profound, philosophical questions that concern our very existence, such as "How did we get here"? "What is the meaning and purpose of my life'? "Is there a God"? and "What happens to me when I die"? Humans have been asking these questions for as long as we have been able to think and reason, and each possible answer spawns a host of additional questions. Existential questions are perhaps ultimately unanswerable, but to accept the challenge and try is to entertain the possibility that they may be.

I appeal to science and philosophy for answers to such questions. Both modes of thought seek knowledge in their own manner, but philosophers must develop a greater tolerance for ambiguity than scientists because they ask many questions that are only partially amenable, or not at all, to empirical testing, and for which there are no universally agreed upon answers. Philosophy thus ventures into areas that science cannot or will not go. Scientists want objective and verifiable answers about the natural world for which there is universal, or near universal, agreement. Because existential questions are not open to objective scientific answers, philosophy picks up the burden and ventures beyond science to search for answers to the questions that thinking people yearn for. It is vexing that questions that we consider most meaningful to our lives can only be imperfectly, or even not at all, probed by the methods of science. Philosophy is thus more encompassing than science.

This does not mean that philosophy and science are at loggerheads. Scientists and philosophers work with different goals and are judged by different standards, although they both share the tools of logic, conceptual analysis, and rigorous argument. Philosophers seek knowledge by the methods of deduction and abduction, and scientists use induction as their primary method of seeking knowledge while also engaging the other two. Questions for which we can acquire definite answers through mathematics and experimentation are the realm of science; questions for which we have no definite answers are the grist for the philosopher. It is this intellectual uncertainty in which the value of philosophy resides because it engages a liberating doubt.

The first chapter engages the most fundamental existential question: "Why is there something rather than nothing." It has been said that the universe is both inevitable and impossible. It is inevitable (the proof being we are here), but it is considered impossible despite this because the probability of its existence is vastly smaller than the probability boundary, calculated to be 1 in 10^{150}. This has led many scientists—including many Nobel Prize winners such as Albert Einstein—and philosophers to invoke the divine as the answer to why there is something rather than nothing. First rate scientists and philosophers have found God to be the ground of all being, and thus the ultimate abductive explanation for the questions discussed in subsequent chapters.

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Chapter One

How Do Philosophy and Science Answer the Big Questions?

The Value of Philosophy

In their book *The Grand Design*, physicists Stephan Hawking and Leonard Mlodinow inform us that humans are curious creatures who want answers to a multitude of existential questions such as what reality is, where the universe came from, how it behaves, and if it needed a creator. They then write: "Traditionally these are questions for philosophers, but philosophy is dead" (2010, p. 5). Hawking and Mlodinow claim that science has become the only bearer of the torch of discovery and then refute themselves by writing page after page of philosophy (as well as great science) because all but one of the questions they pose are metaphysical. For instance, they appeal to a multiverse of trillions of universes that is inaccessible to empirical science, even in principle, for answers to existence, which makes it a philosophical rather than a scientific question. Hawking was an undoubted wizard at physics and mathematics and was well qualified to address questions about how the physical universe behaves, but the other questions they pose are fundamentally existential questions concerning our very existence, and thus squarely in the domain of philosophy.

Science and philosophy are not contradictory modes of thought at war with one another. Many great scientists are steeped in philosophy and insist that there is constant cross-fertilization between science and philosophy. Both seek knowledge in their own manner, but philosophers must develop a greater tolerance for ambiguity than scientists because they ask many questions that are only partially amenable, or not at all, to the methods of science, and for which there is no consensus about answers. Scientists, however, want objective answers to questions about the natural world for which there is universal, or near universal, agreement. But not all questions are open to objective answers, so philosophy picks up the burden and ventures beyond science (while not contradicting it) to search for answers. It seems rather perverse that questions that the proverbial "man in the street" considers most meaningful—questions about the social, psychological, political, and metaphysical realms—can only be peripherally approached by the methods of science. Philosophy is thus more encompassing than science; it attempts to answer questions that even children ask, such as "Why am I here"? and "What happens when we die"?

Philosophy is nutritious food for your mind. It is like a never-ending smorgasbord of sumptuous intellectual victuals with something to suit everyone's taste, from ethics to aesthetics, from epistemology to ontology, from metaphysics to logic, and many more delicious treats. When reading philosophy, you silently converse with the greats of the ancient world like Plato and Aristotle, or more modern thinkers such as Bertrand Russell or William Craig without fear of contradiction. But philosophy is not fun for everyone, and some find it to be an endless meal of stale porridge because it demands discipline of thought. She is the stern but loving mother of all formal systems of knowledge parceled out to modern disciplines. Because the subject matter she claims for herself is the whole of intellectual knowledge, she fusses around at the periphery of these disciplines, sometimes scolding, sometimes applauding, but always encouraging and adding moral and ethical nuances. She permeates all disciplines because she deals with fundamental knowledge and asks questions about everything that there is to ask in the physical, social, and political worlds, and ventures far beyond into the metaphysical. Metaphysics is perhaps the most interesting and challenging branch of philosophy because it refers to realities beyond the reach of science.

The term "philosophy" combines the Greek words, *Philia* (love) and *Sophia* (wisdom); hence the literal meaning of philosophy: "Love of wisdom." Philosophers pondered many of the same questions that the modern sciences do long before those questions were assigned to different disciplines, relying only on their rational faculties unaided by any of the fantastic instruments that bless modern science. Philosophy's domain is not shrinking as the sciences advance because it continues to have a valuable role to play in knowledge synthesis and holding before us the continuity of thought bequeathed to us by the great minds of the past. Philosophy continues to monitor her offspring in their adolescence, making sure that in their haste to grow up they do not lose contact with the foundational principles of knowledge. She lets the scientists perform the experiments and the mathematical grunt work to explain how things work and then endeavors to explain why they do in terms of some more encompassing reality. Thus, philosophy and science inform one another because we like to know both the hows and whys of existence. As Daniel Dennett opines: "There is no such thing as philosophy-free science; there is only science whose philosophical baggage is taken on board without examination" (1995, p. 21).

Philosophy clarifies our thoughts, provides unsuspected possibilities, informs us of why we think about things the way we do and perhaps solves some contradictions in our thinking we never knew existed. It helps us to analyze concepts, definitions, and arguments, and to organize our ideas. It also aids us to distinguish subtle differences between opposing views, perhaps find common ground, and perhaps even synthesize them. The ancient Greeks thought of philosophy as a practical endeavor because it explores things that are most important to one's life, such as how we should orientate our lives to make them happy, meaningful, and good. We all have an unconscious philosophy that we apply to our social, political, and religious lives; the alternative to having a philosophy is not having a philosophy but having a bad philosophy.

Similarities and Differences Between Philosophy and Science

Scientists and philosophers work with different goals and are judged by different standards. They both share the tools of logic, conceptual analysis, and argumentation, and one cannot be a philosopher without a fascination with science, nor a scientist without a philosophical frame of mind. It is the uncertainty inherent in philosophical questions where its value resides because it engages a liberating doubt. Scientists are judged by the explanatory power of their findings applied to specific problems. Philosophers are judged by their persuasive use of logic and language in articulating the general intellectual framework within which these specific problems reside. To give a simple example; criminologists are content with showing that a particular approach to punishing criminal offenders "works" better than some alternative in terms of the goals they have in mind (rehabilitation, deterrence, etc.), or with arguing whether this or that practice is consistent with justice as they view it. The philosopher's goals are more fundamental, dealing with core concepts, presuppositions, moral and ethical principles, and categories of being and knowledge rather than with the raw facts of interest to criminologists. Philosophers will ask why we punish, what is the basis for it, do we justify it on consequentialist grounds (what might happen if we do this or that?) or deontological grounds (were the reasons for doing this based on good intentions?), where society would be without it, what law's relationship is to justice, where justice comes from, and what it means to act justly, and many other such questions.

Philosophical knowledge is thus aimed at providing unity and system to science by critically examining its fundamental concepts, convictions, prejudices, and beliefs. Philosophy concerns itself with examining the assumptions, methods, and ethics that apply to the sciences, and to issues such as the nature of truth and reality. As is the case with any other domain of inquiry, the philosophy of science seeks to lay bare the practices and assumptions underlying the inquiries the discipline makes and offers critiques with the aim of enhancing a discipline's ability to improve its understanding of the phenomena it claims as its domain. Philosophy asks scientists to contemplate the abstractions and concepts they work with, which are usually, consciously, or otherwise, taken for granted as representing the truth of the matter. This is truer for the human sciences than the physical and natural sciences, but science needs philosophy and philosophy needs science.

All sciences have journals devoted to the philosophy of their subjects (the philosophy of mathematics, biology, physics, etc.), which makes it obvious that they think it wise to hang on to their mother's apron strings. Many important questions in these disciplines, such as the nature of their concepts and their interrelationships, are philosophical. Many of the finest minds in physics, the pinnacle of what it means to be scientific, such as Niels Bohr and Erwin Schrodinger, were steeped in philosophy. Albert Einstein's philosophical frame of mind influenced the way he did physics; often referencing the works of philosophers such as Kant, Hume, and Spinoza in his writings. Einstein believed that all scientists should cultivate a philosophical frame of mind or rest content to be outhouse counters unable to see the forest for the trees: "So many people today—and even professional scientists—seem to me like somebody who has seen thousands of trees but has never seen a forest." Seeing the forest is: "the mark of distinction between a mere artisan or specialist and a real seeker after truth" (in Smolin, 2007, pp. 310–311). The former does normal science; the latter does revolutionary science. To do revolutionary science, in addition to mastering a subject, one needs philosophical wisdom and the imagination to delve deeper to uncover what we didn't even know we didn't know.

Not far behind Einstein in the pantheon of great minds is Nobel laureate Niels Bohr, of whom Galison (2008, p. 122) writes: "historians of physics have made much of the way Niels Bohr used the ideas, directly and indirectly, of Soren Kierkegaard as he formulated his principle of complementarity." Werner Heisenberg, a pioneer in quantum physics, lectured extensively on Kant's ontology and epistemology, especially in terms of interpreting quantum phenomena. If you do not believe that philosophy can be of use in quantum mechanics, try wrapping your head around its concepts such as superposition, wave collapses, and quantum entanglement. If use is found use among physicists for interpreting the weird world of quantum mechanics, use is certainly found for it when wrestling with the big questions of existence.

Ways of Knowing: Deduction, Induction, and Abduction

Science and philosophy search for knowledge, but how do they know what they think they know? The short answer is that scientists run experiments and do calculations while philosophers rely only on the tools of the mind. Philosophy lets it get into metaphysical areas where cold science cannot or will not go, such as "Does life have ultimate meaning?" and "Does God exist?" No amount of experimenting and calculation will provide answers to such questions. Scientists value questions for the answers they can provide and philosophers value questions for their intrinsic worth apart from any answers because they enrich the imagination. Another difference is how philosophers and scientists arrive at conclusions to their questions. This gets us into the branch of philosophy called epistemology; the study of how knowledge is acquired, the nature of knowledge, and how it relates to connected concepts such as truth and justified belief. Philosophy relies on deductive and abductive reasoning to arrive at its answers, to which science adds induction.

Deduction, properly applied, is the most reliable of the three. Its reliability revolves around the issue of the nature of the necessary relationship between its antecedent and its consequent, but such relationships are rare outside mathematics. It is a "top down" method that reasons from a general premise that is self-evidently true ("All men are mortal.") and then derives further truths from them ("Plato is a man."), and on to a specific logical and irrefutable conclusion that compels our assent ("Therefore, Plato is mortal."). Philosophers of a Platonic frame of mind subscribe to a school of thought called rationalism, which contends that the world can only be understood as *it is* through the intellect because the senses allow us only to see it as *it appears.* They say that the phenomena of the world come to us through the buzzing confusion of sense perceptions and must be filtered, organized, and understood by the intellect. It is true that our perceptions are organized by the mind and that our senses can and do deceive. After all, our senses perceive that the sun moves from east to west across the heavens, and it is it rather than the earth that is moving. Nothing in our unaided senses can tell us that we are on a wild cosmic ride as Earth spins at about 1,000 miles an hour as we travel around the sun at about 67,000 miles an hour.

But the intellect also deceives even the greatest of minds. Nevertheless, rationalists idealize mathematics as the only true paradigm of truth because mathematical thinking rests on *a priori* knowledge that is true by definition: if $x = 3$ and $y = 4$, then $(x)(y) = 12$ is absolute in all possible instances. Deductive reasoning from truths considered self-evident has been taken as the ideal path to knowledge ever since the time of Plato. It is considered ideal because it guarantees the truth of the conclusion given that it is already present in the premise ("All crimes are against the law.") and any denial of it is self-contradictory. Once we leave the certainty of mathematics and enter the real world, however, we run into trouble because except in the most trivial sense ("All mothers are females."), we have precious few major premises that are self-evidently true. Of course, our major premises may be true, but seldom are they self-evidently so. We cannot simply rationalize ourselves into knowing; knowledge must be gained by observation and experiment.

Observation and experiment are "bottom up" forms of inductive reasoning from the specific to the general. A conclusion in a philosopher's deductive mode is a hypothesis in a scientist's inductive mode; an assertion to be tested experimentally. That is, while a valid deductive argument is one in which the premises infallibly confirm the conclusion, a valid inductive argument is one in which the conclusion tentatively confirms the premises—makes them only more *probable* than not. To conduct experiments and make observations, scientists are guided by theories from which hypotheses are logically deduced. Hypotheses are considered only probably true because the antecedent theories are themselves considered only probably true. Theories in science must be falsifiable; if a theory cannot be falsified it cannot be tested and is useless. Unlike mathematical axioms, theories are not true by definition. Deductions from theory presuppose broad inductions (guided by the observations and data produced by previous scientific works) to validate their major premises. Knowledge of the world can only be achieved with some degree of confidence when we test our concepts in the world outside our own minds because a deduction is only solid when it is inductively justified. If the empirical hypothesis is not supported by the test, either the deduction or our measurements were faulty. Empirical science cannot produce the absolute certainty of mathematics, but the experimental-observational inductive method is the bedrock of all justified knowledge.

The third method of reasoning is abduction. Abductive reasoning is *post hoc,* and starts with all available observations relevant to a particular phenomenon and offers the most reasonable explanation for it but leaves space for other possible explanations. Philosopher Peter Lipton (2000) offers a simple example of abductive reasoning in the form of Sherlock Holmes zeroing in on his arch-enemy, Professor Moriarty, as the one guilty of murder. Holmes infers that Moriarty is guilty because his inference best explains all the evidence gathered, such as fingerprints, blood stains, and other such evidence. Although all the evidence points to Moriarty's guilt, there always remains the possibility that someone else could have been the guilty party. However, Holmes' inference about Moriarty's guilt provides the most reasonable explanation based on the evidence before the court.

Abductive is the primary form of reasoning we will be using to explore the big questions because most of them are ontological. Ontology is the study of the fundamental nature of purpose, being, and existence. Because abduction goes from consequence to antecedent rather than the opposite as in deduction, abductive reasoning is also called retroductive reasoning and yields a result that is highly plausible without necessarily being justified. For example, if we observe that the street is wet, we may conclude that it has been raining. However, there are other possibilities—perhaps the street cleaners have been at work, or a water pipe had burst close by. All three possibilities (rain, street cleaners, broken water pipe) have explanatory power; if any were true, it would explain why the street is wet. Intuitively, however, the rain explanation is better than the others, especially if we seek further evidence. If we find that the grass is wet in the backyard and there is fresh water in the rain gutters, we can reject the other possibilities and abductively conclude that the street is wet because it rained. This is a backward-looking conclusion from consequent to antecedent and will not allow you to predict that it will rain on the same date next month, but it is the best explanation of the current wetness of the street.

We will be applying abductive reasoning to a wide range of scientific observations. Once a wide range of scientific observations is given (call them A), an explanation (call it B) that neatly and satisfactorily elucidates A becomes highly plausible. Within that abduction schema, valid conclusions are thus those which explain A, which implies that A confirms B as the best explanation of all that A entails. Abductive explanations thus yield conclusions that are difficult to doubt even though they lack the certainty that accompanies the logic of deductive arguments from self-evidently true premises. Abduction is therefore a "cumulative case" argument that binds together as many arguments as possible for why X happened or why X exists in terms of balancing the probabilities such that X is more likely than not X.

God, Atheism, and Science

I invoke God as the ultimate explanation of the big questions raised in this book because God is the ground of all being. Of course, that claim is hotly disputed, as is the very existence of God. The typical argument of the atheist is that the concept of God is incoherent and therefore theism is irrational. It follows that if theism is irrational, then atheism must be rational. If atheism is more rational than theism, and if scientists are rational beings, we should see that most scientists are atheists. However, a large sample of scientists surveyed by Gross and Simmons (2008) found that a plurality of scientists maintain their religious commitment and only a piddling 9.8% described themselves as atheists and 13.1% as agnostics. Atheism is even more lonely among the true greats of science. Baruch Shalev (2003) documented the religious views of all 719 Nobel Prize winners from 1901 to 2000 and found that only 10.5% of these brilliant men and women fell into an atheist or agnostic category. It was winners in literature, not science, who make up by far the biggest category of non-believers (35.28%). Only 4.7% of the winners in physics, 7.18% in chemistry, and 8.98% in physiology or medicine fell into the non-believer category. We cannot know how devout they were, but it helps us to understand prize-winning mathematical physicist Robert Griffiths' words: "If we need an atheist for a debate, we go to the philosophy department. The physics department isn't much use" (in Kainz, 2010, p.21).

Theism and atheism are thesis and antithesis, the latter exists only because the former does. If atheists want theists to provide empirical evidence for the existence of God, then they too should be prepared to provide empirical evidence that God does not exist if it is to be a valid antithesis. Neither side, of course, can prove its position scientifically since God is outside of the methods of science. We can only look for God's fingerprints in science, but He has left them everywhere for us to find. As Albert Einstein said: "The more I study science the more I believe in God" (in Porter, 1998, p.107). The pronouncements of great scientists notwithstanding, like the prisoner in the dock, an atheist does not feel it necessary to defend his position since it is a negative one of simply denying the evidence theists point to or maneuvering it in a different direction. However, just as in a court of law, the onus of proof lies with the man who affirms a position, not on he who denies it, and the position must be proven, not beyond all doubt, but "beyond a reasonable doubt." To achieve this, the prosecutor in a court of law uses the abductive method of piling evidence upon evidence on his side of the scale until the combined weight of it brings the pan down with a resounding thump.

Chapter Two

Why Is There Something Rather Than Nothing?

The Most Fundamental Question

Why is there something rather than nothing? Philosopher Martin Heidegger called this the fundamental question of metaphysics. The question may not matter much to you, because there are a whole lot of other questions that have more meaning for you and me. However, by calling this question the "fundamental" question, Heidegger did not mean "most important to us," but rather that it is the most basic existential question. Why are sentient beings here at all to be asking such questions? It may be a metaphysical question, as Heidegger said, but metaphysics divorced from the input of scientific knowledge cannot be a sound guide to answering it. The answer must be in some sense metaphysical, but the musings of metaphysicians combined with scientific findings can be compelling.

Many curious minds have pondered why the universe exists and works the way it does, but philosopher and mathematician Gottfried Leibniz (1646–1716) took it a step further and asked why there is a universe to ponder in the first place. Leibniz was not the first to ask this question, but it is his name that most frequently linked to it. Ludwig Wittgenstein also pronounced: "how extraordinary that anything should exist" (in Ambrozy, Králik, & Poyner, 2018, p. 118). If the question is the most fundamental existential question, then the answer to it must be the most fundamental existential answer. Leibniz thought that nothing would be simpler because if nothing at all existed no explanation would be needed. But then, no one would be around to ask for an explanation. Since we are here, Leibniz said that the fact that there is something rather than nothing requires an explanation.

Shakespeare might accuse us of making "Much ado about nothing," but nothing has become seriously talked about in science in recent years. We tend to think of "nothing" in terms of the absence of some specific thing, such as the absence of coffee in my cup; that is, non-existence is a state that something can be in. But my "empty" coffee cup is not empty at all, it is only empty of coffee. It contains atmospheric gases, a sheen of moisture condensation, tiny soap molecules left over from the morning wash, and perhaps nastier things best unsaid. That is not what Leibniz meant by nothing; he literally meant absolutely "no-thing." Absolutely nothing must have no properties at all, no size, no shape, no position, no energy, no past, no present, no future, and thus no existence. When you think about it, non-existence is an impossibility because it is a contradiction to say that non-existence can exist. Existence is thus a necessary situation, but we can only say this because we are here to say it. The question remains, however, as to why all the contingent things in the universe exist in the first place because the probability of the universe's existence is astronomically low.

The Origin of Existence

There is a real possibility that existence as we know it may not have been given the insane probabilities that scientists have calculated against it. Physicist Nima Arkani-Hamed declared in a talk at Columbia University: "The universe is inevitable," and at the same time, "The universe is impossible" (in Wolchover, 2018, p. 3). How can it be both inevitable and impossible? It had to be inevitable because here we are; it is impossible because events such as the origin of the universe and the origin of life have been called miraculous because the probabilities calculated for these things occurring vastly exceed the boundary of probability. According to Allen and Lidström: "If the Standard Model were strictly obeyed, there should have been an essentially complete annihilation of matter and antimatter in the early Universe, leaving only photons" (2016, p. 10). Matter consists of atoms with a negatively charged electron; antimatter contains a positively charged positron, and they come together there is mutual destruction. Allen and Lidström call this a fundamental problem and "an extreme and unnatural fine-tuning in the initial state of the Universe" (p. 10). Complete annihilation did not happen because about one negatively charged particle in 10^{20} escaped annihilation to eventually coalesce into matter.

This slim matter/anti-mater ratio is far from the only exquisite fine-tuning that physicists have calculated for there to be something rather than nothing. We can ignore the fact that there would have been lots of evanescent high-energy photons resulting from matter/anti-mater collisions because they are as close to nothing as we can get. There had to be an extreme degree of order at the very beginning because a universe capable of supporting life must begin with the lowest possible entropy; the lowest possible rate of disorder. Nobel laureate physicist Sir Roger Penrose asks us to imagine all the possible ways that the universe might have started and the probability that the Creator could hit the exact point to create a life-producing universe: "How big was the original phase-space volume W that the Creator had to aim for in order to provide a universe compatible with the second law of thermodynamics and with what we now observe?" He then gives two ways to estimate this figure and writes: "Either way, the ratio of V [total phase-space volume available] to W will be, closely $V/W = 10^{10\,(123)}$" (2016, pp. 445-446). That's 10 billion multiplied by 10 billion 123 times! Penrose notes that this number could not be written down in non-exponential form if we had every elementary particle in the universe to write a zero on.

Penrose's calculations present problems for those who have wrestled with the initial low entropy problem themselves. Three physicists wrote a paper titled "Disturbing Implications of a Cosmological Constant." They noted that it is a given that the universe could only make sense if it began in a state of minimum entropy and add: "Far from providing a solution to the problem, we will be led to a disturbing crisis" (Dyson, Kleban, & Susskind, 2002. p.1). The disturbing crisis they found after examining all naturalistic explanations for such exquisite fine-tuning and finding them wanting is no less than forcing physicists to think the unthinkable: "Another possibility is an unknown agent intervened in the evolution, and for reasons of its own restarted the universe in the state of low entropy characterizing inflation" (p. 19). Who this unknown agent may be was not addressed.

Among the many other aspects of the universe that seem miraculously contrived is the contrast and density of matter that had to be just right from the first second of creation. Too much matter and the gravitational pull would be greater than the expansive force of the Big Bang causing it all to collapse back on itself; too little matter and the gravitational pull would be insufficient for the matter to coalesce into stars and planets. This is known as the energy density of matter (p). There is a critical value (p_{crit}) of the energy density that prevents gravity from overcoming the force of expansion and pulling all matter into a big crunch. The value of p must be microscopically close to p_{crit} to avoid this, and it had to vary by less than one part in 10^{60} from the beginning of creation. Paul Davies expresses his amazement at this fine-tuning: "We know of no reason why p is not a purely arbitrary number... to choose p so close to p_{crit}, fine-tuned to such stunning accuracy, is surely one of the great mysteries of cosmology" (1982, p. 90).

The explosive force of the Big Bang was enough to balance out the pull of gravity for the first few billion years, but that force is slowly dissipating, thus requiring another force to prevent a "big crunch." The Supernova Cosmology Project began in 1998 expecting to measure the deceleration of the universe but found that it was accelerating despite the dissipating force of the Big Bang. Gravity dominated during the period of matter accretion into galaxies, stars, and planets, but dark energy (a repulsive force opposite to gravity) now rules the roost. Einstein's cosmological constant (the dark energy built into the vacuum of space) has taken on the job of keeping the universe expanding. There is much about the amazing precision of the cosmological constant that puzzles the best minds in physics. Jenkins and Perez remark that "the most serious fine-tuning problem in theoretical physics: the smallness of the 'cosmological constant,' thanks to which our universe neither recollapsed into nothingness a fraction of a second after the big bang, nor was ripped apart by an exponentially accelerating expansion" (2010, p. 44).

Livio and Rees tell us that anthropic ("man-centered") reasoning is becoming seriously discussed in physics and may have predictive power for explaining phenomena such as the miraculous mystery of the cosmological constant. They ask: "Why is the force so small? If there was an inflationary era with a large cosmic repulsion, how could that force have been switched off (or somehow have been neutralized) with such amazing precision? In our present universe, Λ ["lambda;" the symbol for the cosmological constant] is lower by a factor of about 10^{120} than the value that seems natural to theorists" (2005, p. 1022). The "switching off" or "neutralization" of repulsion they refer to must be unbelievably fine-tuned to 120 decimal places from the very beginning of the universe. Livio and Rees go on to note that: "If Λ were larger, then the acceleration would have overwhelmed gravity before galaxies had a chance to form" (p. 1022). Nobel laureate physicist Steven Weinberg exclaimed about the razor's edge balance between dark energy and gravity: "This is the one fine-tuning that seems to be extreme, far beyond what you could imagine just having to accept as a mere accident" (in Folger, 2008, np).

There are hundreds of other incredibly fine-tuned values that stretch the laws of probability to the breaking point. In fact, there is a probability boundary beyond which the improbable becomes naturalistically impossible. Mathematician William Dembski computed the absolute limit of probability from three solid estimates from astrophysics: the estimated number of atoms in the known universe (10^{80}), Planck time (10^{-45} [that is one ten-millionth of a trillionth of a trillionth of a trillionth of a second!]), and the number of seconds since the beginning of time (10^{25}). Planck time sets an absolute limit on the rate at which anything can transition from one state to another. From these absolute limits—all existing matter; the shortest period of time for any transition from one state to another, and the total time available in which everything in the universe has happened, Dembski concludes: "If we now assume that any specification of an event within the known physical universe requires at least one elementary particle to specify it and that such specifications cannot be generated any faster than the Planck time, then these cosmological constraints imply that the total number of specified events throughout cosmic history cannot exceed $10^{80} \times 10^{45} \times 10^{25} = 10^{150}$" (2004, pp. 84-84). (Note: when we multiply exponents with the same base, we sum the exponents, not multiply them, and that Dembski uses the inverse of Planck time). The probability boundary completely exhausts all probability resources, but the combined probability that the Planck mass, the cosmological constant, the masses of the proton, electron, and neutron, and the strengths and ranges of the four fundamental forces (electromagnetism, gravity, and the strong and weak nuclear forces) would have the values they have is one in 10^{229} (Smolin 1997). And that is just a small sampling of the many other fine-tuned properties we observe.

Is Existence Contingent or Necessary?

Existence is either contingent or it is necessary. Anything contingent is explained by other things preceding it; that is, causes prior to the fact that is to be explained. For example, your existence depends on your parent's existence, their existence on their parent's existence, and so on down the generations. If existence is contingent, many say then there is no coherent scientific account of existence because there was nothing before the Big Bang for the universe to be contingent on. If this is one's position, then one must view the existence of the universe as simply a brute fact for which there is no explanation. The brute-fact position is that nothing is required for the universe to exist other than the mere fact that it does, and to think otherwise is to project our desire for intelligibility on to it. The universe simply is, and its patterned regularity is probably just coincidental. However, the ordered regularity of the universe is just too pervasive to be coincidence, and the sheer number of these regularities renders it incoherent to dismiss them as coincidences. But there are some who do, such as Bertrand Russell, who said in a 1948 BBC radio debate: "The universe is just there, and that's all." Folks like Russell tell us that we can look for explanations of things as far back as we like—until we get to the existence of the universe itself. This is the Big Bang terminus, and we must get off the bus.

If existence is considered a brute fact, the implication is that it is a necessary fact. If this is so, we must reboard the bus and find something to ground this fact because the human mind cannot give up asking "Why?" Yet the brute-fact notion was the standard position of science until the 1920s-1930s because it was believed that the universe is past-eternal, static, and uncaused. This position was a convenient one because it spared scientists the task of pondering its origin. Science now knows the universe had a beginning in the Big Bang but is in a quandary regarding how or why it began, and the theistic implications of even thinking about it. The Judeo/Christian view, however, has always asserted a beginning as revealed in Genesis *1:1:* "In the beginning God created the heavens and the earth" (creation *ex nihilo*"). Science had difficulty accepting the Big Bang at first because (1) it is a given that nothing can come *naturally* from nothing, and (2) it "spookily" aligned with Genesis. As Georges Politizer maintained: "The universe was not a created object. If it were, then it would have to be created instantaneously by God and brought into existence from nothing. To admit Creation, one has to admit, in the first place, the existence of a moment when the universe did not exist, and that something came out of nothingness. This is something to which science cannot accede" (in Yahya, 1999, p. 19).

Allan Sandage, the "Grand old man of cosmology," could not believe it either, but as the evidence piled up, he became a Christian, noting that "It was my science that drove me to the conclusion that the world is much more complicated than can be explained by science. It was only through the supernatural that I can understand the mystery of existence" (in Strobel, 2004, p. 84). Other scientists had no problem with it from the beginning. In a *New York Times* interview, Nobel laureate physicist Arno Penzias stated: "The best data we have (concerning the big bang) are exactly what I would have predicted had I nothing to go on but the five books of Moses, the Psalms, the Bible as a whole" (in Schaefer, 2003, p. 49). Astronomer Robert Jastrow said of the Big Bang: "Now we see how the astronomical evidence supports the Biblical view of the origin of the world. The details differ, but the essential elements in the astronomical and Biblical accounts of Genesis are the same: the chain of events leading to man commenced suddenly and sharply at a definite moment in time, in a flash of light and energy" (1981, p. 19).

But wait, didn't Lawrence Krauss write a book called, *A Universe from Nothing* in which he wrote: "'nothing' is every bit as physical as 'something,' especially if it is to be defined as the 'absence of something'" (20112, p. xiv). If that makes sense to you, I applaud a more imaginative mind than mine because "nothing" cannot be "every bit as physical as something" and the "absence of something" cannot simultaneously be "something." Krauss wants to redefine nothing, and so begins with space filled with constant energy from the photons emitted from the mutual annihilation of matter/anti-matter, and space, but matter/antimatter, photons, and space are not nothing. If by nothing Krauss means the lowest-energy state of a system, although it is not zero, it is presumably insufficient to evolve into any other state, so he still must explain why it did evolve (he does speculate on possible ways in that it could), and where the pre-existing elementary stuff constituting the system came from. Krauss also speculates that empty space existed before the Big Bang, but the scientific consensus is that space/time came into existence with the Big Bang and thus it could not have existed before it. The Big Bang was the inaugural event for everything.

According to Krauss, space is empty because of the mutual destruction of matter/antimatter, and appears to be saying that empty space existed prior to itself and created itself. This is akin to saying that a man can be the father of himself or that he can exist without being fathered. Furthermore, since matter/antimatter already "existed" in a state of nothingness, to what other state of nothingness do they go when they annihilate each other? Nevertheless, Krauss, being a brilliant physicist, understands that there was an asymmetry of matter/antimatter and posits that it was the energy that comes from the mutual annihilation that allowed the universe to evolve. But energy is physical (due to matter-energy equivalence) and does not have necessary existence and is therefore contingent. Because the universe itself is a closed system, like every other contingent thing, energy will dissipate. That is, once everything in the universe is at the same temperature it is at maximum entropy ("heat death"), and no further work can be done. The total energy of the universe will still exist but so thinly and evenly spread out over the entire universe that no use could be made of it. It could not have existed infinitely "before" the Big Bang because it would have reached that state long ago. Finite energy thus needs "something" outside itself that is the necessary cause of its existence.

Krauss proposes the idea that the universe could be a vacuum energy fluctuation on a very large scale in a spaceless, timeless void. A vacuum fluctuation is an extremely transient appearance of virtual particles or excitations of an energy field, and although virtual particles cannot be directly detected and have no definite position, they affect physical fields. He speculates that in addition to the quantum mechanics that exist in space/time, there is a “hyper” system of quantum mechanics existing beyond our universe in multiple dimensions of space/time where bubbles pop in and out of existence spontaneously like bubbles in your bathtub and that our universe is one of those bubbles. If his hypothesized hyper quantum mechanics works like quantum mechanics in our universe, however, the space/time bubbles would disappear just as spontaneously as they appeared in the tiniest fraction of a second. So how did they manage to hang around for 13.8 billion years? Krauss’ answer is that quantum fluctuations could take place in those bubbles and be stretched out due to the expansion of space. According to many physicists who have criticized Krauss, what his speculations really stretches is logic to its breaking point, and he would still have to account for why a quantum vacuum with virtual particles exists in the first place. Virtual particles bouncing around in a vacuum is one thing; the creation of a whole universe is quite another.

Stephen Hawking and Leonard Mlodinow preceded Krauss in claiming that the universe created itself and that there are multiple other universes popping into existence, but the universe was created by the laws of gravity rather than quantum fluctuations. They write: “Because there is a law like gravity, the universe can and will create itself from nothing... Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist. It is not necessary to invoke God to light the blue touch paper and set the universe going” (2010, p. 180). So, we are back to saying that something that did not exist managed to create itself. But this mysterious nothing is not nothing, since they say it is gravity. According to Einstein, gravity is a product of locally warped spacetime, and spacetime warps because of matter, so for Einstein (although not all physicists agree) the concept of gravity has no meaning absent the existence of spacetime and mass. How then could gravity have existed prior to the material universe?

Gravity was born together with spacetime and matter, but Hawking and Mlodinow say that it was the law of gravity, and not gravity itself, that existed before spacetime and matter, but this is worse. Mathematician John Lennox accuses them of committing a category mistake by confusing physical laws and God's agency, two very different things. The laws of science are mathematical models that describe the behavior of forces or things that are observed; they do not possess agency to bring those forces or things into being. Abstractions such as the law of gravity have never created a concrete reality in the history of the universe. As Lennox put it in a YouTube debate: "The laws of arithmetic tell me that 2 + 2 = 4, but that has never put £4 in my pocket." Hawking and Mlodinow also beg the question of who designed gravity so exquisitely precise that it led to our magnificent, improbable, habitable universe, but perhaps the law of gravity designed itself.

Hawking and Mlodinow argue that while our universe is exquisitely fine-tuned for our existence, it is simply blind luck, and we are the lucky winner in the ultimate Powerball lottery. They say this because they believe that our universe is one of multiple trillions of other universes in which every possible combination of physical laws exists, and we happen to live in the one that has the just-right laws. They base the multiverse hypothesis on a mathematical theory known as M-theory and inform us that: "People are still trying to decipher the nature of M-theory, but that may not be possible" (2010, p. 117). Despite saying that deciphering the nature of M-theory "may not be possible," they continue to write as though it is not only possible but has been done and dusted. They posit that the multiverse is governed by the "laws" of M-theory and exists in internal curled spaces: "The laws of M-theory therefore allow for different universes with different apparent laws, depending on how internal space is curled. M-theory has solutions that allow for many different internal spaces, perhaps as many as 10^{500}, which means that it allows for 10^{500} different universes, each with its own laws" (p. 118).

When asked where the law of gravity came from, Hawking and Mlodinow answered: "M-theory" (p. 39). So, gravity was created by math equations coming to life. M-theory has not provided one scrap of empirical evidence; it is a gun that has never been fired, so we cannot gauge its accuracy, nor can we do so, even in principle. Yet, testing theories in science always rests on the firm ground of experimental data, adjusting the theory as the data warrants. It is a bedrock principle of science that theories must be testable; if they are not, they cannot be open to falsification, and if they are not open to falsification, they are not scientific. But M-theorists want to decouple mathematics from empirical validation and quarantine the problem of empirical verification behind a wall of equations. They claim that the validity of their models depends on the beauty of their equations, and if a theory is sufficiently elegant it need not be tested. M-theorists have created such a fetish out of mathematical beauty that their operative equation is evidently "beauty = truth." Although mathematics describes reality, it is not reality any more than an architect's plans for a building are the building. Many physicists dismiss the whole multiverse-M-theory menagerie as threatening the scientific status of physics. Noting that for all its mathematical elegance, M-theory generates only untestable hypotheses and ignores empirical science, Ellis and Silk write that because M-theory is metaphysical: "theoretical physics risks becoming a no-man's-land between mathematics, physics, and philosophy that does not truly meet the requirements of any" (2014, p. 321).

In his final paper coauthored with Thomas Hertog before he passed away in 2018, Hawking took a giant step back from his 10^{500} possible universes. In an interview with *The Guardian*, Hertog notes that in the earlier theory there were all sorts of universes exhibiting all sorts of strange characteristics, but it did not address the mystery of our existence in this fine-tuned universe. He continues: "This paper takes one step towards explaining that mysterious fine tuning. It reduces the multiverse down to a more manageable set of universes which all look alike. Stephen would say that, theoretically, it's almost like the universe had to be like this" (in Sample, 2018, np). Of course, anything that has so many characteristics of design "had to be like this." It is as though Hawking was almost at the cusp of recognizing that fine-tuning requires a fine tuner.

My problem with Krauss and Hawking/Mlodinow is that they seem to believe that the laws of physics can exist in the absence of anything physical. The laws of physics are contingent things; they only exist because scientists have formulated them from their observations of the universe that already exists for the laws to describe. Yet, the laws of quantum mechanics and gravity are somehow expected to exist in the absence of anything physical, and to have created themselves. The laws of science exist contingently on the existence of the phenomena to which they refer; they are not causal agents that exist necessarily. There is only one entity that exists necessarily, so…...

On to God

If the mind-bending improbabilities of the universe's fine-tuning present physicists with a conundrum. If they will not allow a Divine Foot in the door, they appeal to a multiverse, thus using one metaphysical concept to get rid of another. Alan Lightman is among those claiming that the multiverse eliminates any need for God. He writes: "Not only *must* we accept that the basic properties of our universe are accidental and incalculable. …we *must* believe in the existence of many other universes. But we have no conceivable way of observing these other universes and cannot prove their existence. Thus, to explain what we see in the world and in our mental deductions, we *must* believe in what we cannot prove" (2011, p. 40; my emphasis). Sounding like the pope of materialism speaking *ex-cathedra*, Lightman concedes that the multiverse hypothesis cannot be tested, but also that all devout materialists *must* take its existence on faith. Tim Radford captures the God-like nature with which M-theory has been endowed, noting that it is different from other theories of science. It is: "a begetter, a creative force that is everywhere and nowhere. This force cannot be identified by instruments or examined by comprehensible mathematical prediction, and yet it contains all possibilities. It incorporates omnipresence, omniscience, and omnipotence, and it's a big mystery. Remind you of Anybody?" (2010, np).

Krauss asks "what, if anything, fixed the rules that governed such creation" (2012, p. 174), and mused that it might be unanswerable. There is an answer, but the likes of Krauss, Hawking, and Lightman are not open to it. The answer for Leibniz and countless other scientists and philosophers is God. Leibniz (1697/1973) reasoned that sufficient reason must exist outside the series of contingencies in the universe and that must be found in a necessary being whom we call God. He reasoned that everything that exists must have a sufficient reason for existing, and the fact that there is something rather than nothing cannot be explained by the series of contingent things, for contingency must end somewhere, or else there would be an infinite regress of contingencies. Infinity may have a place in mathematics, but in the physical world it is an impossibility. Thus, the explanation for physical existence must lie outside the series of contingent things in a being who exists necessarily.

If we want to stop Leibniz's regress with the universe as a self-creating brute fact, we will have to assert that while it is true that everything manifested in the universe has a cause, the universe itself requires no explanation because it is the uncaused cause of itself. The universe pulled itself up by its own bootstraps so astoundingly well that it produced sentient beings capable of probing its secrets. Adherents of this model thus have neither a natural nor a supernatural explanation for creation—nothing created something from nothing for no reason! Which is the most logical inference to the best explanation: God or nothing? An "omnipotent" universe takes us back to the time in which the universe was considered an eternal brute fact, and we need not bother pondering further. Rather than claiming a self-creating omnipotent universe, Nobel laureate physicist Sir Edmund Whittaker applies Occam's razor: "It is simpler to postulate creation *ex nihilo*—Divine Will constituting Nature from nothingness" (in Heeren, 2000, p. 121). Robert Jastrow's account of how science caught up with theology on the matter of something rather than nothing is interesting and poetic: "For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountain of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries" (1992, p. 107).

If you object to mixing religion with science, contemplate the words of William Bragg, a Nobel laureate physicist: "From religion comes a man's purpose; from science, his power to achieve it. Sometimes people ask if religion and science are not opposed to one another. They are: in the sense that the thumb and fingers of my hand are opposed to one another. It is an opposition by means of which anything can be grasped" (in Gonzalo, 2008, p 121). Another Nobel laureate physicist, Max Plank, wrote: "Both Religion and science require a belief in God. For believers, God is in the beginning, and for physicists He is at the end of all considerations… To the former He is the foundation, to the latter, the crown of the edifice of every generalized world view" (1949, p. 184). Think of it this way: every compound thing in the universe is composed of two or more elements. Elements are atoms; atoms are composed of neutrons, protons, and electrons, and so on until at the lowest level, the solidity of matter fades away into the vibrations of little strings of energy. What is behind those energy vibrations at the rock bottom of natural reality? Many great physicists, Nobel laureates included, think of the universe as a great thought, but that is nothing new. Almost 2,000 years ago it was written in John1.1: "In the beginning was the Word, and the Word was with God, and the Word was God."