The Grand Design - Truth Or Fiction?

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SUMMARY

When it came to the creation of the Universe, God just wasn't necessary. This is the conclusion renowned English physicist and cosmologist Stephen Hawking has made in his latest book with Leonard Mlodinow, The Grand Design. "It is not necessary to invoke God to light the blue touch paper and set the Universe going," Hawking writes. According to Hawking, the big bang was a natural event that would have happened without the help or involvement of God. Thus, Hawking and Mlodinow's new book has made a big bang among laypeople. But what about these authors' conclusions? How accurate are they? William Lane Craig, noted Christian philosopher and theologian, responds to Hawking and Mlodinow's new book.

THE GRAND DESIGN - TRUTH OR FICTION?

The Grand Design **and Philosophy**

Stephen Hawking and Leonard Mlodinow open their book *The Grand Design* with a series of profound questions: What is the nature of reality? Where did all this come from? Did the universe need a Creator? Then they say, "Traditionally these are questions for philosophy, but philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge." [1]

The professional philosopher can only roll his eyes at the effrontery and condescension of such a statement. Two scientists, who have to all appearances little acquaintance with philosophy, are prepared to pronounce an entire discipline dead and to insult their own faculty colleagues in philosophy at Cal Tech and Cambridge University — many of whom, such as Michael Redhead and D.H. Mellor, are eminent philosophers of science — for supposedly failing to keep up.

The professional philosopher will regard their verdict as not merely amazingly condescending but also as outrageously naïve. The man who claims to have no need of philosophy is the one most apt to be fooled by it. One might therefore anticipate that Mlodinow and Hawking's subsequent exposition of their favored theories will be underpinned by a host of unexamined philosophical presuppositions. That expectation is, in fact, borne out. They assert their claims about laws of nature, the possibility of miracles, scientific determinism, and the illusion of free will with only the thinnest of justification. Clearly Mlodinow and Hawking are up to their necks in philosophical questions.

What one might not expect is that, after pronouncing the death of philosophy, Hawking and Mlodinow should themselves plunge immediately into a philosophical discussion of scientific realism vs. antirealism. The first third of their book is not about current scientific theories at all but is a disquisition on the history and philosophy of science. I found this section to be the most interesting and mind-boggling of the whole book. Let me explain.

Having set aside a Monday afternoon to read Hawking and Mlodinow's book, I had spent that morning working through a scholarly article from Blackwell's *Contemporary Debates in Metaphysics* on a philosophical viewpoint known as ontological pluralism. Ontological pluralism is a view in a subdiscipline of philosophy whose name sounds like stuttering: meta-metaphysics, or, as it is sometimes called, meta-ontology. This is philosophy at its most ethereal. Ontology is the study of being, or of what exists — the nature of reality. Meta-ontology is one notch higher: It inquires whether ontological disputes are meaningful and how best to resolve them.

Ontological pluralism holds that there really is no right answer to many ontological questions, such as: Do composite objects exist? According to the ontological pluralist, there are just different ways of describing reality, and none of these is more correct or accurate than another. There literally is no fact of the matter at all in answer to these questions. So if you were to ask, "Is there such a thing as the Moon?" the ontological pluralist would say that the question has no objective answer. It is not true that the Moon exists, and it is not true that the Moon does not exist. There just is no fact of the matter about whether there is such a thing as the Moon. Ontological pluralism is thus a radical view that is defended by a handful of philosophers.

Imagine my astonishment, therefore, to find Hawking and Mlodinow espousing ontological pluralism (without being aware of the name) as their philosophy of science. They call their view "model-dependent realism." They explain that models are just different ways of interpreting our sense perceptions. In their view there is no objective reality to which our models of the world more or less accurately correspond (page 7).

Mlodinow and Hawking are thus extreme antirealists. For example, contrasting young earth creationism and the big bang theory, Hawking and Mlodinow claim that while the big bang theory is "more useful," nevertheless, "neither model can be said to be more real than the other" (page 51).

One cannot help but wonder what sort of argument would justify adopting so radical a view. All that Mlodinow and Hawking have to offer is the fact if we were, say, inhabitants of a virtual reality controlled by alien beings, then there would be no way for us to tell that we were in the simulated

world and so would have no reason to doubt its reality (page 42). The trouble with this sort of argument is that it does not exclude the possibility that we have in this case two competing models of the world — one the aliens' and one ours, and one of the models is true and one false, even if we cannot tell which is which.

Moreover, the fact our observations are model-dependent does not imply that we cannot have knowledge of the way the world is (much less that there is no way the world is). For example, a layman entering a scientific laboratory might see a piece of machinery on the lab table, but he would not see it as an interferometer, since he lacks the theoretical knowledge to recognize it as such. A caveman entering the laboratory would not even see there is a piece of machinery on the table, since he lacks the concept of a machine. But that does nothing to undermine the objective truth of the lab technician's observation that there is an interferometer on the table.

Mlodinow and Hawking, not content with ontological pluralism, really go off the deep end when they assert, "There is no model-independent test of reality. It follows that a well-constructed model creates a reality of its own" (page 172). This is an assertion of ontological relativity, the view that reality itself is different for persons having different models.

If you are Fred Hoyle, the universe really has existed eternally in a steady state; but if you are Stephen Hawking, the universe really began with a big bang. If you are the ancient physician Galen, blood really does not circulate through the human body; but if you are William Harvey, who discovered circulation, it does. Such a view seems crazy and is made only more so by Mlodinow and Hawking's claim that the model itself is responsible for creating its respective reality. It hardly needs to be said that no such conclusion follows from there being no model-independent test of the way the world is.

All this is, however, beside the main point. The main point is that despite their claim to speak as scientific torchbearers of knowledge, what Hawking and Mlodinow are engaged in is philosophy. The most important conclusions drawn in their book are philosophical, not scientific. Why, then, do they pronounce philosophy dead and claim as scientists to be bearing the torch of discovery? Simply because that enables them to cloak their amateurish philosophizing with the mantle of scientific authority and so avoid the hard work of actually arguing for, rather than merely asserting, their philosophical viewpoints.

Why Does the Universe Exist?

In their book, Hawking and Mlodinow seek to answer three questions that they set themselves in

chapter 1:

1. Why is there something rather than nothing?

2. Why do we exist?

3. Why this particular set of laws and not some other?

Curiously, their answers to each of these questions turn out to be very brief. In fact, (2) gets folded into (1) and so does not even receive a separate answer.

Hawking and Mlodinow's answer to questions (1) and (2) is an appeal to the "no boundary" model of the origin of the universe, popularized by Hawking in his book, A Brief History of Time. Our authors simply expound the model without adducing any evidence for it or mentioning any of the alternative models to it. Nor do they respond to the criticism that the so-called "imaginary time" featured in the model is physically unintelligible and therefore merely a mathematical "trick" useful for avoiding the cosmological singularity which appears in classical theories of the beginning of the universe.

Still, their exposition is not without interest with regard to the beginning of the universe. For example, they write: "The realization that time can behave like another direction of space means one can get rid of the problem of time having a beginning, in a similar way in which we got rid of the edge of the world. Suppose the beginning of the universe was like the South Pole of the earth, with degrees of latitude playing the role of time. As one moves north, the circles of constant latitude, representing the size of the universe, would expand. The universe would start as a point at the South Pole, but the South Pole is much like any other point. To ask what happened before the beginning of the universe would become a meaningless question, because there is nothing south of the South Pole. In this picture space-time has no boundary — the same laws of nature hold at the South Pole as in other places" (page 134-5).

This passage is fascinating because if we take the analogy seriously, it posits a beginning point to both time and the universe. Despite the fact that imaginary time *behaves* like another spatial dimension, Hawking allows the circles of latitude to play the role of time, which has a beginning point at the South Pole. When Hawking speaks of "the problem of time having a beginning," what he means is "the age-old objection to the universe having a beginning" (page 135) an objection which his model removes. That age-old objection is the question, "What happened before the beginning of the universe?" Hawking is right that this question is meaningless on his model. But

what he fails to mention is that the question is equally meaningless on the standard big bang model, since there is nothing prior to the initial cosmological singularity. Or either model the universe has an absolute temporal beginning.

So the question is, Why did the universe begin to exist? Why is there something rather than nothing? Hawking and Mlodinow advocate what they call a “top-down” approach to this question. The idea here is to begin with our presently observed universe characterized by the standard model of particle physics and then calculate, given the no boundary condition, the probability of the various histories allowed by quantum physics to reach our present state. The most probable history represents the history of our observable universe. Hawking and Mlodinow claim that, “In this view, the universe appeared spontaneously from nothing” (page 136). By “spontaneously” they seem to mean, without a cause.

But how does that follow from the model? The top-down approach calculates the probability of our observable universe *given the no boundary condition*. The top-down approach does not calculate the probability that the no boundary condition should exist but takes it for granted. Such a condition is not metaphysically or physically necessary. If the universe came into being uncaused from nothing, it could have had any sort of conceivable spatiotemporal configuration. For nothingness, or nonbeing, has no properties or constraints and is governed by no physical laws. Physics only begins at the “South Pole” in the no boundary model. There is not anything in the model that implies that that point came to be without a cause. Indeed, the idea that being could arise without a cause from nonbeing seems metaphysically absurd.

Hawking and Mlodinow seem to realize they have not yet answered the question, “Why is there something rather than nothing?” They return to this question in their concluding chapter and give a quite different answer. There they explain there is a constant vacuum energy contained in empty space, and if the universe’s positive energy associated with matter is evenly balanced by the negative energy associated with gravitation, then the universe can spontaneously come into being as a fluctuation of the energy in the vacuum (which, by a clever sleight of hand, they say “we may as well call … zero”).

This seems to be a very different account of the universe’s origin, for it presupposes the reality of space and the energy in it. So it is puzzling when Mlodinow and Hawking conclude, “Because there is a law like gravity, the universe can and will create itself from nothing in the manner described in Chapter 6” (page 180). Here it is said that the nothingness spoken of in Chapter 6 is

not really nothingness after all but is space filled with vacuum energy. This goes to reinforce the conviction that the no boundary approach only describes the evolution of our universe from its origin at its “South Pole” to its present state but is silent as to why the universe came to exist in the first place.

What this implies is that Hawking and Mlodinow have not even begun to address the philosophical question, “Why is there something rather than nothing?” For “nothing” in their vocabulary does not have the traditional meaning “nonbeing” but rather means “the quantum vacuum.” They are not even answering the same question. Like the philosophy student who, to the question, “What is Time?” on his final exam, answered, “a weekly news magazine,” so Hawking and Mlodinow have avoided the tough question by equivocation.

Why Is the Universe Fine-tuned for Life?

If they have failed to answer questions (1) and (2), what about (3): Why is there this particular set of laws rather than some other? The issue here is explaining the apparently miraculous fine-tuning of the universe for intelligent life. Hawking and Mlodinow express this idea by observing that “in recent years physicists began asking themselves what the universe would have been like if the laws of nature were different” (page 159). Unfortunately, this statement is very misleading. Scientists grappling with fine-tuning are not asking what the universe would have been like if it were governed by different laws of nature. Rather they are asking what the universe would have been like if it were governed by the same laws of nature but with different values for the physical constants appearing in them and with different quantities for the initial conditions on which the laws operate.

Nobody knows what a universe governed by different laws would be like. But because we are talking about universes governed by the same laws, but with different numbers plugged in for the constants and quantities, we can calculate what kind of universe the laws would predict (just as Hawking and Mlodinow illustrate on page 159-62). So question (3) is malformed as stated. The real question is: Why this particular set of constants and quantities rather than some other?

Now there are three possible answers to that question: physical necessity, chance, or design. Hawking and Mlodinow reject the hypothesis of physical necessity: “It appears that the fundamental numbers, and even the form, of the apparent laws of nature are not demanded by logic or physical principle” (page 143). Since Mlodinow and Hawking want nothing to do with a Cosmic Designer, they opt for the hypothesis of chance. Since the odds of our universe’s being

fine-tuned for intelligent life are so incomprehensibly remote, Hawking and Mlodinow appeal to the Many Worlds Hypothesis to augment one's probabilistic resources to the extent that it becomes inevitable that a finely-tuned universe will appear by chance somewhere in the World Ensemble or multiverse. If there are an infinite number of randomly ordered universes in the Ensemble, then a finely-tuned universe will appear somewhere in the Ensemble by chance alone.

If the Many Worlds Hypothesis is to be serious science rather than metaphysical speculation, some sort of mechanism needs to be provided to generate the World Ensemble. The mechanism to which Hawking and Mlodinow appeal is Richard Feynman's "sum-over-histories" approach to quantum theory. This is the approach Hawking uses in the no boundary model to calculate the most probable history of the universe, given the no boundary condition, to our present observed state. Hawking and Mlodinow take these alternative histories that the universe might have pursued to be actual, parallel universes that are just as real as our universe.

Unfortunately, this is not science but a gratuitous piece of metaphysics. Feynman's sum-over-histories method is just a mathematical tool for calculating the probability of a subatomic particle's arriving at one point from another. One imagines all the possible paths the particle could have taken and then on that basis calculates the probability of its reaching the observed destination. There's no basis for interpreting this mathematical "trick" to imply the ontological reality of concrete, spatio-temporal universes.

Hawking and Mlodinow also appeal to M-Theory or superstring theory to generate the World Ensemble of universes exhibiting various values for the constants of nature. Such a speculation is problematic in a number of ways that they do not discuss. First, the "cosmic landscape" of 10500 different possible universes consistent with nature's laws that M-Theory allows are just that: possibilities. They are not real worlds, anymore than are Feynman's histories.

Second, it's not clear that 10500 possibilities are sufficient to guarantee the existence of finely-tuned universes in the landscape. What if the probability of fine-tuning is less than 1:10500? This may be especially problematic concerning the arbitrary initial conditions.

Finally, does the multiverse itself described by M-Theory exhibit fine-tuning? If it does, then the problem has only been pushed back a notch. It seems that it does, for as Hawking and Mlodinow explain, M-Theory requires precisely eleven dimensions if it is to be viable. Yet the theory cannot account for why just that number of dimensions should exist.

Moreover, Mlodinow and Hawking do not even mention, much less respond to, Roger Penrose's

trenchant criticism of the Many Worlds Hypothesis for explaining fine-tuning in his The Road to Reality. Namely, he argues that if we were just a random member of a World Ensemble, then it is incomprehensibly more probable that we should be observing a much different universe than what we do, which strongly disconfirms the Many Worlds Hypothesis. There is no excuse for Hawking's failure to respond to his erstwhile collaborator's criticisms of Hawking's view.

Conclusion

In summary, despite Hawking and Mlodinow's vaunted assertions and constant sniping at religious belief throughout this book, there is actually genuine profit in it for religious believers, especially for those interested in natural theology. For the authors affirm and argue for the facts of an absolute beginning of time and the universe and of the apparently miraculous fine-tuning of the universe for intelligent life. Given the desperation and/or irrelevancy of their proffered answers to the questions that motivated their inquiry, their book turns out to be quite supportive of the existence of a transcendent Creator and Designer of the cosmos.

Footnotes:

[1] Stephen Hawking and Leonard Mlodinow, *The Grand Design* (New York: Bantam Books, 2010), 5.