THE FINE-TUNING DESIGN ARGUMENT

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From *Reason for the Hope Within* (1999)

I. INTRODUCTION[(1)]

The Evidence of Fine-tuning

Suppose we went on a mission to Mars, and found a domed structure in which everything was set up just right for life to exist. The temperature, for example, was set around 70^{o} F and the humidity was at 50%; moreover, there was an oxygen recycling system, an energy gathering system, and a whole system for the production of food. Put simply, the domed structure appeared to be a fully functioning biosphere. What conclusion would we draw from finding this structure? Would we draw the conclusion that it just happened to form by chance? Certainly not. Instead, we would unanimously conclude that it was designed by some intelligent being. Why would we draw this conclusion? Because an intelligent designer appears to be the only plausible explanation for the existence of the structure. That is, the only alternative explanation we can think of—that the structure was formed by some natural process—seems extremely unlikely. Of course, it is *possible* that, for example, through some volcanic eruption various metals and other compounds could have formed, and then separated out in just the right way to produce the "biosphere," but such a scenario strikes us as extraordinarily unlikely, thus making this alternative explanation unbelievable.

The universe is analogous to such a "biosphere," according to recent findings in physics. Almost everything about the basic structure of the universe—for example, the fundamental laws and parameters of physics and the initial distribution of matter and energy—is balanced on a razor's edge for life to occur. As the eminent Princeton physicist Freeman Dyson notes, "There are many . . . lucky accidents in physics. Without such accidents, water could not exist as liquid, chains of carbon atoms could not form complex organic molecules, and hydrogen atoms could not form breakable bridges between molecules" (p. 251)—in short, life as we know it would be impossible.

Scientists call this extraordinary balancing of the parameters of physics and the initial conditions of the universe the "fine-tuning of the cosmos." It has been extensively discussed by philosophers, theologians, and scientists, especially since the early 1970s, with hundreds of articles and dozens of books written on the topic. Today, it is widely regarded as offering by far the most persuasive current argument for the existence of God. For example, theoretical physicist and popular science writer Paul Davies—whose early writings were not particularly sympathetic to theism—claims that with regard to basic structure of the universe, "the impression of design is overwhelming" (Davies, 1988, p. 203). Similarly, in response to the life-permitting fine-tuning

of the nuclear resonances responsible for the oxygen and carbon synthesis in stars, the famous astrophysicist Sir Fred Hoyle declares that I do not believe that any scientists who examined the evidence would fail to draw the inference that the laws of nuclear physics have been deliberately designed with regard to the consequences they produce inside stars. If this is so, then my apparently random quirks have become part of a deep-laid scheme. If not then we are back again at a monstrous sequence of accidents. (Fred Hoyle, in *Religion and the Scientists*, 1959; quoted in Barrow and Tipler, p. 22)

A few examples from the literature of this fine-tuning are listed below:

1. If the initial explosion of the big bang had differed in strength by as little as 1 part in 10^{60}, the universe would have either quickly collapsed back on itself, or expanded too rapidly for stars to form. In either case, life would be impossible. [See Davies, 1982, pp. 90-91. (As John Jefferson Davis points out (p. 140), an accuracy of one part in 10^{60} can be compared to firing a bullet at a one-inch target on the other side of the observable universe, twenty billion light years away, and hitting the target.)]

2. Calculations indicate that if the strong nuclear force, the force that binds protons and neutrons together in an atom, had been stronger or weaker by as little as 5%, life would be impossible. (Leslie, 1989, pp. 4, 35; Barrow and Tipler, p. 322.)

3. Calculations by Brandon Carter show that if gravity had been stronger or weaker by 1 part in 10^{40}, then life-sustaining stars like the sun could not exist. This would most likely make life impossible. (Davies, 1984, p. 242.)

4. If the neutron were not about 1.001 times the mass of the proton, all protons would have decayed into neutrons or all neutrons would have decayed into protons, and thus life would not be possible. (Leslie, 1989, pp. 39-40)

5. If the electromagnetic force were slightly stronger or weaker, life would be impossible, for a variety of different reasons. (Leslie, 1988, p. 299.)

Imaginatively, one could think of each instance of fine-tuning as a radio dial: unless all the dials are set exactly right, life would be impossible. Or, one could think of the initial conditions of the universe and the fundamental parameters of physics as a dart board that fills the whole galaxy, and the conditions necessary for life to exist as a small one-foot wide target: unless the dart hits the target, life would be impossible. The fact that the dials are perfectly set, or the dart has hit the target, strongly suggests that someone set the dials or aimed the dart, for it seems enormously improbable that such a coincidence could have happened by chance.

Although individual calculations of fine-tuning are only approximate and could be in error, the fact that the universe is fine-tuned for life is almost beyond question because of the large number of independent instances of apparent fine-tuning. As philosopher John Leslie has pointed out, "clues heaped upon clues can constitute weighty evidence despite doubts about each element in the pile" (1988, p. 300). What is controversial, however, is the degree to which the fine-tuning provides evidence for the existence of God. As impressive as the argument from fine-tuning seems to be, atheists have raised several significant objections to it. Consequently, those who are aware of these objections, or have thought of them on their own, often will find the argument unconvincing. This is not only true of atheists, but also many theists. I have known, for instance, both a committed Christian Hollywood film-maker and a committed Christian biochemist who remained unconvinced because of certain atheist objections to the argument. This is unfortunate, particularly since the fine-tuning argument is probably the most powerful current argument for the existence of God. My goal in this chapter, therefore, is to make the fine-tuning argument as strong as possible. This will involve developing the argument in as objective and rigorous way as we can, and then answering the major atheist objections to it. Before launching into this, however, we will need to make a preliminary distinction.

A Preliminary Distinction

To rigorously develop the fine-tuning argument, we will find it useful to distinguish between what I shall call the *atheistic single-universe hypothesis* and the *atheistic many-universes hypothesis*. According to the atheistic single-universe hypothesis, there is only one universe, and it is ultimately an inexplicable, "brute" fact that the universe exists and is fine-tuned. Many atheists, however, advocate another hypothesis, one which attempts to explain how the seemingly improbable fine-tuning of the universe could be the result of chance. This hypothesis is known as the *atheistic many-worlds hypothesis*, or *the atheistic many-universes hypothesis*. According to this hypothesis, there exists what could be imaginatively thought of as a "universe generator" that produces a very large or infinite number of universes, with each universe having a randomly selected set of initial conditions and values for the parameters of physics. Because this generator produces so many-universes, just by chance it will eventually produce one that is fine-tuned for intelligent life to occur. …

II. CORE ARGUMENT RIGOROUSLY FORMULATED

General Principle of Reasoning Used

The Principle Explained

We will formulate the fine-tuning argument against the atheistic single-universe hypothesis is in terms of what I will call the *prime principle of confirmation*. The prime principle of confirmation is a general principle of reasoning which tells us when some observation counts as evidence in favor of one hypothesis over another. *Simply put, the principle says that whenever we are considering two competing hypotheses, an observation counts as evidence in favor of the hypothesis under which the observation has the highest probability (or is the least improbable)*. (Or, put slightly differently, the principle says that whenever we are considering two competing hypotheses, H_1 and H_2, an observation, O, counts as evidence in favor of H_1 over H_2 if O is more probable under H_1 than it is under H_2.) Moreover, the degree to which the evidence counts in favor of one hypothesis over another is proportional to the degree to which the observation is more probable under the one hypothesis than the other.[(2)] For example, the fine-tuning is much, much more probable under the theism than under the atheistic single-universe hypothesis, so it counts as strong evidence for theism over this atheistic hypothesis. In the next major subsection, we will present a more formal and elaborated rendition of the fine-tuning argument in terms of the prime principle. First, however, let's look at a couple of illustrations of the principle and then present some support for it.

Additional Illustrations of the Principle

For our first illustration, suppose that I went hiking in the mountains, and found underneath a certain cliff a group of rocks arranged in a formation that clearly formed the pattern "Welcome to the mountains Robin Collins." One hypothesis is that, by chance, the rocks just happened to be arranged in that pattern—ultimately, perhaps, because of certain initial conditions of the universe. Suppose the only viable alternative hypothesis is that my brother, who was in the mountains before me, arranged the rocks in this way. Most of us would immediately take the arrangements of rocks to be strong evidence in favor of the "brother" hypothesis over the "chance" hypothesis. Why? Because it strikes us as extremely *improbable* that the rocks would be arranged that way by chance, but *not improbable* at all that my brother would place them in that configuration. Thus, by the prime principle of confirmation we would conclude that the arrangement of rocks strongly supports the "brother" hypothesis over the chance hypothesis.

Or consider another case, that of finding the defendant's fingerprints on the murder weapon. Normally, we would take such a finding as strong evidence

that the defendant was guilty. Why? Because we judge that it would be *unlikely* for these fingerprints to be on the murder weapon if the defendant was innocent, but *not unlikely* if the defendant was guilty. That is, we would go through the same sort of reasoning as in the above case.

Support for the Principle

Several things can be said in favor of the prime principle of confirmation. First, many philosophers think that this principle can be derived from what is known as the *probability calculus*, the set of mathematical rules that are typically assumed to govern probability. Second, there does not appear to be any case of recognizably good reasoning that violates this principle. Finally, the principle appears to have a wide range of applicability, undergirding much of our reasoning in science and everyday life, as the examples above illustrate. Indeed, some have even claimed that a slightly more general version of this principle undergirds all scientific reasoning. Because of all these reasons in favor of the principle, we can be very confident in it.

Further Development of Argument

To further develop the core version of the fine-tuning argument, we will summarize the argument by explicitly listing its two premises and its conclusion:

> *Premise 1*. The existence of the fine-tuning is not improbable under theism.
> Premise 2. The existence of the fine-tuning is very improbable under the atheistic single-universe hypothesis.
>
> *Conclusion*: From premises (1) and (2) and the prime principle of confirmation, it follows that the fine-tuning data provides strong evidence to favor of the design hypothesis over the atheistic single-universe hypothesis.

At this point, we should pause to note two features of this argument. First, the argument does not say that the fine-tuning evidence proves that the universe was designed, or even that it is likely that the universe was designed. In order to justify these sorts of claims, we would have to look at the full range of evidence both for and against the design hypothesis, something we are not doing in this chapter. Rather, the argument merely concludes that the fine-tuning strongly *supports* theism *over* the atheistic single-universe hypothesis.

In this way, the evidence of fine-tuning argument is much like fingerprints found on the gun: although they can provide strong evidence that the defendant committed the murder, one could not conclude merely from them alone that the defendant is guilty; one would also have to look at all the other evidence offered. Perhaps, for instance, ten reliable witnesses claimed to see the defendant at a party at the time of the shooting. In this case, the

fingerprints would still count as significant evidence of guilt, but this evidence would be counterbalanced by the testimony of the witnesses. Similarly the evidence of fine-tuning strongly supports theism over the atheistic single-universe hypothesis, though it does not itself show that everything considered theism is the most plausible explanation of the world. Nonetheless, as I argue in the conclusion of this chapter, the evidence of fine-tuning provides a much stronger and more objective argument for theism (over the atheistic single-universe hypothesis) than the strongest atheistic argument does against theism.

The second feature of the argument we should note is that, given the truth of *the prime principle of confirmation*, the conclusion of the argument follows from the premises. Specifically, if the premises of the argument are true, then we are guaranteed that the conclusion is true: that is, the argument is what philosophers call *valid*. Thus, insofar as we can show that the premises of the argument are true, we will have shown that the conclusion is true. Our next task, therefore, is to attempt to show that the premises are true, or at least that we have strong reasons to believe them.

Support for the Premises

Support for Premise (1).
Premise (1) is easy to support and fairly uncontroversial. The argument in support of it can be simply stated as follows: *since God is an all good being, and it is good for intelligent, conscious beings to exist, it not surprising or improbable that God would create a world that could support intelligent life.* Thus, the fine-tuning is not improbable under theism, as premise (1) asserts.

Support for Premise (2).
Upon looking at the data, many people find it very obvious that the fine-tuning is highly improbable under the atheistic single-universe hypothesis. And it is easy to see why when we think of the fine-tuning in terms of the analogies offered earlier. In the dart-board analogy, for example, the initial conditions of the universe and the fundamental parameters of physics are thought of as a dart-board that fills the whole galaxy, and the conditions necessary for life to exist as a small one-foot wide target. Accordingly, from this analogy it seems obvious that it would be highly improbable for the fine-tuning to occur under the atheistic single-universe hypothesis—that is, for the dart to hit the board by chance. …

III. SOME OBJECTIONS TO CORE VERSION

As powerful as the core version of the fine-tuning argument is, several major objections have been raised to it by both atheists and theists. In this section, we will consider these objections in turn.

Objection 1: More Fundamental Law Objection

One criticism of the fine-tuning argument is that, as far as we know, there could be a more fundamental law under which the parameters of physics *must* have the values they do. Thus, given such a law, it is not improbable that the known parameters of physics fall within the life-permitting range.

Besides being entirely speculative, the problem with postulating such a law is that it simply moves the improbability of the fine-tuning up one level, to that of the postulated physical law itself. Under this hypothesis, what is improbable is that all the conceivable fundamental physical laws there could be, the universe just happens to have the one that constrains the parameters of physics in a life-permitting way. Thus, trying to explain the fine-tuning by postulating this sort of fundamental law is like trying to explain why the pattern of rocks below a cliff spell "Welcome to the mountains Robin Collins" by postulating that an earthquake occurred and that all the rocks on the cliff face were arranged in just the right configuration to fall into the pattern in question. Clearly this explanation merely transfers the improbability up one level, since now it seems enormously improbable that of all the possible configurations the rocks could be in on the cliff face, they are in the one which results in the pattern "Welcome to the mountains Robin Collins."

A similar sort of response can be given to the claim that the fine-tuning is not improbable because it might be *logically necessary* for the parameters of physics to have life-permitting values. That is, according to this claim, the parameters of physics must have life-permitting values in the same way 2 + 2 must equal 4, or the interior angles of a triangle must add up to 180 degrees in Euclidian geometry. Like the "more fundamental law" proposal above, however, this postulate simply transfers the improbability up one level: of all the laws and parameters of physics that conceivably could have been logically necessary, it seems highly improbable that it would be those that are life-permitting.[(3)]

Objection 2: Other Forms of Life Objection

Another objection people commonly raise to the fine-tuning argument is that as far as we know, other forms of life could exist even if the parameters of physics were different. So, it is claimed, the fine-tuning argument ends up presupposing that all forms of intelligent life must be like us. The answer to this objection is that most cases of fine-tuning do not make this

presupposition. Consider, for instance, the case of the fine-tuning of the strong nuclear force. If it were slightly larger or smaller, no atoms could exist other than hydrogen. Contrary to what one might see on *Star Trek*, an intelligent life form cannot be composed merely of hydrogen gas: there is simply not enough stable complexity. So, in general the fine-tuning argument merely presupposes that intelligent life requires some degree of stable, reproducible organized complexity. This is certainly a very reasonable assumption.

Objection 3. **Anthropic Principle Objection**:

According to the weak version of so-called *anthropic principle*, if the laws of nature were not fine-tuned, we would not be here to comment on the fact. Some have argued, therefore, that the fine-tuning is not really *improbable or surprising* at all under atheism, but simply follows from the fact that we exist. The response to this objection is to simply restate the argument in terms of our existence: our existence as embodied, intelligent beings is extremely unlikely under the atheistic single-universe hypothesis (since our existence requires fine-tuning), but not improbable under theism. Then, we simply apply the prime principle of confirmation to draw the conclusion that *our existence* strongly confirms theism over the atheistic single-universe hypothesis.

To further illustrate this response, consider the following "firing-squad" analogy. As John Leslie (1988, p. 304) points out, if fifty sharp shooters all miss me, the response "if they had not missed me I wouldn't be here to consider the fact" is not adequate. Instead, I would naturally conclude that there was some reason why they all missed, such as that they never really intended to kill me. Why would I conclude this? Because my continued existence would be very improbable under the hypothesis that they missed me by chance, but not improbable under the hypothesis that there was some reason why they missed me. Thus, by the prime principle of confirmation, my continued existence strongly confirms the latter hypothesis.

Objection 4: The "Who Designed God?" Objection

Perhaps the most common objection that atheists raise to the argument from design, of which the fine-tuning argument is one instance, is that postulating the existence of God does not solve the problem of design, but merely transfers it up one level. Atheist George Smith, for example, claims that if the universe is wonderfully designed, surely God is even more wonderfully designed. He must, therefore, have had a designer even more wonderful than He is. If *God* did not require a designer, then there is no reason why such a relatively less wonderful thing as the universe needed one. (1980, p. 56.)

Or, as philosopher J. J. C. Smart states the objection:

If we postulate God in addition to the created universe we increase the complexity of our hypothesis. We have all the complexity of the universe itself, and we have in addition the at least equal complexity of God. (The designer of an artifact must be at least as complex as the designed artifact) . . . .*If the theist can show the atheist that postulating God actually reduces the complexity of one's total world view, then the atheist should be a theist*. (pp. 275-276; italics mine)

The first response to the above atheist objection is to point out that the atheist claim that the designer of an artifact must be as complex as the artifact designed is certainly not obvious. But I do believe that their claim has some intuitive plausibility: for example, in the world we experience, organized complexity seems only to be produced by systems that already possess it, such as the human brain/mind, a factory, or an organisms' biological parent.

The second, and better, response is to point out that, at most, the atheist objection only works against a version of the design argument that claims that all organized complexity needs an explanation, and that God is the best explanation of the organized complexity found in the world. The version of the argument I presented against the atheistic single-universe hypothesis, however, only required that the fine-tuning be more probable under theism than under the atheistic single-universe hypothesis. But this requirement is still met even if God exhibits tremendous internal complexity, far exceeding that of the universe. Thus, even if we were to grant the atheist assumption that the designer of an artifact must be as complex as the artifact, the fine-tuning would still give us strong reasons to prefer theism over the atheistic single-universe hypothesis.

To illustrate, consider the example of the "biosphere" on Mars presented at the beginning of this paper. As mentioned above, the existence of the biosphere would be much more probable under the hypothesis that intelligent life once visited Mars than under the chance hypothesis. Thus, by the prime principle of confirmation, the existence of such a "biosphere" would constitute strong evidence that intelligent, extraterrestrial life had once been on Mars, even though this alien life would most likely have to be much more complex than the "biosphere" itself.

The final response theists can give to this objection is to show that a supermind such as God would *not* require a high degree of unexplained organized complexity to create the universe. Although I have presented this response elsewhere (unpublished manuscript), presenting it here is beyond the scope of this chapter.

IV. THE MANY-UNIVERSES HYPOTHESIS

The Many-Universes Hypothesis Explained

In response to theistic explanation of fine-tuning of the cosmos, many atheists have offered an alternative explanation, what I will call the atheistic many-universes hypothesis. (In the literature it is more commonly refereed to in the *Many Worlds hypothesis*, though I believe this name is somewhat misleading.) According to this hypothesis, there are a very large—perhaps infinite—number of universes, with the fundamental parameters of physics varying from universe to universe.[(4)] Of course, in the vast majority of these universes the parameters of physics would not have life-permitting values. Nonetheless, in a small proportion of universes they would, and consequently it is no longer improbable that universes such as ours exist that are fine-tuned for life to occur.

Advocates of this hypothesis offer various types of models for where these universes came from. We will present what are probably the two most popular and plausible, the so-called *vacuum fluctuation* models and the *oscillating Big Bang* models. According to the vacuum fluctuation models, our universe, along with these other universes, were generated by quantum fluctuations in a pre-existing superspace (e.g., see Quentin Smith, 1986, p. 82). Imaginatively, one can think of this pre-existing superspace as a infinitely extending ocean full of soap, and each universe generated out of this superspace as a soap-bubble which spontaneously forms on the ocean.

The other model, the oscillating Big Bang model, is a version of the *Big Bang* theory. According to the Big Bang theory, the universe came into existence in an "explosion" (that is, a "bang") somewhere between 10 and 15 billion years ago. According to the *oscillating* Big Bang theory, our universe will eventually collapse back in on itself (what is called the "Big Crunch") and then from that "Big Crunch" will arise another "Big Bang", forming a new universe, which will in turn itself collapse, and so on. According to those who use this model to attempt explain the fine-tuning, during every cycle, the parameters of physics and the initial conditions of the universe are reset at random. Since this process of collapse, explosion, collapse, and explosion has been going on for all eternity, eventually a fine-tuned universe will occur, indeed infinitely many of them.

In the next section, we will list several reasons for rejecting atheistic many-universes hypothesis.

Reasons for Rejecting the Many-universes Hypothesis

First Reason: The first reason for rejecting the atheistic many-universes hypothesis, and preferring the theistic hypothesis, is the following general rule: *everything else being equal, we should prefer hypotheses for which we have independent evidence or that are natural extrapolations from what we already know.* Let's first illustrate and support this principle, and then apply it to the case of the fine-tuning.

Most of us take the existence of dinosaur bones to count as very strong evidence that dinosaurs existed in the past. But suppose a dinosaur skeptic claimed that she could explain the bones by postulating a "dinosaur-bone-producing-field" that simply materialized the bones out of thin air. Moreover, suppose further that, to avoid objections such as that there are no known physical laws that would allow for such a mechanism, the dinosaur skeptic simply postulated that we have not yet discovered these laws or detected these fields. Surely, none of us would let this skeptical hypothesis deter us from inferring to the existence of dinosaurs. Why? Because although no one has directly observed dinosaurs, we do have experience of other animals leaving behind fossilized remains, and thus the dinosaur explanation is a *natural extrapolation* from our common experience. In contrast, to explain the dinosaur bones, the dinosaur skeptic has invented a set of physical laws, and a set of mechanisms that are *not* a natural extrapolation from anything we know or experience.

In the case of the fine-tuning, we already know that minds often produce fine-tuned devices, such as Swiss watches. Postulating God—a supermind—as the explanation of the fine-tuning, therefore, is a natural extrapolation from of what we already observe minds to do. In contrast, it is difficult to see how the atheistic many-universes hypothesis could be considered a natural extrapolation from what we observe. Moreover, unlike the atheistic many-universes hypothesis, we have some experiential evidence for the existence of God, namely religious experience. Thus, by the above principle, we should prefer the theistic explanation of the fine-tuning over the atheistic many-universes explanation, everything else being equal.

Second Reason: A second reason for rejecting the atheistic many-universe hypothesis is that the "many-universes generator" seems like it would need to be designed. For instance, in all current worked-out proposals for what this "universe generator" could be—such as the oscillating big bang and the vacuum fluctuation models explained above—the "generator" itself is governed by a complex set of physical laws that allow it to produce the universes. It stands to reason, therefore, that if these laws were slightly different the generator probably would not be able to produce any universes that could sustain life. After all, even my bread machine has to be made just right in order to work properly, and it only produces loaves of bread, not

universes! Or consider a device as simple as a mouse trap: it requires that all the parts, such as the spring and hammer, be arranged just right in order to function. It is doubtful, therefore, whether the atheistic many-universe theory can entirely eliminate the problem of design the atheist faces; rather, at least to some extent, it seems simply to move the problem of design up one level.[(5)]

… *Final Reason:* This brings us to the final reason for rejecting the atheistic many-universes hypothesis, which may be the most difficult to grasp: namely, neither the atheistic many-universes hypothesis (nor the atheistic single-universe hypothesis) can at present adequately account for the improbable initial arrangement of matter in the universe required by the second law of thermodynamics. To see this, note that according to the second law of thermodynamics, the entropy of the universe is constantly increasing. The standard way of understanding this entropy increase is to say that the universe is going from a state of order to disorder. We observe this entropy increase all the time around us: things, such as a child's bedroom, that start out highly organized tend to "decay" and become disorganized unless something or someone intervenes to stop it.

Now, for purposes of illustration, we could think of the universe as a scrabble-board that initially starts out in a highly ordered state in which all the letters are arranged to form words, but which keeps getting randomly shaken. Slowly, the board, like the universe, moves from a state of order to disorder. The problem for the atheist is to explain how the universe could have started out in a highly ordered state, since it is extraordinarily improbable for such states to occur by chance.[(6)] If, for example, one were to dump a bunch of letters at random on a scrabble-board, it would be very unlikely for most of them to form into words. At best, we would expect groups of letters to form into words in a few places on the board.

Now our question is, Could the atheistic many-universes hypothesis explain the high degree of initial order of our universe by claiming that given enough universes, eventually one will arise that is ordered and in which intelligent life occurs, and so it is no surprise that we find ourselves in an ordered universe? The problem with this explanation is that it is overwhelmingly more likely for local patches of order to form in one or two places than for the whole universe to be ordered, just as it is overwhelmingly more likely for a few words on the scrabble-board randomly to form words than for all the letters throughout the board randomly to form words. Thus, the overwhelming majority of universes in which intelligent life occurs will be ones in which the intelligent life will be surrounded by a small patch of order necessary for its existence, but in which the rest of the universe is disordered. Consequently, even under the atheistic many-universes hypothesis, it would still be enormously improbable for intelligent beings to find themselves in a universe such as ours which is highly ordered throughout. (See Sklar, chapter 8)

Conclusion

Even though the above criticisms do not definitively refute the atheistic many-universes hypothesis, they do show that it has some severe disadvantages relative to theism. This means that if atheists adopt the atheistic many-universes hypothesis to defend their position, then atheism has become much less plausible than it used to be. Modifying a turn of phrase coined by philosopher Fred Dretske: these are inflationary times, and the cost of atheism has just gone up.

V. OVERALL CONCLUSION

In the above sections we showed we have good, objective reasons for claiming that the fine-tuning provides strong evidence for theism. We first presented an argument for thinking that the fine-tuning provides strong evidence for preferring theism over the atheistic single-universe hypothesis, and then presented a variety of different reasons for rejecting the atheistic many-universes hypothesis as an explanation of the fine-tuning. In order to help one appreciate the strength of the arguments we presented, I would like to end by comparing the strength of the *core* version of the argument from the fine-tuning to what is widely regarded as the strongest atheist argument against theism, the argument from evil. Typically, the atheist argument against God based on evil takes a similar form to the core version of the fine-tuning argument. Essentially, the atheist argues that the existence of the kind of evils we find in the world is very improbable under theism, but not improbable under atheism. Thus, by the prime principle of confirmation, they conclude that the existence of evil provides strong reasons for preferring atheism over theism.

What makes this argument weak in comparison to the core version of the fine-tuning argument is that, unlike in the case of the fine-tuning, the atheist does not have a significant objective basis for claiming that the existence of the kinds of evil we find in the world is highly improbable under theism. In fact, their judgment that it is improbable seems largely to rest on a mistake in reasoning. To see this, note that in order to show that it is improbable, atheists would have to show that it is *unlikely* that the types of evils we find in the world are necessary for any morally good, greater purpose, since if they are, then it is clearly not at all unlikely that an all good, all powerful being would create a world in which those evils are allowed to occur. But how could atheists show this without first surveying all possible morally good purposes such a being might have, something they have clearly not done? *Consequently, it seems, at most the atheist could argue that since no one has came up with any adequate purpose yet, it is unlikely that there is such a purpose*. This argument, however, is very weak, as I will now show.

The first problem with this atheist argument is that it assumes that the various explanations people have offered for why an all good God would create evil--such as the free will theodicy—ultimately fail. But even if we grant that these theodicies fail, the argument is still very weak. To see why, consider an analogy. Suppose someone tells me that there is a rattlesnake in my garden, and I examine a portion of the garden and do not find the snake. I would only be justified in concluding that there was probably no snake in the garden if either: i) I had searched at least half the garden; or ii) I had good reason to believe that if the snake were in the garden, it would likely be in the portion of the garden that I examined. If, for instance, I were to randomly pick some small segment of the garden to search and did not find the snake, I would be unjustified in concluding from my search that there was probably no snake in the garden. Similarly, if I were blindfolded and did not have any idea of how large the garden was (e.g., whether it was ten square feet or several square miles), I would be unjustified in concluding that it was unlikely that there was a rattlesnake in the garden, even if I had searched for hours with my rattlesnake detecting dogs. Why? Because I would not have any idea of what percentage of the garden I had searched.

As with the garden example, we have no idea of how large the realm is of possible greater purposes for evil that an all good, omnipotent being could have. Hence we do not know what proportion of this realm we have actually searched. Indeed, considering the finitude of our own minds, we have good reason to believe that we have so far only searched a small proportion, and we have little reason to believe that the purposes God might have for evil would be in the proportion we searched. Thus, we have little objective basis for saying that the existence of the types of evil we find in the world is highly improbable under theism.

From the above discussion, therefore, it is clear that the relevant probability estimates in the case of the fine-tuning are much more secure than those estimates in the atheist's argument from evil, since unlike the latter, we can provide a fairly rigorous, objective basis for them based on actual calculations of the relative range of life-permitting values for the parameters of physics. (See the Appendix to this chapter for a rigorous derivation of the probability of the fine-tuning under the atheistic single-universe hypothesis.) *Thus, I conclude, the core argument for preferring theism over the atheistic single-universe hypothesis is much stronger than the atheist argument from evil.*

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End Notes

1. This work was made possible in part by a Discovery Institute grant for the fiscal year 1997-1998.

2. For those familiar with the probability calculus, a precise statement of the degree to which evidence counts in favor of one hypothesis over another can be given in terms of the odds form of Bayes's Theorem: that is, $P(H_1/E)/P(H_2/E) = [P(H_1)/P(H_2)] \times [P(E/H_1)P(E/H_2)]$. The general version of the principle stated here, however, does not require the applicability or truth of Bayes's theorem.

3. Those with some training in probability theory will want to note that the kind of probability invoked here is what philosophers call *epistemic probability*, which is a measure of the rational degree of belief we should have in a proposition. (See Appendix, subsection III.) Since our rational degree of belief in a necessary truth can be less than 1, we can sensibly speak of it being improbable for a given law of nature to exist necessarily. For example, we can speak of an unproven mathematical hypotheses—such as Goldbach's conjecture that every number greater than 6 is the sum of two odd primes—as being probably true or probably false given our current evidence, even though all mathematical hypotheses are either necessarily true or necessarily false.

4. I define a "universe" as any region of space-time that is disconnected from other regions in such a way that the parameters of physics in that region could differ significantly from the other regions.

5. Moreover, the advocate of the atheistic many-universes hypothesis could not avoid this problem by hypothesizing that the many-universes always existed as a "brute fact" without being produced by a universe generator. This would simply add to the problem: it would not only leave unexplained the fine-tuning or our own universe, but would leave unexplained the existence of these other universes.

6. This connection between order and probability, and the second law of thermodynamics in general, is given a precise formulation in a branch of fundamental physics called *statistical mechanics*, according to which a state of high order represents a very improbable state, and a state of disorder represents a highly probable state.