6

A Theological Critique of the Fine-Tuning Argument

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The history of Western thought is littered with failed arguments for God's existence. And yet, there is one notable exception—a theistic argument that still finds widespread support, both among philosophers and among scientists. The so-called "design argument" for God's existence claims that the best explanation for the apparent design in our universe is that it was designed by an intelligent being. Despite an apparently devastating critique in the eighteenth century by David Hume, and despite the Darwinian revolution, the design argument has been undergoing a renaissance, thanks in large part to discoveries in physical cosmology. The new design argument, usually called the *fine-tuning argument* says that the probability of a universe like ours existing is higher conditional on God's existence than it is on God's non-existence. If this is the case, then, standard probabilistic reasoning tells us that the existence of our universe confirms God's existence.

The fine-tuning argument has a veritable army of distinguished philosophers and scientists among its supporters, e.g., Bradley 2001, 2002; Collins 1999, 2003, 2005, 2009; Holder 2002; Koperski 2005, 2014; Leslie 1997, 2002; Plantinga 2011; Pruss 2005; Roberts 2012; Swinburne 1998, 2003, 2004, 2005, 2009; White 2011. And it has an equally impressive group of detractors, e.g., Colyvan et al. 2005; Howson 2011; McGrew et al. 2001; Monton 2006; Oppy 2013; Philipse 2012; Priest 1981; Weisberg 2010, 2012. (For a collection of recent articles, see Manson 2003; and for a short survey, see Manson 2009.) The fine-tuning question is also regularly discussed in mainstream media outlets, and in popular expositions of contemporary physics. And the argument has become a favorite stratagem among contemporary Christian apologists such as Francis Collins, William Lane Craig, Tim Keller, John Lennox, and Eric Metaxas.[1]

[1] E.g., Eric Metaxas, "Science Increasingly Makes the Case for God," *The Wall Street Journal,* December 25, 2014.

In this chapter, I argue that the fine-tuning argument undermines itself. If the existence of our universe confirms God's existence, then the fact that the probability of a nice universe is low disconfirms God's existence.

6.1 Preliminaries

According to the fine-tuning argument (FTA), the existence of a life-permitting universe raises the probability of the existence of God. That is, $Pr(G|N) > Pr(G)$, where:

G = God exists,

N = the universe is nice, i.e., life-conducive.

For simplicity, I will assume that only a single universe exists. In this case, $\neg G$ is equivalent to what Robin Collins (2009) calls the *naturalist single universe hypothesis* (NSU).

Recall that $Pr(G|N)>Pr(G)$ is equivalent to each of the following two inequalities:[2]

$$Pr(N|G) > Pr(N), \quad Pr(N) > Pr(N|\neg G).$$

In fact, fine-tuning advocates often claim that $Pr(N|\neg G)$ is very small. (But as we will see in section 6.2, fine-tuners fail to distinguish clearly between $Pr(N|\neg G)$ and $Pr(N)$.) I will argue, however, that the fine-tuning data is primarily evidence for the unconditional probability $Pr(N)$, and that a rational credence function should satisfy $Pr(N|G) = Pr(N) = Pr(N|\neg G)$.

Before proceeding, I need to make a few clarifications. Throughout this chapter, I will think of the probability function Pr along the same lines as fine-tuning advocates. For example, Collins (2009) restricts attention to conditional probabilities of the form $Pr(A|B)$, which are taken to be, "warranted conditional epistemic probabilities."

But what then is the set over which Pr is defined? One might suppose that Pr is defined over the set of all possible worlds. (In this case, the arguments A and B of Pr would correspond to measurable subsets of possible worlds.) However, such a supposition leads to several problems. First, it is not clear that the set of all possible worlds is well behaved enough, mathematically, to admit of any probability measure. Second, contemporary fine-tuning advocates only speak of probabilities over restricted subsets of possible worlds. (Indeed, their arguments would be less forceful if they didn't make this restriction.) For example, Collins (2009) always places background information K in the second argument of his probability functions; and K either specifies (1) the actual laws of nature, or (2) the form of the laws of nature (modulo constants), or (3) some reasonably well-behaved set of possible laws of nature. These three possibilities

[2] The equivalence of $Pr(G|N)>Pr(G)$ and the first inequality is obvious. For the second inequality, use the fact that $Pr(N\wedge\neg G) = Pr(N) - Pr(N\wedge G)$ and $Pr(N) - Pr(N)Pr(G) = Pr(N)Pr(\neg G)$.

for K correspond to Collins's three types of fine-tuning: initial conditions, constants, and laws of nature.[3]

Collins (2009, p. 207) states four premises of the FTA, the first two of which can be paraphrased as:

1. Given the fine-tuning evidence, N is very, very epistemically unlikely under $\neg G$; that is, $\Pr(N|\neg G \,\&K) \approx 0$, where K represents some appropriately chosen background information;
2. Given the fine-tuning evidence, N is not unlikely under G: that is, $\Pr(N|G \wedge K)$ is not extremely small.

(I have changed the notation for uniformity.) Without loss of generality, we can absorb K into the probability function Pr, thus simplifying notation. We need only remember that Pr depends on a choice of K, which corresponds to a restriction on the set of possible worlds. In this notation, Collins' two claims are:

$$\Pr(N \mid \neg G) \approx 0, \text{ and } \Pr(N \mid G) >> 0,$$

the conjunction of which entails $\Pr(G|N) > \Pr(G)$.

In the following three sections, sections 6.2, 6.3, and 6.4, I will critique the three versions of the FTA. My primary, and most decisive, critique applies to the fine-tuning of initial conditions. I will argue that this version of the FTA is fundamentally flawed, and should be abandoned. The other two versions of the FTA are more speculative, and less firmly rooted in physics. Correspondingly, my critique will be less decisive, and will leave some wiggle-room for revamped versions of the FTA.

6.2 Fine-Tuning of Initial Conditions

The FTA for initial conditions takes the background information K to include the laws of our best physical theory of the early universe, e.g., Einstein's theory of general relativity. In this case, then, the conditional probability measure $\Pr(-|K)$ is a measure on possible solutions of Einstein's field equations, i.e., initial conditions of the universe.

How then should a rational agent assign probabilities to initial conditions of the universe? I myself don't know how to answer that question. But what is clearly the case is that fine-tuning advocates assume that physics itself supplies a measure "M" on initial configurations of the universe, and that a rational agent will calibrate her credences according to this measure. That is, $\Pr(S|K) = M(S)$, for all measurable subsets S of X.[4] For example, when Roger Penrose says that, "The Creator's pin has to find a tiny box," the word "tiny" really means, "small relative to the measure M" (Penrose 2005). There

[3] I will assume throughout that K has already been purged of the information that the actual universe is nice. So, I'm using K for Collins's K′.

[4] For example, if the theory has a Hamiltonian formulation, where the phase space X is the cotangent space of a manifold, then there is a canonical measure M on X is the unique measure that is invariant under all point-transformations of the cotangent bundle.

is nothing else that Penrose could possibly mean, since regions of an abstract space of physical possibilities don't intrinsically have any size; the notion of size only applies in the presence of a measure. Similarly, Collins (2009, p. 221) claims that:

> applying the standard measure to the initial condition of our universe implies that it has an enormously low unconditional probability of occurring.

That is, $M(N) \approx 0$; and if we apply Lewis's principal principle, $\Pr(N|K) \approx 0$.

There are many reasons to doubt that the measure M can and should be used to guide credences. For one, M is not normalized (see McGrew et al., 2001). Even more importantly, the physical details themselves suggest that M doesn't provide a good guide to objective chances (Norton 2010; Schiffrin and Wald 2012). And even if M were a good guide to objective chances, some physicists claim that it assigns a *high* probability to the set of nice universes (Carroll and Tam 2010). Each one of these objections would by itself be fatal to the FTA. But let's set all of them aside and assume, that M is the guide to objective chances, and that M says that the chances of a nice universe are objectively low. But then the fine-tuning argument would still fail: *if M is the guide to objective chances, then both atheist and theist alike should calibrate their credences by M*. In particular, we should have:

$$(\#)\ \Pr(N|G \wedge K) = \Pr(N|K) = M(N) \approx 0.$$

Thus, a theist ought also to believe that the chances of a nice universe are low; and so the fine-tuning argument fails. I will now proceed to argue for this claim: that if M is the guide to objective chances, then (#) should hold.

6.3 Objective Chances Screen Off God's Existence

In what follows, I will consider theism to include both the belief that God created the universe, and the belief that God chose which laws of nature would hold. In other words, God picks out the subset of nomologically possible worlds (equivalently: the set of possible initial configurations), and which dynamical laws apply in these worlds.

Let K be the conjunction of the laws of nature. Thus, K implicitly restricts the set of all possible worlds to the set of nomologically admissible initial conditions; and $\Pr(-|G \wedge K)$ is a probability measure over nomologically admissible initial conditions. Intuitively speaking, $\Pr(-|G \wedge K)$ is the theist's probability measure over initial configurations of the universe, consistent with the currently accepted laws of nature.

Now I need to make two points: first, according to Collins and other fine-tuning advocates, the currently accepted laws of nature determine a standard measure M over the set X of initial conditions (see Collins 2009, p. 220–2). Thus, I take it that they agree to the equation:

$$(*)\ \Pr(A|K) = M(A),$$

for all measurable subsets A of X.

Second, and most importantly, if God exists, then God would have the power to choose different laws of nature. But different laws of nature would give rise to a different standard measure on initial conditions, and therefore God could have brought it about that some M' other than M was the correct guide for rational credences. In other words, the background information K specifies the chances, and if a theist accepts K, that means she accepts the chances specified by K. Thus, a rational credence function Pr should satisfy:

$$(\$)\ \Pr(A|G \wedge K) = \Pr(A|K).$$

Assuming that $M(N) \approx 0$, equations (*) and ($) entail that $\Pr(N|G \wedge K) \approx 0$. Thus, a theist ought to believe that the chances of a life-permitting universe are extremely low.

The main claim of this chapter is that equation ($) should hold whenever K specifies the objective chances, and G states that God exists (and so has the power to make K true or false).

In the remainder of this section, I will provide several supporting arguments for the main claim.

Example 1. Consider a sinister game of reverse Russian roulette: your captor hands you a revolver with five chambers filled, and one empty. Now suppose that you pull the trigger, and you hear "click" . . . you've survived. What should you conclude?

Should you conclude that your captor rigged the game so that you wouldn't die? But then why would your captor begin the game by filling five of the six chambers? Why not fill only one . . . or, even better, don't fill any at all?

Now magnify the scenario: suppose that your captor has a revolver with 10^{10} chambers, and fills all but one. Again, you pull the trigger but survive. Should you thank your captor for designing the game with your survival in mind?

In application to the FTA, the analogy is as follows: God created laws such that almost all physically possible universes are lifeless. And yet, the fine-tuning advocate wants us to believe that God designed this "game" so that we would win. Wouldn't this be a strange way for a deity to operate? Why would God make things hard for himself?

Example 2. Suppose that there is an urn filled with one yellow, and 99 purple balls. Let K include this information about the balls in the urn, and also the information that the balls are otherwise identical (and so any two balls are equally likely to be drawn). Let N′ denote the event that a yellow ball is drawn. Then according to the principal principle, the rational credence for drawing a yellow ball, given K, is 0.01. That is, $\Pr(N'|K) = 0.01$.

But now suppose that some people believe in a religion according to which there is a person named Gob who filled the urn. Let G′ be the statement, "Gob exists, and he filled the urn." What then is the rational credence $\Pr(N' \mid G' \wedge K)$, i.e., the probability of drawing a yellow ball, conditional on Gob's having filled the urn? Once again, the principle principal entails that the probability of drawing yellow, conditional on Gob's existence, is still 0.01. The only difference between those who believe in Gob and those who don't is their story about *how* the balls came to be in the urn. They don't disagree about the background information K, and this background information specifies that there is a one in one hundred chance of drawing a yellow ball.

Example 3. Now consider a slight modification of this example. Suppose that believers in Gob also believe that he loves the color yellow. Then one might think that Gob's love of yellow would justify the claim that:

$$(@)\ \mathrm{Pr}(\mathrm{N}'|\mathrm{G}' \wedge \mathrm{K}) > Pr(\neg N' \,|\, G' \wedge K),$$

because Gob is likely to create an urn with a high proportion of yellow balls. But (@) entails that $\mathrm{Pr}(\mathrm{G}'|\mathrm{K}) \leq 0.2$. That is, based on the background information K, it's highly unlikely that Gob exists.

This line of thinking exposes an internal tension in the belief set of fine-tuning advocates. Suppose, for example, that (as Penrose claims) the chance of a nice universe is less than one in $10^{10^{123}}$. If we also assume that God favors nice universes in the sense that:

$$(\&)\ \mathrm{Pr}(\mathrm{N}|\mathrm{G} \wedge \mathrm{K}) > Pr(\neg N \,|\, G \wedge K),$$

then it follows that:[5]

$$\mathrm{Pr}(\mathrm{G}|\mathrm{K}) \leq \frac{2}{10^{10^{123}}}.$$

That is, the probability that God exists, given background information *K*, is practically zero.

This internal tension can be made even more apparent by means of one of Collins's favorite intuition pumps: the unembodied alien (see Collins 2009, p. 233). Suppose that an unembodied alien were asked: how likely is it, based on the actual laws of nature (K), that God exists? If this alien accepts (&), but doesn't know which universe is actual, then it should conclude that the probability that the actual universe is nice is astronomically low; and hence that the probability that God exists is astronomically low. In other words, the laws of nature (minus information about which world is actual) provide incredibly strong evidence that God doesn't exist. This conclusion should be troubling for theists who think that God has the power to choose the laws of nature. If God favors life, in the sense of (&), then why did God create laws that make life so incredibly unlikely?

That said, I don't see why a theist needs to be committed to (&). A theist can simply say that knowledge of God's character (that God is holy, loving, just, etc.) doesn't warrant the belief that God is likely to create a nice universe.[6] Moreover, supposing that a

[5] To see this, note that $\mathrm{Pr}(\mathrm{G}|\mathrm{K}) = \mathrm{Pr}(\mathrm{G} \wedge \mathrm{N}|\mathrm{K}) + \mathrm{Pr}(\mathrm{G} \wedge \neg\mathrm{N}|\mathrm{K}) < 2 \times Pr(G \wedge N|K) \leq 2 \times Pr(N \,|\, K)$.

[6] Many theists believe that God was under no compulsion in his choice to create a universe. God didn't have to create anything at all; and God could have created a universe different than this one (see Adams 1972; Kretzmann 1990). Thus, from a purely theological point of view, the probability of a nice universe, conditional on God's existence, might not be all that high.

nice universe is *a priori* unlikely, (&) is inconsistent with $\Pr(N|G \wedge K) = \Pr(N|K)$, which ought to hold whenever K specifies the chances of N, and G is admissible in the vsense of Lewis (1986).[7]

Example 4. Suppose that you're running a Stern-Gerlach experiment on an electron, and K includes the information that this electron's quantum wavefunction assigns a 0.01 probability to its coming out spin up (= N′). According to the principal principle, your credence for N′ should be set at $\Pr(N' \mid K) = 0.01$. But what then is the probability that this electron will come out spin up, conditional on God's existence? Again, if G is admissible, then we should have $\Pr(N' \mid G \wedge K) = 0.01$. For if God exists, then he is responsible for the truth of K, including the fact that this electron has probability 0.01 of coming out spin up.

Suppose now that if N′ occurs, then something wonderful will happen, e.g., a life-conducive universe will come into existence. Then what is the probability of N' conditional on God's existence? The answer here depends crucially on whether our hypothetical rational agent still believes that K is true (i.e., that quantum mechanics is true, and that the wavefunction assigns a 0.01 probability to N'). If the agent continues to believe K, then the information that N' is correlated with the existence of a life-conducive universe should *not* influence his judgment about the chances for N'.

Of course, this agent might decide, upon learning that N' is correlated with the existence of a life-conducive universe, to reject K. For example, he might believe that God would never choose laws that didn't favor life; and so when he learns that K doesn't favor life, he might come to believe that K is false. But if he does believe K, then the only rational option is for him to believe that the chances of N′ are low.

6.4 Can God Override the Chances?

There is another possibility that we need to consider. The fine-tuning advocate might say that although God chooses the laws K that determine the standard measure over initial configurations, he might nonetheless nudge things in the life-permitting direction. This idea is analogous to saying that God might decree that:

K = This coin toss shall have a 50 percent chance of coming up heads,

but then God might cause the coin toss to come up heads. If this possibility is on the table, then we can no longer assume that G is admissible in Lewis's sense.

It is far from clear that this way of thinking is coherent. If God exists, then God's decrees would be binding. So, if God decrees that a coin toss is going to be random, then that coin toss is going to be random. But if a coin toss is truly random, then by definition, God does not cause that coin toss to come up heads. Therefore, if God

[7] If $\Pr(N \mid G) = \Pr(N)$, then $\Pr(N \wedge G) = \Pr(N)\Pr(G)$ and $\Pr(\neg N \wedge G) = \Pr(\neg N)\Pr(G)$. Thus $\Pr(\neg N) \geq \Pr(N)$ imas $\Pr(\neg N \wedge G) \geq \Pr(N \wedge G)$, and hence $\Pr(\neg N \mid G) \geq \Pr(N \mid G)$.

decrees that a coin toss shall have a 50 percent chance of coming up heads, then God does not cause the coin to come up heads.[8]

The burden of proof then lies on the person who thinks it's coherent to say that God creates probabilistic laws, and then overrides these laws. But even if we grant coherence for the sake of argument, this maneuver still won't help the FTA.

I suppose that the defender of this line of thought would say that when God decrees the probability of an event, he really decrees the probability of that event *conditional on God's own non-intervention*. So if we let V stand for the claim that God intervenes, then when God decrees the chance of the event N, that means he sets the value for $\Pr(N|\neg V)$. And of course, it's perfectly possible that $\Pr(N|\neg V)$ is very small while $\Pr(N|V)$ is large.

In this case, the claim, "the probability of a nice universe is practically zero," would be interpreted as a conditional probability: $\Pr(N \mid \neg V) \approx 0$. But would the fact that $\Pr(N \mid \neg V) \ll \Pr(N \mid V)$ mean that the existence of life confirms that God overrode the probabilistic laws of physics? If all the probabilities were well defined, then yes. But not many of us—even the theists among us—have a prior probability for the claim that God will intervene in a certain situation. In fact, I'd wager that nobody has a *rational prior* probability for the claim that God will intervene.[9] But if N is to confirm V, then one needs to have a prior probability for V, and nobody can be expected to have such a prior probability. Therefore, the FTA can't be revived as an argument for the claim that God overrode the probabilistic laws of physics.

6.5 Fine-Tuning of Constants

To formulate the FTA for constants, it's helpful to think of K(x) as a statement of a law, or laws, with a free variable x replacing a particular constant. For example, K(x) might be the laws of general relativity, with x standing in place of the cosmological constant. Then for a fixed real number $\lambda \in \mathbb{R}$, $\Pr(N|K(\lambda))$ gives the probability of a nice universe, given the laws $K(\lambda)$, where λ is substituted for x.

Collins (2009) specifies two intervals: $W_r \subseteq W_R \subseteq \mathbb{R}$ such that:W_r is the interval of values such that the laws K(x) are life-permitting, and W_R is the interval of values x such that we have reliable information about whether or not K(x) is life-permitting. Collins calls W_R the *epistemically illuminated* region.

There is a prima facie problem for this version of the FTA. What does it mean to say that K(x) is life-permitting? On the one hand, we might say that K(x) is life-permitting just in case $\Pr(N \mid K(x))$ is non-negligible (for concreteness, say larger than one-tenth). But in this case, the laws of our universe are presumably not life-permitting, and so the life-permitting region W_r might be empty. On the other hand, we might say

[8] My argument here runs parallel to Plantinga's argument that God cannot cause a person to freely undertake some action (see Plantinga 1974, ch. 9). Thanks to Adam Elga for pointing out the parallel.

[9] My claim here is consistent with the claim that one can have a rational posterior probability that God did act in a certain situation. For example, I assign a rather high probability to the claim that, "God created the heavens and the earth." Did God intervene? I haven't the slightest clue.

that $K(x)$ is life-permitting just in case $\Pr(N \mid K(x))$ is nonzero. In this case, the laws of our universe $K(x_0)$ might be life-permitting, and so might be the laws $K(x)$ with x near x_0. Presumably, however, the fine-tuning advocate would say that the laws of our universe maximize the chances of life; i.e., that $\Pr(N \mid G \wedge K(x_0))$ is a local maximum of the function $x \mapsto \Pr(N \mid G \wedge K(x))$. But then:

$$\begin{aligned}\Pr\big(N \mid G \wedge K\big) &= \int_{W_R} \Pr\big(N \mid G \wedge K(x)\big) \times \Pr\big(K(x)\big)dx \\ &\leq \Pr\big(N \mid G \wedge K(x_0)\big) \times \int_{W_R} \Pr\big(K(x)\big)dx \\ &= \Pr(N \mid G \wedge K(x_0)) \approx 0.\end{aligned}$$

Thus, if the argument of the previous section was successful, then the FTA for constants also fails.

But even without assuming the previous argument against the FTA for initial conditions, there is still another problem with the FTA for constants. To get to the heart of the issue, let's ignore the fact that the laws of nature are consistent with many different initial conditions of the universe. Let's suppose that whether or not a particular universe is life-permitting depends only on the value of a single parameter λ. That is:

$$\Pr\big(N \mid (\lambda = x) \wedge K\big) = \begin{cases} 1 & \text{if } x \in W_r, \\ 0 & \text{if } x \in W_R - W_r \end{cases}$$

According to Collins, a rational agent will use the *restricted principle of indifference* to determine the probability of a life-permitting universe. That is, the probability density function $\Pr(\lambda = x)$ is the flat distribution on W_R, and hence:

$$\Pr\big(N \mid K\big) = \int_{W_R} \Pr\big(N \mid (\lambda = x) \wedge K\big)\Pr\big(\lambda = x\big)dx = \frac{|W_r|}{|W_R|} \approx 0.$$

Moreover, Collins seems to assume that if $\Pr(N \mid K) \approx 0$ then $\Pr(N \mid \neg G \wedge K) \approx 0$. (Here again it seems that probabilities conditional on atheism have been conflated with unconditional probabilities.)

One objection to Collins's argument here is that the parameter λ takes values in the entire real line $\mathbb{R}$, and there is no countably additive, invariant probability measure on $\mathbb{R}$ (see McGrew et al. 2001). I'm not going to pursue that objection in this chapter. For the sake of argument, I'm going to assume that it's possible to apply the principle of indifference in this case, and that there are compelling reasons to do so. But now there's another problem: if an arbitrary rational agent would apply the principle of indifference in this case, then why wouldn't a rational theist?

Collins is acutely aware of the objections to the principle of indifference, and he addresses these objections in a systematic fashion. For example, one objection to the principle of indifference is that its application depends on how one describes a problem. Consider, for example, Bertrand's paradox, as reimagined by (van Fraassen 1989). Consider a factory that randomly produces cubes whose sides have length between 0 and 1 foot. What's the chance that this factory will produce a cube whose sides are between 0.5 and 1 foot? To answer this question, one needs a measure on the set of cubes. But should we choose the flat measure over the parameter, "length of the side of a cube," or should we choose the flat measure over the parameter, "area of the face of a cube"? Clearly we've got two distinct "flat" measures on the set of cubes, and hence two different answers to the question, "how likely is it that the factory will produce a cube with sides of length between 0.5 and 1 foot?"

Bertrand's paradox reminds us that the metric structure of a parameter is not necessarily a reliable guide to the probability that the parameter will fall in a certain range. In van Fraassen's example, if the cube factory were designed to produce cubes with random areas, then a rational person should apply the indifference principle relative to the parameter "area," and not relative to the parameter, "length."

Applied to the fine-tuning case, if λ is a variable whose life-permitting range is small, then one can replace λ with a variable λ' whose life-permitting range is large. For example, suppose that λ takes values in [0,1], and that its life-permitting range is [0.99,1]. It's tempting, then, to think that the chance of the universe being life-permitting is 0.01. But not so quick: if $\lambda' = \lambda^{500}$, and if M is the flat measure over λ', then:

$$M\left(\text{"life permitting"}\right) = M\left(\lambda \in \left[0.99,1\right]\right) \approx M\left(\lambda' \in \left[0.01,1\right]\right) = 0.99,$$

i.e., almost all universes are life-permitting. And who is to say which is the true physical parameter, λ or λ'? So, one cheap and easy solution to the fine-tuning problem is to choose variables so that the existence of a life-permitting universe is no surprise at all.

Collins attempts to block this maneuver by invoking the notion of a *natural variable* (see Collins 2009, p 236). The idea, simply put, is that natural laws favor certain variables over others—and it is with respect to these natural variables that a rational person is licensed to apply the principle of indifference.

There are many questions we might ask about this notion of a natural variable. But fine-tuning advocates haven't answered these questions, and so I'll have to guess at some answers. First, is the statement, "λ is a natural variable," contingent, or is it metaphysically necessary? It seems to me that this statement is contingent. For example, some possible worlds might be so disorderly that they cannot be characterized by any gravitational laws, in which case the cosmological constant might not be a natural variable. Note, however, that if the statement, "λ is a natural variable," is contingent, then God could have made it false.

Second, why does the claim, "λ is a natural variable," justify our applying the principle of indifference to the space of λ values? I'm not sure what fine-tuners would say about this issue; but I will suppose that if a person believes that λ is a natural variable, then in the absence of specific information about the state of our universe, that person should adopt a flat measure over λ values. In particular, if a *theist* believes that God decided to make λ a natural variable, then that theist should apply the principle of indifference to the space of λ values.

Let's assume, then, that the background information K specifies that λ is a natural variable, and takes values in the epistemically illuminated region W_R. Thus, $\Pr(-\,|\,K)$

ought to be a flat distribution over λ. Now, Collins himself applies this reasoning not to $\Pr(- \mid K)$, but to $\Pr(- \mid \neg G \wedge K)$; and this seems reasonable, for if K says that λ is natural, then why would disbelief in God be relevant to the probability that λ will lie in a certain interval? But if the non-theist would be rational in adopting a flat measure over λ, then why wouldn't a theist be rational to do the same? Of course, the fine-tuning advocate will just repeat that God favors life-permitting universes, i.e., that the information G biases the probability distribution towards life-permitting values.

But recall that this theist also believes that the variable λ is natural. So, the distribution $\Pr(- \mid G \wedge K)$ represents a hypothetical agent who believes that God chose λ to be a natural variable—i.e., that God chose to create the world in such a way that a rational person would assign a flat distribution to λ values. Thus, $\Pr(- \mid G \wedge K)$ should also be a flat distribution, in which case:

$$\Pr\left(N \mid G \wedge K\right) = \frac{|W_r|}{|W_R|} \approx 0.$$

Once again, the problem for fine-tuning is that the background information K includes all the facts about our universe and its laws that are relevant for determining the chances, and therefore it screens off G.

I expect the fine-tuning advocate will repeat, once again, that God favors values in the life-permitting region W_r. But let's be clear about what's really going on here: the fine-tuning advocate is declaring God's existence to be inconsistent with the background information K. If God exists and would ensure that λ lies in the life-permitting region, then *contemporary physics is wrong* when it says that λ can take a value outside of this region. Thus, this sort of fine-tuning argument is not so much an argument for God's existence as it is an argument against contemporary physics.

6.6 Fine-Tuning of Laws

The third and final version of the FTA is based on the supposed fine-tuning of the laws of nature. In short, considering all the possible ways that our universe could have been, it's remarkable that it has laws that permit the existence of beings who can discover these very laws. Does this intuitive idea correspond to a rigorous argument for God's existence?

First of all, if the argument against the FTA for initial conditions was successful, then it also destroys the FTA for laws. Intuitively, if $\Pr(N \mid G \wedge k_0) = \Pr(N \mid k_0)$, where k_0 specifies the laws of our world, and if $\Pr(N \mid G \wedge k_0) \geq \Pr(N \mid G \wedge k)$ for k similar to k_0 (as fine-tuning advocates would surely assert), then:

$$\Pr(N \mid G \wedge K) \leq \Pr(N \mid K),$$

where K specifies the set of possible laws of nature. In other words, once you've specified which laws of nature are possible, conditionalizing on God's existence doesn't raise the probability of a nice universe.

Second, setting aside the argument against the FTA for initial conditions, there are further reasons to be skeptical of the FTA for laws. In particular, it's not at all clear which laws of nature are included in the comparison class; and even once a comparison class is specified, there won't be a canonical measure on it. Therefore, it's not clear that it makes any sense to talk about prior probabilities for life-permitting laws.

6.7 Conclusion

When I think of God, I think of a being who not only created our universe, but who also chose (freely) which laws would govern our universe. So when I learn that the physical laws imply that the chances of life are low, then I think, "God must have wished it to be so." I am not sure why God would do such a thing. The again, I learned long ago that God's ways are not my ways, and so not to trust my *a priori* predictions about how God would do things.

But fine-tuning advocates think a different way. Fine-tuning advocates think that we can predict with confidence: God would create a universe like ours, in which life would emerge. I have argued that if we are warranted in believing that God would do that, then we are just as warranted in believing that God would create laws according to which nice universes are likely. But apparently the laws are not like that. Therefore, either it's unlikely that God exists, or we are not warranted in believing that God would create a nice universe.

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