

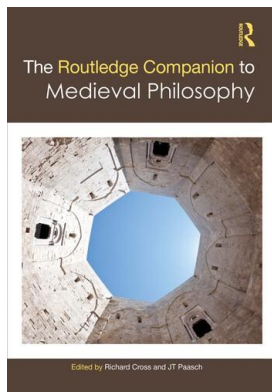
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### **Proofs for God's Existence**

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# PROOFS FOR GOD'S EXISTENCE

*William E. Mann*

Medieval philosophers bequeathed to posterity some of the most famous arguments in favor of the existence of God. In this essay, I will examine some of the members of two families of such arguments. Before introducing the families, however, we should consider some preliminary questions. Why did so many medieval philosophers think it important to prove God's existence? Who was the intended audience? What did the proofs disclose about the nature of God?

*The importance of proofs.* Some religious believers have claimed that God's existence is "self-evident," requiring no proof. Other believers claim that the only ways in which God's existence can be known are either through revelatory sacred texts or individual mystical experience. Thus, it would seem that proof is in all cases unnecessary. This conclusion follows, however, only if one assumes that the choice between self-evidence and revelation exhausts all the possibilities. By the time of the High Middle Ages, philosophical theologians rejected that assumption. They regarded an important part of their subject as a science, that is, an orderly, structured discipline whose task is to articulate what humans can know about God using only reason and experience of the natural world. This part of theology—*natural* theology—was distinct from what was alleged to be known only by means of revelation or mystical experience. And while most theologians conceded something to the notion of self-evidence in their conception of a science, the concession did not obviate the need for proof.

Other sciences could presuppose the existence of their subject matter without controversy. No one denies the existence of light and vision, the subject matter of optics, or of triangles, circles, and the like, studied by geometry. God's existence is not such a straightforward matter. Optics can tell us all about our perception of the visible world, but is appropriately silent about God's existence. Nor is it immediately obvious that God's existence can be proved in the way that one can prove that the square of the hypotenuse of a right triangle is equal to the sum of the squares of the sides. Theology's first order of business, then, is to establish that it has a legitimate subject matter, namely, God.

*The audience.* The fool of the Psalms who declares that there is no God (Psalms 14:1; 53:1) might be a fool, but even fools can have an influence over the beliefs of others. Anselm's argument, which we will examine first, explicitly addresses the fool, hoping thereby to undermine the fool's credibility by showing that theism is rationally superior to atheism. But he also hopes that his argument will help other believers to understand their belief more fully.

We will be primarily examining arguments presented by Christian philosophers. It is doubtful that these various existence proofs would have had much effect on converting non-Christian theists, if only for the simple reason that medieval Jewish and Islamic philosophers developed similar

proofs of their own. There was disagreement within and among these three faiths about the principles employed in the arguments, but the disagreement was mostly philosophical.<sup>1</sup>

*God's nature.* Medieval philosophers also disagreed about what divine attributes were best suited to prove God's existence, though there was considerable general agreement about the attributes descriptive of God. God was thought of as omniscient, omnipotent, perfectly good, eternal, omnipresent, infinite, and spiritual; unique, necessarily existing, creator of and sovereign over everything else, in sum, a being than which nothing greater can be conceived.

*Anselm's argument.* Members of the first family of arguments have been called "ontological arguments." Their most distinctive common feature is that they purport to show that God's existence can be proved by reason alone. No empirical claims are premises of these arguments. No experience of the world is necessary; reason alone suffices. The most famous family member was presented by Anselm of Canterbury (1033–1109). In his *Proslogion*, Anselm fastened upon the phrase, "something than which nothing greater can be conceived," to demonstrate how reason could establish God's existence.

We believe you [Lord] to be something than which nothing greater could be conceived. Or is there then not something of such a nature, since the fool has said in his heart, "There is no God"? But surely this same fool, when he hears this very thing that I speak—"something than which nothing greater can be conceived"—understands that which he hears, and that which he understands is in his understanding, even if he does not understand it to exist . . . And surely that than which a greater cannot be conceived cannot be in the understanding alone. For if it is in the understanding alone, it can be conceived to exist in reality also, which is greater. Thus if that than which a greater cannot be conceived is in the understanding alone, then that than which a greater cannot be conceived itself is that than which a greater can be conceived. But surely this cannot be. Therefore without doubt something than which a greater cannot be conceived exists both in the understanding and in reality.<sup>2</sup>

Anselm begins by granting, provisionally, what the atheist must suppose. He then proceeds to argue that the atheist's suppositions lead to the very conclusion the atheist wants to deny. If successful, Anselm will have demonstrated that atheism is impossible, not merely mistaken. Anselm's atheist must suppose two things:

- (1) He [the atheist] understands the phrase, "the being than which nothing greater can be conceived."
- (2) The being than which nothing greater can be conceived does not exist in reality.

Why (1)? Because failure to understand the phrase would be a sign of deep linguistic incompetence, deep enough to prevent the coherent assertion of (2). And (2) is, of course, the standard-bearer of atheism.

To be successful, Anselm must show that despite appearances to the contrary, (1) and (2) conceal an inconsistency. Although his reasoning is compressed, it can be interpreted along these lines: let us begin by abbreviating "the being than which nothing greater can be conceived" with "the GCB." To understand "the GCB" is to understand that nothing can be greater than the GCB. Now if the GCB is conceived as existing only in the understanding, then *at least one* being greater than it can be conceived, namely, a being just like the one the atheist is conceiving, but which also exists in reality.<sup>3</sup> Therefore, *either* the atheist is not really conceiving of the GCB, but of some inferior entity—Zeus or Odin, perhaps—*or* if he is really conceiving of the GCB he must acknowledge that the GCB exists in reality.<sup>4</sup>

It did not take long for Anselm's argument to receive criticism. Gaunilo, a monk from Marmoutier, wrote an essay in reply, and Anselm, in turn, replied to Gaunilo, instructing that henceforth all three works be published together. Although Gaunilo is not as careful as he might be, he raises one notable criticism that can be refined on his behalf. The criticism proceeds by constructing an argument parallel to Anselm's, but which has a false conclusion. Consider the phrase, "the island than which no greater island can be conceived" (the GCI). Gaunilo claims that Anselm's style of argument would "prove" that the GCI exists. For Anselm would want to assent to both (1') and (2')

- (1') He [Anselm] understands the phrase, "the GCI."
- (2') The GCI does not exist in reality.

In order to understand "the GCI," Anselm must acknowledge that no island can be greater than the GCI. But if Anselm tries to claim that the GCI exists only in the understanding and not in reality, he will seemingly be hoist with his own petard. If the GCI exists only in the understanding, then a greater island than it can be conceived, namely, one just like it but also existing in reality. So either Anselm has not been conceiving of the GCI or he must concede that the GCI exists in reality.

While Anselm dismissed Gaunilo's counterexample, he did not provide satisfactory grounds for its dismissal. Anselm's argument, however, captured the attention of his successors, some of whom were supporters, while others were detractors. Chief among the detractors was Thomas Aquinas (1225–1274).

*Aquinas's epistemological objection.* In his *Summa Theologiae*, Aquinas argues that even if one grants to Anselm that the proposition that the GCB exists in reality is a self-evident truth, one is not thereby forced to acknowledge that the GCB exists in reality. Aquinas's position appears to be contradictory, but it is not. Aquinas distinguishes between two kinds of self-evidence, self-evidence in itself and self-evidence to us. Every self-evident proposition is self-evident in itself but some self-evident propositions are not self-evident to every person. (Some may not be self-evident to *any* person.) Aquinas's distinction can be illustrated by these examples. "Every triangle has three angles" is self-evident in itself *and* self-evident to anyone with rudimentary linguistic competence. In contrast, consider "No three integers,  $x, y, z$ , satisfy the equation,  $x^n + y^n = z^n$  when  $n > 2$ ." It is not clear whether Aquinas would have regarded this proposition—Fermat's Conjecture—as self-evident in itself. The proposition is necessarily true but unproven until 1995. Moreover, Aquinas would have to acknowledge that it would be self-evident to an omniscient God. In any case, it is not self-evident to every person; virtually, every person lacks the mathematical sophistication to see that it is necessarily true.

Return now to Aquinas's objection. Aquinas regards "God exists" as self-evident in itself, because God's essence is to exist. But because we do not fully understand God's essence, we are in the same epistemological position as those who do not fully understand enough about the essential interconnections among the infinitely many integers to intuit that Fermat's Conjecture is true. God's existence is not self-evident to us. By Aquinas's lights, then, Anselm's argument does not rule out atheism as an epistemologically defensible position.<sup>5</sup>

Anselm seems to have anticipated Aquinas's criticism. In *Proslogion* 4, titled "How the Fool Said in His Heart What Cannot Be Conceived," Anselm emphasizes that no one can fully *understand* what the GCB is. However, he believes, full understanding is not required for his argument to work. There is a world of difference between

- (3) You understand the phrase, "the GCB"
- and
- (4) You understand the GCB.

The truth of (3) does not require or presuppose the truth of (4).

*Scotus's Amendment.* John Duns Scotus (1266–1308) thought that there was a weak spot engendered by Anselm's argument that could be repaired by amending "the GCB." The weak spot is this: the more superlative attributes that are alleged to be essential to God's nature, the more likely it is that some of those attributes will conflict with others. Anselm, for example, had raised questions about how God can be omnipotent while also being unable to lie, or be supremely just yet merciful.<sup>6</sup> Scotus is sensitive to this sort of potential conflict of attributes because he maintains that it is impossible to conceive of a contradiction. If that is so, and if analysis of "the GCB" reveals contradictory attributes, then "the GCB" can no more be conceived than "the greatest square circle." Barring some sort of special explanation, this consequence would prevent Anselm from beginning his argument. Scotus's repair is to amplify "the GCB" to the "being conceived without contradiction, who is so great that it would be a contradiction if a greater being could be conceived."<sup>7</sup> Armed with this amplification and confronted with a pair of seemingly contradictory attributes, one can argue either that the pair is not really contradictory or that at least one of the attributes does not really apply to God.

It is doubtful that Anselm would have found comfort in Scotus's amendment, for it has Anselm putting the cart before the horse. Anselm *begins* his *Proslogion* with his proof; only after that does he seek to resolve conflicts among divine attributes. There is nothing untoward or question-begging about Anselm's method. Of course, he believes in God antecedently. He also believes that there is nothing like a proof to provide rational support for a belief initiated in faith. For Anselm as for many of his successors, an existence proof is the proper way for natural theology to begin. Once that proof is in place, one can begin the process of showing that the object of belief can be absolved of charges of contradiction.

*Aquinas's metaphysical objection.* Suppose, however, that Anselm would have granted Scotus's amendment. It still would not insulate Anselm's argument from criticism. Aquinas may have been the first to raise the criticism, although he puts it somewhat cryptically.

Let it be given that this name, "God," is understood by everyone as "something than which a greater cannot be conceived." It will not be necessary for something than which a greater cannot be conceived to exist in reality. For a thing is necessarily posited in the same way as an account of its name. Moreover, from [the fact that] what is expressed by the name, "God," is conceived by the mind, it does not follow that God exists solely in the understanding. Hence one is not obliged [to think] that that than which a greater cannot be conceived exists solely in the understanding. Yet from this it does not follow that there is in reality something than which a greater cannot be conceived. For, given that either in reality or in the understanding something can be greater, there is no difficulty for anyone, except for one who allows that there is something in reality than which a greater cannot be conceived.<sup>8</sup>

Aquinas's point seems to be that even if all of humankind were to agree with the description of God as "the greatest conceivable being," the description is inadequate to prove that God exists in reality. Why is that? Because the description may be defective in the same way that "the greatest positive integer" is defective: for any integer one can think of, there are integers greater than it. Similarly, there may be no conceivable being so great that a greater cannot exist or be conceived. To deny this possibility would be to beg the question—to presuppose what Anselm's argument sets out to prove.

Aquinas is not engaged here in the project of freeing the concept of God from contradictory attributes. He is rather sounding an alarm against even beginning Anselm's project. By initially identifying God as the being than which a greater cannot be conceived, Anselm risks erecting his theological edifice on a metaphysical fault line.<sup>9</sup>

*Aquinas's approach.* Aquinas's antipathy toward Anselm's argument is a consequence of a different conception of the way in which natural theology should proceed. Anselm proceeds in a way

reminiscent of what one would find in a textbook on geometry: begin with indubitable premises and deduce consequences with the aid of reason alone. Empirical evidence is irrelevant to Anselm's procedure. This is not so for Aquinas, who is explicit about his method. He points out that sometimes we reason from cause to effect, based on experience. Thus, our knowledge that fire burns leads us to avoid putting our hand on the burner. But in other cases, we argue from effect to cause. The broken window, the ball on the floor; the kids must have been playing baseball again. In this case, the effect is better known to me. I hypothesize the cause on the basis of the evidence. I could, of course, be wrong. The ball might have been on the floor for weeks. The window might have been broken by a large bird. Aquinas takes his arguments for God's existence to proceed from effect to cause. We are more familiar with some general features of the world than we are with God. But these features, Aquinas believes, when considered properly, lead us to acknowledge God's existence as the cause of their existence.<sup>10</sup>

The most visible source of Aquinas's arguments is article 3 of question 2 of the first part of his *Summa Theologiae*. In article 3, Aquinas presents "five ways" in which God's existence can be demonstrated by one's attending to different earthly phenomena.<sup>11</sup> Each "way" is a complex argument, presupposing in several cases a background of Aristotelian physics and metaphysics. Analysis of all of them would take us beyond the confines of this essay.<sup>12</sup> I shall concentrate on the first and fifth ways, because they more closely resemble arguments put forward in recent times.

### The First Way

The first and most obvious way is based on motion. For it is certain and confirmed by the senses that some things are being moved in this world. But whatever is moved is moved by something else. For nothing is moved except in accordance with what it has the potentiality to be moved. Something moves, however, as it is in actuality, for to move is nothing other than to bring something from potentiality into actuality. But a thing cannot be brought from potentiality into actuality except by some being in actuality. For example, fire, which is hot in actuality, makes wood, which is hot in potentiality, also to be hot in actuality by moving and altering it. But it is not possible that the same thing be at the same time in actuality and in potentiality—not in the same respect, but only in a different respect. For what is hot in actuality cannot at the same time be hot in potentiality, though it is at the same time cold in potentiality. Thus it is impossible for something in motion to be in the same respect and in the same manner both mover and thing moved, or that it move itself. Thus it is necessary that whatever is moved is moved by something else. It follows that if this [other] mover is moved, it must be moved by something else, and this latter [mover] by something else again. This does not go on to infinity, because if that were so, nothing would be a first mover. As a consequence neither would there be other movers, because second movers do not move unless they are moved by a first mover. For example, a stick does not move [anything] unless it is moved by a hand. Therefore, we must arrive at something that is a first mover that is moved by nothing. And this everyone understands to be God.<sup>13</sup>

A few explanatory notes are in order before we proceed to examine the argument in detail. For an argument seemingly based on motion, it is odd to find fire burning wood used as an illustrative example. Aquinas's notion of *motus* covers, in addition to change of location, some other kinds of change, such as growth of an organism and alteration of a quality in a subject, for example, a leaf's turning from green to red. Thus for Aquinas, the burning of a log is as much a case of *motus* as a cue ball striking the eight ball.

In his somewhat earlier *Summa Contra Gentiles*, Aquinas gave pride of place to the same argument, noting that its success depends on proving two of its assumptions, namely, that whatever is

moved is moved by something else and that the sequence of movers and things moved cannot be infinitely long. In this earlier presentation, Aquinas offered three separate, intricate sub-proofs for each of the two assumptions. The sub-proofs cite Aristotle's *Physics* for their authority.<sup>14</sup> By the time he wrote the *Summa Theologiae*, he had distilled the sub-proofs for the assumptions down to one apiece. It is plausible to assume that these were the sub-proofs he took to be the most convincing.

*Whatever is moved is moved by something else.* This assumption is equivalent to the proposition that nothing moves itself. At first, it seems obviously false: you sweep your eyes from left to right as you read this line; an acorn forgotten by a squirrel grows into an oak; the internal degradation of a leaf's chlorophyll accounts for its turning color. Second thoughts suggest, however, that these cases may not be counterexamples. What tugs in the opposite direction is the intellectual impulse to think that every change must have some cause or other distinct from the change itself. Aquinas's first assumption plays on that impulse.

The bulk of the first way is devoted to a campaign to establish the first assumption. The campaign begins by assimilating all cases of movement to cases of potentiality being actualized. Any particular thing will have a repertoire of potentialities. For example, in scanning a line of text, you actualize your potentiality to move your eyes in their sockets. (Owls lack this potentiality; they must instead swivel their heads to survey a landscape.) The campaign continues by claiming that

(5) Potentialities can only be actualized by something that is already actual.

(5) appears to be innocuous enough. However, Aquinas's example of the actual heat of fire transforming wood's potential heat into actual heat suggests that he has a principle in mind that is both more refined and more contentious. Let the variable letters  $x$  and  $y$  range over individuals, and let  $F$  range over properties. Then instead of (5), we have

(5') The potentiality in  $x$  to be  $F$  can only be actualized by something,  $y$ , that is already actually  $F$ .

As a general claim, (5') appears to be false. A coach can make a potential hurdler into an actual hurdler, even though the coach never ran hurdles.

The next stage of Aquinas's argument consists of the claim that nothing can be both potentially  $F$  and actually  $F$  at the same time. Because it is actually hot, boiling water can no longer be potentially hot, though it is now potentially cold. The purpose of this claim is to establish the thesis that

(6) If the actual  $F$ -ness of  $y$  actualizes  $x$ 's potential  $F$ -ness, then  $y \neq x$ .

That is, nothing can be self-actualizing.

*The sequence of movers and things moved cannot be infinitely long.* Let us begin a discussion of this assumption by calling attention to what may appear to be a contradiction in Aquinas's thought. Later in the *Summa Theologiae*, when Aquinas is discussing the nature of creation, he defends the position that the world has not existed forever but rather had a beginning. However, he also maintains that there is no evidence sufficient to demonstrate that the world began: an everlasting world is not impossible and for all that we can tell by empirical means, the world might have existed forever. That the world began by a creative act of God is an item of faith for Aquinas, accessible to us only by means of divine revelation.<sup>15</sup> He thus is committed to the possibility that God could have created a world that had no beginning!<sup>16</sup> In order to underscore that point, he acknowledges that there could have been infinitely long causal sequences, stretching backward in time with no beginning. His examples are that of a craftsman who wears out (infinitely) many hammers

throughout his career, and of the generation of children from parents. Although Genesis tells us that there were first parents, for Aquinas that is a matter of revelation, not necessity.<sup>17</sup>

These examples appear to contradict the assumption that causal sequences cannot be infinitely long. But Aquinas makes a distinction that we can begin to understand by looking at his illustrative examples. Aquinas allows that there could have been an infinite, beginningless sequence of hammers, with each hammer<sub>*n*</sub> having been manufactured with the aid of predecessor hammer<sub>*n-1*</sub>, just as there could have been an infinite sequence of parental generations in one's family tree. These two putative examples are examples of causal sequences that are ordered *per accidens*: whether they are finite or infinite in length is accidental to them. But Aquinas disallows an infinite regress of causes in the example that occurs near the end of his first way. A ball, we may suppose, is moved by a stick. The stick, in turn, is moved by the hand holding it. What moves the hand? Perhaps it was nudged by someone else. Aquinas's point is that this line of inquiry must terminate in something he calls a first or unmoved mover. This kind of causal sequence is ordered essentially or *per se*.

There are five differences between *per accidens* sequences and *per se* sequences.<sup>18</sup> (A) *Per accidens* sequences are sequential in time. Each cause in a *per accidens* sequence is earlier than that cause's effect. In *per se* sequences, the causes are all simultaneous. (B) *Per se* sequences count as sequences because they are ordered hierarchically: higher causes in the sequence have more power, actuality, or perfection than lower members of the sequence. For example, the motion of a hand imparts motion to the cue stick striking the cue ball, converting the ball's potential motion into actual motion. (C) Because they are simultaneous, all the members of a *per se* sequence exist as long as the sequence exists. Continuing existence need not hold in the case of *per accidens* sequences. Hammer<sub>*n-1*</sub> might have been destroyed before hammer<sub>*n*</sub> was manufactured. One's great-grandparents may no longer be alive. (D) *Per se* causal relations are transitive. If a hand's motion causes the cue stick's motion and the cue stick's motion causes the cue ball's motion, then the hand's motion causes the cue ball's motion. *Per accidens* causal relations need not be transitive. One's grandparents bring about one's parents but do not bring about oneself. (E) Finally, because of their hierarchical nature, membership in a *per se* sequence requires diversity of kind. The cue stick is a kind of instrument that, in virtue of its rigidity, has the capacity to transfer its actual motion to the potentially moving cue ball. The cue stick is in motion, however, because of the motion of a hand, a kind of organ with significantly more capacities than the cue stick. The hand, in turn, is part of an even more complex kind, a person, whose intention, one may presume, is to sink some object ball on the table. In the case of *per accidens* sequences, there need be no diverse hierarchy of kind. There can be hammers and ancestors all the way back.

So it is charitable to suppose that when Aquinas claims that an infinite sequence of movers is impossible, he is disbaring only an infinitely long *per se* sequence. The notion of a *per se* sequence has considerable utility for Aquinas, because it entails that, unlike the earlier movers in a *per accidens* sequence that might have expired long ago, the first mover in a *per se* sequence, "which everyone understands to be God," still must exist and be active. But even if we acknowledge the differences between the two types of sequence, why should we agree with Aquinas's claim? It is not obvious that the differences are sufficient to guarantee essential finiteness to *per se* sequences. Aquinas's argument is that if there were an infinitely long *per se* sequence, nothing would be the first mover in the sequence, and so "neither would there be other movers, because second movers do not move unless they are moved by a first mover." The argument does not establish what it may seem to establish. Consider Aquinas's example:

HAND → STICK → BALL

In this sequence, **STICK** is a second (or intermediate) mover and **HAND** is a first mover. If **HAND** is removed from the sequence, it does not follow that **STICK** ceases to be a second



mover. All that is required in order for **STICK** to retain its status as a second mover is that there be some mover higher than it. And that higher mover need not be a prime mover. It is hard to see, then, how Aquinas has shown that a sequence of higher and higher movers can only be finite.

There is more that can be said in defense of Aquinas's views about *per se* sequences. These views will resurface as we consider the fifth way.

### The Fifth Way

The fifth way is based on the directedness of things. For we see that some things devoid of cognitive capacity work for the sake of an end—natural bodies, obviously, because they appear always or for the most part to work in the same manner and to pursue that which is best. Thus it is clear that they arrive at an end not by chance but by design. But things not having cognitive capacity do not tend towards an end unless directed by something having cognitive capacity and intelligence, as an arrow from an archer. Therefore there is some intelligent being from whom every natural thing is set in order to an end, and this we call God.<sup>19</sup>

Imagine dividing the physical world into natural bodies and artifacts. In the Natural Bodies ledger, we would place the chemical elements, oceans, mountains, plants, and more. Arrows go in the Artifacts ledger. Though fabricated from natural bodies such as feathers, wood, and iron, arrows are a product of conscious design. Notice that the distinction between natural bodies and artifacts does not track the distinction between simpler things and more complex things. Artichokes are more complex than arrows; yet, artichokes count as natural bodies. It is not clear whether Aquinas would regard animals and humans as natural bodies. It seems odd to classify them as artifacts. What is unclear is whether Aquinas thinks that *all* natural bodies must lack cognitive capacity. Though it would be interesting to pursue the question further—for example, is the natural body/artifact distinction exhaustive?—the fifth way has a more radical message. It is that everything is an artifact, the universe as a whole and each element in it: artichokes and archers differ from arrows only in the proximate sources of their artifactuality.

The argument from design, which enjoyed its heyday in the first half of the nineteenth century, appealed to the complexity of living organisms to argue that they could not be natural bodies in the way that oceans and mountains are. Proponents of the argument from design argued persuasively that it is staggeringly improbable that matter could have been assembled by chance to form something as sophisticated and adaptive as an eagle's eye, let alone the eagle itself, or a human. Thus, they concluded, there must be an enormously wise and powerful artificer who designed and created these organic structures and organisms.<sup>20</sup>

Whatever the merits of this argument, it is not Aquinas's. In ways that Aquinas could not have known, the fifth way lends itself to a more scientifically modern interpretation. Suppose that we take advantage of the advances in science since Aquinas's time and focus our interpretation of "natural bodies" on the chemical elements, not earth, water, air, and fire, but hydrogen, helium, and their confreres. They behave "always or for the most part in the same manner," that is, their behavior conforms to empirical regularities that appear to allow for no exceptions. The regularities relevant here are the values of the four forces fundamental in physics, namely, gravitational, electromagnetic, weak, and strong. For present purposes, all we need to know is that gravitational force is roughly 40 *orders of magnitude* weaker than the other three forces.<sup>21</sup> Yet, holding the other forces constant, it is crucially important that gravity be as weak as it is.

The universe contains 98 naturally occurring elements. Soon after the Big Bang, at least 95 of them, the elements heavier than lithium, would have to be produced naturally by stellar nucleosynthesis. This process requires that stars, which begin as clouds of hydrogen atoms, be large and have a long life, in order for gravitational attraction among the atoms to have enough time to

build up sufficient pressure in the star's core to bring about nucleosynthesis. According to physicist Lee Smolin:

If the gravitational force were stronger by only a factor of ten, the lifetime of a typical star would decrease from about ten billion years to the order of ten million years. If its strength were increased by still another factor of ten . . . the lifetime of a star would shrink to ten thousand years.<sup>22</sup>

Stars realize the alchemist's dream, transmuting baser elements into gold (also oxygen, calcium, iron, and more). But they take their time, measured in billions of years, time provided by gravity's weakness.

This is one example of a more general phenomenon, the "fine-tuning" of the universe's physical parameters. The parameters might have had many different values, but in the unlimitedly many scenarios in which the values differ, either no universe develops—for example, matter collapses back into a singularity shortly after the Big Bang—or matter/energy dissipates so quickly that none of the heavy elements can be formed. It is a tempting step to infer that fine-tuning requires a fine-tuner, a being of immense wisdom and power, "and this," as Aquinas puts it, "we call God."

It may come as no surprise that alternative inferences have been offered.<sup>23</sup> Many of them have in common the postulation of some sort of theoretical mechanism that allows for the existence of a *multiverse*, including many—perhaps infinitely many—distinct universes. We happen to inhabit a universe that supports our existence. But in an honest casino where millions of poker hands are being dealt, it would be a mistake for a recipient of a royal flush to infer providence, divine or otherwise.

*New work for per se causes?* Multiverse theories can thus be invoked as alternative accounts to the theist's account of fine-tuning. A persistent theist may wish, however, to object that multiverse theories simply raise anew the questions to which theists believe only a supernatural answer is adequate. We can distinguish two pairs of questions.

- (7) How can there be many universes?
- (8) Why are there, or should there be, many universes?

Many physicists attracted to a multiverse theory will claim that there must be a naturalistic answer to (7), even if the answer resists empirical testing. Many of the same physicists will regard (8) either as a way of rephrasing (7) or as a question it is not the business of physics to answer. Physicists will divide on the interpretation of "not the business of physics to answer." Latitudinarians allow that (8) might be the legitimate business of some discipline other than physics. Defenders of scientism insist that if (8) is not a paraphrase of (7), and thus answerable by scientific means, then it is an illegitimate question.<sup>24</sup>

- (9) What is it about our universe that makes its behavior intelligible, explainable, and predictable?
- (10) Why does our universe continue to behave in a way that makes it intelligible, explainable, and predictable?

Physicists can answer (9) by citing the stability over time of the values of the physical parameters and the laws that describe their interactions. Question (10) demands an explanation, not for the values and laws themselves, but for their very stability. Defenders of scientism will regard (10) as on a par with (8)—unanswerable because illegitimate.



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