

**Readings
in the Philosophy
of Religion**

second edition



edited by
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READINGS IN PHILOSOPHY

Chapter 1



The Ontological Argument

The Ontological Argument

*St. Anselm and Gaunilo**

Anselm's argument. *Truly there is a God, although the fool hath said in his heart, There is no God.*

AND so, Lord, do thou, who dost give understanding to faith, give me, so far as thou knowest it to be profitable, to understand that thou art as we believe; and that thou art that which we believe. And indeed, we believe that thou art a being than which nothing greater can be conceived. Or is there no such nature, since the fool hath said in his heart, there is no God? (Psalms xiv. 1). But, at any rate, this very fool, when he hears of this being of which I speak—a being than which nothing greater can be conceived—understands what he hears, and what he understands is in his understanding; although he does not understand it to exist.

For, it is one thing for an object to be in the understanding, and another to understand that the object exists. When a painter first conceives of what he will afterwards perform, he has it in his understanding, but he does not yet understand it to be, because he has not yet performed it. But after he has made the painting, he both has it in his understanding, and he understands that it exists, because he has made it.

Hence, even the fool is convinced that something exists in the understanding, at least, than which nothing greater can be conceived. For, when he hears of this, he understands it. And whatever is understood, exists in the understanding. And assuredly that, than which nothing greater can be conceived, cannot exist in the understanding alone. For, suppose it exists in the understanding alone: then it can be conceived to exist in reality; which is greater.

Therefore, if that, than which nothing greater can be conceived, exists in the understanding alone, the very being, than which nothing greater can be conceived,

*St. Anselm (1033-1109) was a priest, philosopher and theologian. He was appointed Archbishop of Canterbury in 1093. Gaunilo of Marmoutier (near Tours, France) was an eleventh-Century monk best known for his critique of Anselm's ontological argument.

is one, than which a greater can be conceived. But obviously this is impossible. Hence, there is no doubt that there exists a being, than which nothing greater can be conceived, and it exists both in the understanding and in reality.

Gaunilo's criticism. It is said that somewhere in the ocean is an island, which, because of the difficulty, or rather the impossibility, of discovering what does not exist, is called the lost island. And they say that this island has an inestimable wealth of all manner of riches and delicacies in greater abundance than is told of the Islands of the Blest; and that having no owner or inhabitant, it is more excellent than all other countries, which are inhabited by mankind, in the abundance with which it is stored.

Now if some one should tell me that there is such an island, I should easily understand his words, in which there is no difficulty. But suppose that he went on to say, as if by a logical inference: "You can no longer doubt that this island which is more excellent than all lands exists somewhere, since you have no doubt that it is in your understanding. And since it is more excellent not to be in the understanding alone, but to exist both in the understanding and in reality, for this reason it must exist. For if it does not exist, any land which really exists will be more excellent than it; and so the island already understood by you to be more excellent will not be more excellent."

If a man should try to prove to me by such reasoning that this island truly exists, and that its existence should no longer be doubted, either I should believe that he was jesting, or I know not which I ought to regard as the greater fool: myself, supposing that I should allow this proof; or him, if he should suppose that he had established with any certainty the existence of this island. For he ought to show first that the hypothetical excellence of this island exists as a real and indubitable fact, and in no wise as any unreal object, or one whose existence is uncertain, in my understanding.

Anselm's reply. But, you say, it is as if one should suppose an island in the ocean, which surpasses all lands in its fertility, and which, because of the difficulty, or the impossibility, of discovering what does not exist, is called a lost island; and should say that there can be no doubt that this island truly exists in reality, for this reason, that one who hears it described easily understands what he hears.

Now I promise confidently that if any man shall devise anything existing either in reality or in concept alone (except that than which a greater be conceived) to which he can adapt the sequence of my reasoning, I will discover that thing, and will give him his lost island, not to be lost again.

But it now appears that this being than which a greater is inconceivable cannot be conceived not to be, because it exists on so assured a ground of truth; for otherwise it would not exist at all.

Hence, if any one says that he conceives this being not to exist, I say that at the time when he conceives of this either he conceives of a being than which a greater

is inconceivable, or he does not conceive at all. If he does not conceive, he does not conceive of the non-existence of that of which he does not conceive. But if he does conceive, he certainly conceives of a being which cannot be even conceived not to exist. For if it could be conceived not to exist, it could be conceived to have a beginning and an end. But this is impossible.

He, then, who conceives of this being conceives of a being which cannot be even conceived not to exist; but he who conceives of this being does not conceive that it does not exist; else he conceives what is inconceivable. The non-existence, then, of that than which a greater cannot be conceived is inconceivable.

Discussion

1. To whom does Anselm address his remarks? What do we ordinarily call what he is? How does this affect your understanding of the argument?
2. What does he ask God to grant him? What does this imply about his view of the relationship of reason to faith?
3. How does Anselm define God? What does this imply about God?
4. What is the heart of Gaunilo's criticism?
5. What is the heart of Anselm's reply?



The Cosmological Argument

The Five Ways

Thomas Aquinas*

Claim. The existence of God can be proved in five ways.

The argument from motion. The first and more manifest way is the argument from motion. It is certain, and evident to our senses, that in the world some things are in motion. Now whatever is in motion is put in motion by another, for nothing can be in motion except it is in potentiality to that towards which it is in motion; whereas a thing moves inasmuch as it is in act. For motion is nothing else than the reduction of something from potentiality to actuality. But nothing can be reduced from potentiality to actuality, except by something in a state of actuality. Thus that which is actually hot, as fire, makes wood, which is potentially hot, to be actually hot, and thereby moves and changes it. Now it is not possible that the same thing should be at once in actuality and potentiality in the same respect, but only in different respects. For what is actually hot cannot simultaneously be potentially hot; but it is simultaneously potentially cold. It is therefore impossible that in the same respect and in the same way a thing should be both mover and moved, i.e., that it should move itself. Therefore, whatever is in motion must be put in motion by another. If that by which it is put in motion be itself put in motion, then this also must needs be put in motion by another, and that by another again. But this cannot go on to infinity, because then there would be no first mover, and, consequently, no other mover; seeing that subsequent movers move only inasmuch as they are put in motion by the first mover; as the staff moves only because it is put in motion by the hand. Therefore it is necessary to arrive at a first mover, put in motion by no other; and this everyone understands to be God.

Argument from the nature of efficient causes. The second way is from the nature of the efficient cause. In the world of sense we find there is an order of efficient causes. There is no case known (neither is it, indeed, possible) in which a thing

*Thomas Aquinas (1225-1274), an Italian philosopher-theologian, taught at the University of Paris.

evidence for it." ("Modal Versions of the Ontological Argument," p. 92). But it's not obvious that the burden of proof rests on Plantinga to develop a criterion of rationality, acceptable to every philosopher, according to which someone in Ann's circumstances is "evidently" rational in believing (P). (For one thing, if it seems evident to Plantinga that Ann's accepting (P) in these circumstances is rational, presumably any criterion that renders her belief irrational would be suspect for him.) Perhaps the burden of proof is on Rowe to develop a universally-accepted theory of rationality according to which Ann's acceptance of (P) is *not* rational. After all, the claim that someone's belief is rational is a relatively modest one.

15. For Morris' argument, see "Necessary Beings," *Mind* 94 (1985): pp. 263-72. With respect to supposed necessary entities that are material objects, Morris suggests appealing either to the intuition that no material object can exist necessarily or to a companion principle to (D), namely: (D') It is possible for a created non-divine person to be thankful to God for any part of his natural causal environment.

Discussion

1. In your own words: What is a possible world?
2. What is the property of maximal greatness?
3. If a maximally great being is possible, a maximally great being is necessary. Rewrite this in possible worlds language.
4. Present one objection to Plantinga's argument and the response.

is found to be the efficient cause of itself; for so it would be prior to itself, which is impossible. Now in efficient causes it is not possible to go on to infinity, because in all efficient causes following in order, the first is the cause of the intermediate cause, and the intermediate is the cause of the ultimate cause, whether the intermediate cause be several, or only one. Now to take away the cause is to take away the effect. Therefore, if there be no first cause among efficient causes, there will be no ultimate, nor any intermediate cause. But if in efficient causes it is possible to go on to infinity, there will be no first efficient cause, neither will there be an ultimate effect, nor any intermediate efficient causes; all of which is plainly false. Therefore it is necessary to admit a first efficient cause, to which everyone gives the name of God.

Argument from possibility. The third way is taken from possibility and necessity, and runs thus. We find in nature things that are possible to be and not to be, since they are found to be generated, and to corrupt, and consequently, they are possible to be and not to be. But it is impossible for these always to exist, for that which is possible not to be at some time is not. Therefore, if everything is possible not to be, then at one time there could have been nothing in existence. Now if this were true, even now there would be nothing in existence, because that which does not exist only begins to exist by something already existing. Therefore, if at one time nothing was in existence, it would have been impossible for anything to have begun to exist; and thus even now nothing would be in existence—which is absurd. Therefore, not all beings are merely possible, but there must exist something the existence of which is necessary. But every necessary thing either has its necessity caused by another, or not. Now it is impossible to go on to infinity in necessary things which have their necessity caused by another, as has been already proved in regard to efficient causes. Therefore we cannot but postulate the existence of some being having of itself its own necessity, and not receiving it from another, but rather causing in others their necessity. This all men speak of as God.

The argument from gradation. The fourth way is taken from the gradation to be found in things. Among beings there are some more and some less good, true, noble and the like. But “more” and “less” are predicated of different things, according as they resemble in their different ways something which is the maximum, as a thing is said to be hotter according as it more nearly resembles that which is hottest; so that there is something which is truest, something best, something noblest and, consequently, something which is uttermost being; for those things that are greatest in truth are greatest in being, as it is written in *Metaph.* ii. Now the maximum in any genus is the cause of all in that genus; as fire, which is the maximum heat, is the cause of all hot things. Therefore there must also be something which is to all beings the cause of their being, goodness, and every other perfection; and this we call God.

The teleological argument. The fifth way is taken from the governance of the world. We see that things which lack intelligence, such as natural bodies, act for an

end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence it is plain that not fortuitously, but designedly, do they achieve their end. Now whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is shot to its mark by the archer. Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God.

Discussion

1. Which of Aquinas's Five Ways seems, at first glance, the most plausible? Why?
2. Do any of the arguments give you the impression that Aquinas is playing a logical trick? Where do you think the “trick” is located?
3. What exactly would each argument, if cogent, prove about the *nature* of God?
4. Suppose that you, like Aquinas, wished to argue for the existence of God based on the best scientific knowledge (*scientia*) of your day. Where do you think you might start? Are there items of knowledge which you think are best explained by the existence of God?

Notes

1. The clearest account is in "On the Ultimate Origination of Things," printed, e.g., in G.W. Leibniz, *Philosophical Writings* (London: Dent, 1934), pp. 32-41.
2. Immanuel Kant, *Critique of Pure Reason*, translated by N. Kemp Smith (London: Macmillan, 1933), *Transcendental Dialectic*, Book II, Chapter III, Section 5.
3. *The Leibniz-Clarke Correspondence*, edited by H.G. Alexander (Manchester University Press, 1956 and 1976), Leibniz's Second Paper.
4. *The Leibniz-Clarke Correspondence*, Clarke's Third and Fifth Replies.
5. Plato, *Phaedo*, pp. 97-99.
6. W.L. Craig, *The Cosmological Argument from Plato to Leibniz* (London: Macmillan, 1980), p. 287.

Discussion

1. If each and every part within the universe were explained, do you think the universe as a whole would nonetheless require an explanation? Why or why not?
2. What is the distinction between *a priori* and *a posteriori*? Mackie claims that the principle of sufficient reason is not justifiable *a priori*, so it must be justified *a posteriori* (which cannot, he contends, be done). If we cannot demonstrate the principle of sufficient reason, *a priori* or *a posteriori*, does that mean that it would not be reasonable for anyone to accept it?
3. What would your life be like if you fully realized the consequences of living in a world which lacked a sufficient reason for its existence?

The Kalaam Version of the Cosmological Argument

William Lane Craig*

Why is there something? "The first question which should rightly be asked," wrote the great German philosopher and mathematician Gottfried Wilhelm Leibniz, "is: Why is there something rather than nothing?" Think about that for a moment. Why *does* anything exist at all, rather than nothing? Why does the universe, or matter, or anything at all exist, instead of just empty space?

Many great minds have been puzzled by this problem. For example, in his biography of the renowned philosopher Ludwig Wittgenstein, Norman Malcolm reports,

... He said that he sometimes had a certain experience which could best be described by saying that "when I have it, *I wonder at the existence of the World*. I am then inclined to use such phrases as 'How extraordinary that anything should exist!' or 'How extraordinary that the world should exist!'"¹

Similarly, the Australian philosopher J.J.C. Smart has said, "... My mind often seems to reel under the immense significance this question has for me. That anything exists at all does seem to me a matter for the deepest awe."²

Why *does* something exist instead of nothing? Unless we are prepared to believe that the universe simply popped into existence uncaused out of nothing, then the answer must be: Something exists because there is an eternal, uncaused being for which no further explanation is possible. But who or what is this eternal, uncaused being? Leibniz identified it with God. But many modern philosophers have identified it with the universe itself.

Now this is exactly the position of the atheist, that the universe itself is uncaused and eternal, or, as Russell remarks, "... The universe is just there, and that's all." But this means, of course, that our lives are without ultimate significance, value or purpose, and that we are therefore abandoned to futility and despair. Indeed, Russell himself acknowledges that life can be faced only upon the "firm foundation of unyielding despair."³

Are there reasons to believe that the universe is not eternal and uncaused, that there is something more? I think that there are.... I want to ... expound two philosophical arguments for why I believe that the universe had a beginning.

An actual infinite? Here is the first philosophical argument:

1. An actual infinite cannot exist.
2. A beginningless series of events in time is an actual infinite.
3. Therefore, a beginningless series of events in time cannot exist.

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there could be for each of the infinite colors an infinite number of books. So you would have an infinity of infinities. And yet it would still be true that if you took all the books of all the colors and added them together, you wouldn't have any more books than if you had taken just the books of a single color.

Let's continue. Suppose each book had a number printed on its spine. Because the collection is actually infinite, *every possible number* is printed on some book. So we could not add another book to the library, for what number would we assign to it? All the numbers have been used up! Thus, the new book could not have a number. But this is absurd, since objects in reality can be numbered.

If an infinite library could exist, it would be impossible to add another book to it. But this conclusion is obviously false, for all we have to do is tear out a page from each of the first hundred books, add a title page, stick them together and put this new book on the shelf. It would be that easy to add to the library. So the only conclusion left to us is that an actually infinite library could not exist.

But suppose we could add to the library, and I put a book on the shelf. According to mathematicians, the number of books in the collection is the same as before. How can this be? If I put the book on the shelf, there is one more book in the collection; if I take it off the shelf, there is one less. I can see myself add and remove the book. Am I really to believe that when I add the book there are no more books in the collection and when I remove it there are no fewer books? Suppose I add an infinity of books to the collection. Am I seriously to believe that there are no more books in the collection than before? What if I add an infinity of infinities of books to the collection? Is there now not one single book more in the collection than before? I find this hard to believe.

Now let's reverse the process and loan out some of the books. Suppose we loan out book number one. Isn't there now one fewer book in the collection? Let's loan out all the odd-numbered books. We have loaned out an infinite number of books, and yet mathematicians would say there are no fewer books in the collection. When we loaned out all these books, a great number of gaps were left behind on the shelves. Suppose we push all the books together again to close the gaps. All those gaps added together would add up to an infinite distance. But, according to mathematicians, the shelves would still be full, the same as before you loaned any out!

Now suppose we loaned out book numbers 4, 5, 6 ... out to infinity. At a single stroke, the collection would be virtually eliminated, the shelves emptied, and the infinite library reduced to finitude. And yet, we have removed exactly the same number of books this time as when we first loaned out all the odd numbered books! Does anybody believe such a library could exist in reality?

These examples serve to illustrate that an actual infinite cannot exist in the real world. Again I want to underline the fact that what I have argued in no way threatens the theoretical system bequeathed by Cantor to modern mathematics. Indeed, some of the most eager enthusiasts of transfinite mathematics, such as David Hilbert, are only too ready to agree that the concept of actual infinity is an idea only and has no relation to the real world. So we can conclude the first step: an actual infinite cannot exist.

Beginningless series = actual infinity. The second step is: *a beginningless series of events in time is an actual infinite.* By "event" I mean something that happens. Thus, this step is concerned with change and holds that, if the series of past events or changes goes back and back and never had a beginning, then, considered all together, these events constitute an actually infinite collection.

Let me provide an example. Suppose we ask someone where a certain star came from. He replies that it came from an explosion in a star that existed before it. Then we ask, where did *that* star come from? Well, it came from another star before that. And where did that star come from? From another, previous star, and so on and so on. This series of stars would be an example of a beginningless series of events in time.

Now if the universe has existed forever, then the series of all past events taken together constitutes an actual infinite, because every event in the past was preceded by another event. Thus, the series of past events would be infinite. It would not be potentially infinite, for we have seen that the past is complete and actual; only the future can be described as a potential infinite. It seems obvious, therefore, that a beginningless series of events in time is an actual infinite.

But that brings us to our conclusion: *a beginningless series of events in time cannot exist.* We know that an actual infinite cannot exist in reality. Since a beginningless series of events in time is an actual infinite, such a series cannot exist. So the series of all past events must be finite and have a beginning. But the universe *is* the series of all events, so the universe must have had a beginning.

Let me give you a few examples to make the point clear. We know that, if an actual infinite could exist in reality, it would be impossible to add to it. But the series of events in time is being added to every day, or at least, so it appears. If the series were actually infinite, then the number of events that have occurred up to the present moment is no greater than the number of events up to, say, 1789, or any point in the past, no matter how long ago it might be.

Take another example. Suppose Earth and Jupiter have been orbiting the sun from eternity. Suppose that it takes the Earth one year to complete one orbit, and it takes Jupiter three years to complete one orbit. So for every one orbit Jupiter completes, Earth completes three. Here is the question: If they have been orbiting from eternity, which has completed more orbits? The answer is: They are equal. Now this seems absurd, since the longer they went, the farther and farther Jupiter would fall behind. How could they possibly be equal?

Or, finally, suppose we meet a man who claims to have been counting from eternity and now he is finishing: ... -5, -4, -3, -2, -1, 0. Now this is impossible, for we may ask, why didn't he finish counting yesterday or the day before or even the year before? By then an infinity of time had already elapsed, so that he should have finished. The fact is we would never find anyone completing such a task because at any previous point in time he would have already finished. There would never be a point in the past at which we could find him counting at all, for he would have already finished. But if, no matter how far back in time we go, we never find him

counting, then it cannot be true that he has been counting from eternity. This illustrates once more that the series of past events could not be without a beginning, for if you could not count numbers from eternity, neither could you have events from eternity.

These examples underline the absurdity of a beginningless series of events in time. Because such a series is an actual infinite, and an actual infinite cannot exist, a beginningless series of events in time cannot exist. This means that the universe began to exist, which is the point that we set out to prove.

The second argument: the impossibility of traversing the infinite. Let's look now at the second philosophical argument for the beginning of the universe. Here it is:

1. The series of events in time is a collection formed by adding one member after another.
2. A collection formed by adding one member after another cannot be actually infinite.
3. Therefore, the series of events in time cannot be actually infinite.

This argument does not debate the existence of an actual infinite. But it does argue that an actual infinite cannot come to exist by adding the members of a collection one after the other.

Let's look at the first step: *The series of events in time is a collection formed by adding one member after another.* This point is pretty obvious. When we consider the collection of all past events, it is clear that those events did not exist simultaneously, but they existed one after another in time. So we have one event, then another after that, then another, and so on. So when we talk about the collection of "all past events," we are talking about a collection that has been formed by adding one member after another.

The second step is the crucial one: *A collection formed by adding one member after another cannot be actually infinite.* Why? Because no matter how many members a person added to the collection, he could always add one more. Therefore he could never arrive at infinity.

Sometimes this is called the impossibility of counting to infinity. No matter how many numbers you count, you could always count one more. You would never arrive at infinity.

Or sometimes this is referred to as the impossibility of traversing the infinite. You could never cross an infinite distance. Imagine a man running up a flight of stairs and every time his foot strikes the top step, another step appears above it. It is clear that the man could run forever, but he would never cross all the steps because you could always add one more step.

Now notice that this impossibility has nothing to do with the amount of time available. The very nature of the infinite requires that it cannot be formed by adding one

member after another, regardless of the amount of time available. Thus, an infinite collection could come to exist in the real world only if all the members were created simultaneously. For example, if our library of infinite books were to exist in the real world, it would have to be created instantaneously by God. God would say, "Let there be...!" and the library would come into existence all at once. But forming the library by adding one book at a time would be impossible, because you would never arrive at infinity.

Therefore, our conclusion must be: *The series of events in time cannot be actually infinite.* If there were an infinite number of days prior to today, then today would never arrive. It is impossible to "cross" an infinite number of days to reach today. But, obviously, today has arrived. So we know that prior to today, there cannot have been an infinite number of days. Therefore the number of days is finite, and the universe must have had a beginning.

Contemporary philosophers have shown themselves incapable of refuting this reasoning.⁵ Thus, one of them asks: "If an infinite series of events has preceded the present moment, how did we get to the present moment? How could we get to the present moment—where we obviously are now—if the present moment was preceded by an infinite series of events?"⁶ Concluding that this difficulty has not been overcome and that the issue is still in dispute, he passes on to another subject, leaving the argument unrefuted. Similarly, another philosopher comments rather weakly, "It is difficult to show exactly what is wrong with this argument," and with that remark moves on without further ado.⁷

Conclusion. So we have two philosophical arguments to prove that the universe had a beginning. First, we argued that an actual infinite cannot exist. Since a beginningless universe would involve an actually infinite number of past events, the universe must have had a beginning. Second, we argued that an actually infinite collection cannot be formed by adding one member after another. Since the series of past events has been formed by adding one event after another, it cannot be infinite, and the universe must have had a beginning. [Which, he argues in the remainder of the book, is God.]

Notes

1. Norman Malcolm, *Ludwig Wittgenstein: A Memoir* (London: Oxford University Press, 1958), p. 70.
2. J.J.C. Smart, "The Existence of God," *Church Quarterly Review* 156 (1955), p. 194.
3. Bertrand Russell and F.C. Copleston, "The Existence of God," in *The Existence of God*, ed. with an Introduction by John Hick, Problems of Philosophy Series (New York: Macmillan and Co., 1964), pp. 174, 176.
4. David Hilbert, "On the Infinite," in *Philosophy of Mathematics*, ed. with an Introduction by Paul Benacerraf and Hilary Putnam (Englewood Cliffs, NJ: Prentice Hall, 1964), pp. 139, 141.

5. For an in-depth discussion of this, see my book, *The Kalaam Cosmological Argument* (London: Macmillan, 1979; New York: Barnes & Noble, 1979), Appendixes 1 and 2.
6. John Hospers, *An Introduction to Philosophical Analysis*, 2nd ed. (London: Routledge & Kegan Paul, 1967), p. 434.
7. William L. Rowe, *The Cosmological Argument* (Princeton, NJ: Princeton University Press, 1975), p. 122.

Discussion

1. Has your mind ever reeled at the sheer wonder of the existence of the universe? Why or why not?
2. What makes Craig's argument that an actual infinite cannot really exist *seem* so persuasive? *Is* it persuasive?
3. It is impossible, according to Craig's first argument, for the universe to be an actual infinite. But if there is a God, he surely has existed forever. How could an eternally existent God be a better explanation of the existence of the universe than simply postulating an eternally existent universe?

Chapter 3



The Argument from Design

The Watch and the Watchmaker

*William Paley**

The watch. In crossing a heath, suppose I pitched my foot against a *stone*, and were asked how the stone came to be there, I might possibly answer, that for any thing I knew to the contrary it had lain there for ever; nor would it, perhaps, be very easy to show the absurdity of this answer. But suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given, that for any thing I knew the watch might have always been there. Yet why should not this answer serve for the watch as well as for the stone; why is it not as admissible in the second case as in the first? For this reason, and for no other, namely, that when we come to inspect the watch, we perceive—what we could not discover in the stone—that its several parts are framed and put together for a purpose, *e.g.*, that they are so formed and adjusted as to produce motion, and that motion so regulated as to point out the hour of the day; that if the different parts had been differently shaped from what they are, or placed after any other manner or in any other order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it. To reckon up a few of the plainest of these parts and of their offices, all tending to one result: We see a cylindrical box containing a coiled elastic spring, which, by its endeavor to relax itself, turns round the box. We next observe a flexible chain—artificially wrought for the sake of flexure—communicating the action of the spring from the box to the fusee. We then find a series of wheels, the teeth of which catch in and apply to each other, conducting the motion from the fusee to the balance and from the balance to the pointer, and at the same time, by the size and shape of those wheels, so regulating that motion as to terminate in causing an index, by an equable and measured progression, to pass over a given space in a given time. We take notice that the wheels are made of brass, in order to keep them from rust; the springs of steel, no other metal being so elastic; that over the face of

*William Paley (1743-1805) was an English philosopher and theologian.

the watch there is placed a glass, a material employed in no other part of the work, but in the room of which, if there had been any other than a transparent substance, the hour could not be seen without opening the case. This mechanism being observed—it requires indeed an examination of the instrument, and perhaps some previous knowledge of the subject, to perceive and understand it; but being once, as we have said, observed and understood, the inference we think is inevitable, that the watch must have had a maker—that there must have existed, at some time and at some place or other, an artificer or artificers who formed it for the purpose which we find it actually to answer, who comprehended its construction and designed its use.

Anticipated objections. Nor would it, I apprehend, weaken the conclusion, that we had never seen a watch made—that we had never known an artist capable of making one—that we were altogether incapable of executing such a piece of workmanship ourselves, or of understanding in what manner it was performed; all this being no more than what is true of some exquisite remains of ancient art, of some lost arts, and, to the generality of mankind, of the more curious productions of modern manufacture. Does one man in a million know how oval frames are turned? Ignorance of this kind exalts our opinion of the unseen and unknown artist's skill, if he be unseen and unknown, but raises no doubt in our minds of the existence and agency of such an artist, at some former time and in some place or other. Nor can I perceive that it varies at all the inference, whether the question arise concerning a human agent or concerning an agent of a different species, or an agent possessing in some respects a different nature.

Neither, secondly, would it invalidate our conclusion that the watch sometimes went wrong, or that it seldom went exactly right. The purpose of the machinery, the design, and the designer might be evident, and in the case supposed, would be evident, in whatever way we accounted for the irregularity of the movement, or whether we could account for it or not. It is not necessary that a machine be perfect, in order to show with what design it was made: still less necessary, where the only question is whether it were made with any design at all.

Nor, thirdly, would it bring any uncertainty into the argument, if there were a few parts of the watch, concerning which we could not discover or had not yet discovered in what manner they conduced to the general effect; or even some parts, concerning which we could not ascertain whether they conduced to that effect in any manner whatever. For, as to the first branch of the case, if by the loss, or disorder, or decay of the parts in question, the movement of the watch were found in fact to be stopped, or disturbed, or retarded, no doubt would remain in our minds as to the utility or intention of these parts, although we should be unable to investigate the manner according to which, or the connection by which, the ultimate effect depended upon their action or assistance; and the more complex the machine, the more likely is this obscurity to arise. Then, as to the second thing supposed, namely, that there were parts which might be spared without prejudice to the movement of the watch, and that we had proved this by experiment, these

superfluous parts, even if we were completely assured that they were such, would not vacate the reasoning which we had instituted concerning other parts. The indication of contrivance remained, with respect to them, nearly as it was before.

Nor, fourthly, would any man in his senses think the existence of the watch with its various machinery accounted for, by being told that it was one out of possible combinations of material forms; that whatever he had found in the place where he found the watch, must have contained some internal configuration or other; and that this configuration might be the structure now exhibited, namely, of the works of a watch, as well as a different structure.

Nor, fifthly, would it yield his inquiry more satisfaction, to be answered that there existed in things a principle of order, which had disposed the parts of the watch into their present form and situation. He never knew a watch made by the principle of order; nor can he even form to himself an idea of what is meant by a principle of order, distinct from the intelligence of the watchmaker.

Sixthly, he would be surprised to hear that the mechanism of the watch was no proof of contrivance, only a motive to induce the mind to think so:

And not less surprised to be informed, that the watch in his hand was nothing more than the result of the laws of *metallic* nature. It is a perversion of language to assign any law as the efficient, operative cause of any thing. A law presupposes an agent; for it is only the mode according to which an agent proceeds: it implies a power; for it is the order according to which that power acts. Without this agent, without this power, which are both distinct from itself, the *law* does nothing, is nothing. The expression, the "law of metallic nature," may sound strange and harsh to a philosophic ear; but it seems quite as justifiable as some others which are more familiar to him, such as "the law of vegetable nature," "the law of animal nature," or, indeed, as "the law of nature" in general, when assigned as the cause of phenomena, in exclusion of agency and power, or when it is substituted into the place of these.

Neither, lastly, would our observer be driven out of his conclusion or from his confidence in its truth; by being told that he knew nothing at all about the matter. He knows enough for his argument; he knows the utility of the end; he knows the subserviency and adaptation of the means to the end. These points being known, his ignorance of other points, his doubts concerning other points, affect not the certainty of his reasoning. The consciousness of knowing little need not beget a distrust of that which he does know....

The eye.... [E]very indication of contrivance, every manifestation of design which existed in the watch, exists in the works of nature, with the difference on the side of nature of being greater and more, and that in a degree which exceeds all computation. I mean, that the contrivances of nature surpass the contrivances of art, in the complexity, subtilty, and curiosity of the mechanism; and still more, if possible, do they go beyond them in number and variety; yet, in a multitude of cases, are not less evidently mechanical, not less evidently contrivances, not less evidently accom-

modated to their end or suited to their office, than are the most perfect productions of human ingenuity.

I know no better method of introducing so large a subject, than that of comparing a single thing with a single thing: an eye, for example, with a telescope. As far as the examination of the instrument goes, there is precisely the same proof that the eye was made for vision, as there is that the telescope was made for assisting it. They are made upon the same principles; both being adjusted to the laws by which the transmission and refraction of rays of light are regulated. I speak not of the origin of the laws themselves; but such laws being fixed, the construction in both cases is adapted to them. For instance, these laws require, in order to produce the same effect, that the rays of light, in passing from water into the eye, should be refracted by a more convex surface than when it passes out of air into the eye. Accordingly we find that the eye of a fish, in that part of it called the crystalline lens, is much rounder than the eye of terrestrial animals. What plainer manifestation of design can there be than this difference? What could a mathematical instrument maker have done more to show his knowledge of his principle, his application of that knowledge, his suiting his means to his end? ...

But this, though much, is not the whole: by different species of animals, the faculty we are describing is possessed in degrees suited to the different range of vision which their mode of life and of procuring their food requires. *Birds*, for instance, in general, procure their food by means of their beak; and the distance between the eye and the point of the beak being small, it becomes necessary that they should have the power of seeing very near objects distinctly. On the other hand, from being often elevated much above the ground, living in the air, and moving through it with great velocity, they require for their safety, as well as for assisting them in descrying their prey, a power of seeing at a great distance—a power of which, in birds of rapine, surprising examples are given. The fact accordingly is, that two peculiarities are found in the eyes of birds, both tending to *facilitate* the change upon which the adjustment of the eye to different distances depends. The one is a bony, yet, in most species, a flexible rim or hoop, surrounding the broadest part of the eye, which confining the action of the muscles to that part, increases the effect of their lateral pressure upon the orb, by which pressure its axis is elongated for the purpose of looking at very near objects. The other is an additional muscle called the marsupium, to draw, on occasion, the crystalline lens *back*, and to fit the same eye for the viewing of very distant objects. By these means, the eyes of birds can pass from one extreme to another of their scale of adjustment, with more ease and readiness than the eyes of other animals.

The eyes of *fishes* also, compared with those of terrestrial animals, exhibit certain distinctions of structure adapted to their state and element. We have already observed upon the figure of the crystalline compensating by its roundness the density of the medium through which their light passes. To which we have to add, that the eyes of fish, in their natural and indolent state, appear to be adjusted to near objects, in this respect differing from the human eye, as well

as those of quadrupeds and birds. The ordinary shape of the fish's eye being in a much higher degree convex than that of land animals, a corresponding difference attends its muscular conformation, namely, that it is throughout calculated for *flattening* the eye.

The *iris* also in the eyes of fish does not admit of contraction. This is a great difference, of which the probable reason is, that the diminished light in water is never strong for the retina.

In the *eel*, which has to work its head through sand and gravel, the roughest and harshest substances, there is placed before the eye, and at some distance from it, a transparent, horny, convex case or covering, which, without obstructing the sight, defends the organ. To such an animal could any thing be more wanted or more useful?

Thus, in comparison, the eyes of different kinds of animals, we see in their resemblances and distinctions one general plan laid down, and that plan varied with the varying exigencies to which it is to be applied....

In considering vision as achieved by the means of an image formed at the bottom of the eye, we can never reflect without wonder upon the smallness yet correctness of the picture, the subtilty of the touch, the fineness of the lines. A landscape of five or six square leagues is brought into a space of half an inch diameter, yet the multitude of objects which it contains are all preserved, are all discriminated in their magnitudes, positions, figures, colors. The prospect from Hampstead-hill is compressed into the compass of a sixpence, yet circumstantially represented. A stage-coach, travelling at an ordinary speed for half an hour, passes in the eye only over one-twelfth of an inch, yet is this change of place in the image distinctly perceived throughout its whole progress; for it is only by means of that perception that the motion of the coach itself is made sensible to the eye. If any thing can abate our admiration of the smallness of the visual tablet compared with the extent of vision, it is a reflection which the view of nature leads us every hour to make, namely, that in the hands of the Creator, great and little are nothing.

Sturmius held that the examination of the eye was a cure for atheism. Besides that conformity to optical principles which its internal constitution displays, and which alone amounts to a manifestation of intelligence having been exerted in the structure—besides this, which forms, no doubt, the leading character of the organ, there is to be seen, in every thing belonging to it and about it, an extraordinary degree of care, an anxiety for its preservation, due, if we may so speak, to its value and its tenderness. It is lodged in a strong, deep, bony socket, composed by the junction of seven different bones, hollowed out at their edges. In some few species, as that of the coatimondi, the orbit is not bony throughout; but whenever this is the case, the upper, which is the deficient part, is supplied by a cartilaginous ligament, a substitution which shows the same care. Within this socket it is embedded in fat, of all animal substances the best adapted both to its repose and motion. It is sheltered by the eyebrows—an arch of hair which, like a thatched penthouse, prevents the sweat and moisture of the forehead from running down into it.

But it is still better protected by its *lid*. Of the superficial parts of the animal frame, I know none which, in its office and structure, is more deserving of attention than the eyelid. It defends the eye; it wipes it; it closes it in sleep. Are there in any work of art whatever, purposes more evident than those which this organ fulfils; or an apparatus for executing those purposes more intelligible, more appropriate, or more mechanical? If it be overlooked by the observer of nature, it can only be because it is obvious and familiar. This is a tendency to be guarded against. We pass by the plainest instances, while we are exploring those which are rare and curious; by which conduct of the understanding we sometimes neglect the strongest observations, being taken up with others which, though more recondite and scientific, are, as solid arguments, entitled to much less consideration.

In order to keep the eye moist and clean—which qualities are necessary to its brightness and its use—a wash is constantly supplied by a secretion for the purpose; and the superfluous brine is conveyed to the nose through a perforation in the bone as large as a goose-quill. When once the fluid has entered the nose, it spreads itself upon the inside of the nostril, and is evaporated by the current of warm air which in the course of respiration is continually passing over it. Can any pipe or outlet for carrying off the waste liquor from a dye-house or distillery, be more mechanical than this is? It is easily perceived that the eye must want moisture; but could the want of the eye generate the gland which produces the tear, or bore the hole by which it is discharged—a hole through a bone? ...

The argument cumulative. Were there no example in the world of contrivance except that of the *eye*, it would be alone sufficient to support the conclusion which we draw from it, as to the necessity of an intelligent Creator. It could never be got rid of, because it could not be accounted for by any other supposition which did not contradict all the principles we possess of knowledge—the principles according to which things do, as often as they can be brought to the test of experience, turn out to be true or false. Its coats and humors, constructed as the lenses of a telescope are constructed, for the refraction of rays of light to a point, which forms the proper action of the organ; the provision in its muscular tendons for turning its pupil to the object, similar to that which is given to the telescope by screws, and upon which power of direction in the eye the exercise of its office as all optical instrument depends; the further provision for its defence, for its constant lubricity and moisture, which we see in its socket and its lids, in its glands for the secretion of the matter of tears, its outlet or communication with the nose for carrying off liquid after the eye is washed with it; these provisions compose altogether an apparatus, a system of parts, a preparation of means, so manifest in their design, so exquisite in their contrivance, so successful in their issue, so precious, and so infinitely beneficial in their use, as, in my opinion, to bear down all doubt that can be raised upon the subject. And what I wish, under the title of the present chapter, to observe, is, that if other parts of nature were inaccessible to our inquiries, or even if other parts of nature presented nothing to our examination but disorder and con-

fusion, the validity of this example would remain the same. If there were but one watch in the world, it would not be less certain that it had a maker. If we had never in our lives seen any but one single kind of hydraulic machine, yet if of that one kind we understood the mechanism and use, we should be as perfectly assured that it proceeded from the hand and thought and skill of a workman, as if we visited a museum of the arts, and saw collected there twenty different kinds of machines for drawing water, or a thousand different kinds for other purposes. Of this point each machine is a proof independently of all the rest. So it is with the evidence of divine agency. The proof is not a conclusion which lies at the end of a chain of reasoning, of which chain each instance of contrivance is only a link, and of which, if one link fail, the whole fails; but it is an argument separately supplied by every separate example. An error in stating an example affects only that example. The argument is cumulative in the fullest sense of that term. The eye proves it without the ear; the ear without the eye. The proof in each example is complete; for when the design of the part, and the conduciveness of its structure to that design is shown, the mind may set itself at rest; no future consideration can detract any thing from the force of the example....

The designer. Contrivance, if established, appears to me to prove every thing which we wish to prove. Among other things, it proves the *personality* of the Deity, as distinguished from what is sometimes called nature, sometimes called a principle which terms, in the mouths of those who use them philosophically, seem to be intended to admit and to express an efficacy, but to exclude and to deny a personal agent. Now, that which can contrive, which can design, must be a person. These capacities constitute personality, for they imply consciousness and thought. They require that which can perceive an end or purpose, as well as the power of providing means and directing them to their end. They require a centre in which perceptions unite, and from which volitions flow; which is mind. The acts of a mind prove the existence of a mind; and in whatever a mind resides, is a person. The seat of intellect is a person. We have no authority to limit the properties of mind to any particular corporeal form, or to any particular circumscription of space. These properties subsist, in created nature, under a great variety of sensible forms. Also, every animated being has its *sensorium*; that is, a certain portion of space, within which perception and volition are exerted. This sphere may be enlarged to an indefinite extent—may comprehend the universe; and being so imagined, may serve to furnish us with as good a notion as we are capable of forming, of the *immensity* of the divine nature, that is, of a Being, infinite, as well in essence as in power, yet nevertheless a person....

Wherever we see marks of contrivance, we are led for its cause to an *intelligent* author. And this transition of the understanding is founded upon uniform experience. We see intelligence constantly contriving; that is, we see intelligence constantly producing effects, marked and distinguished by certain properties—not certain particular properties, but by a kind and class of properties, such as relation to

an end, relation of parts to one another and to a common purpose. We see, wherever we are witnesses to the actual formation of things nothing except intelligence producing effects so marked and distinguished. Furnished with this experience, we view the productions of nature. We observe *them* also marked and distinguished in the same manner. We wish to account for their origin. Our experience suggests a cause perfectly adequate to this account. No experience, no single instance or example, can be offered in favor of any other. In this cause, therefore, we ought to rest; in this cause the common-sense of mankind has, in fact, rested, because it agrees with that which in all cases is the foundation of knowledge—the undeviating course of their experience....

Discussion

1. Consider a watch and a rock. Which one does the world more relevantly resemble? How would the conclusion of Paley's argument differ if you were to believe that the universe is more like the rock?
2. Now reconsider the watch and compare it with an eye. Do you find it easy or difficult to resist the inclination to believe that the eye was designed?
3. Are there any adequate, non-supernatural, explanations of the apparent design of things like the human eye?

Critique of the Argument from Design

David Hume*

Cleanthes. Look round the world: contemplate the whole and every part of it: You will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions to a degree beyond what human senses and faculties can trace and explain. All these various machines, and even their most minute parts, are adjusted to each other with an accuracy which ravishes into admiration all men who have ever contemplated them. The curious adapting of means to ends, throughout all nature, resembles exactly, though it much exceeds, the productions of human contrivance; of human designs, thought, wisdom, and intelligence. Since, therefore, the effects resemble each other, we are led to infer, by all the rules of analogy, that the causes also resemble; and that the Author of Nature is somewhat similar to the mind of man, though possessed of much larger faculties, proportioned to the grandeur of the work which he has executed. By this argument *a posteriori*, and by this argument alone, do we prove at once the existence of a Deity, and his similarity to human mind and intelligence....

Philo. What I chiefly scruple in this subject, said Philo, is not so much that all religious arguments are by Cleanthes reduced to experience, as that they appear not to be even the most certain and irrefragable of that inferior kind. That a stone will fall, that fire will burn, that the earth has solidity, we have observed a thousand and a thousand times; and when any new instance of this nature is presented, we draw without hesitation the accustomed inference. The exact similarity of the cases gives us a perfect assurance of a similar event; and a stronger evidence is never desired nor sought after. But wherever you depart, in the least, from the similarity of the cases, you diminish proportionably the evidence; and may at last bring it to a very weak analogy, which is confessedly liable to error and uncertainty....

If we see a house, Cleanthes, we conclude, with the greatest certainty, that it had an architect or builder; because this is precisely that species of effect which we have experienced to proceed from that species of cause. But surely you will not affirm, that the universe bears such a resemblance to a house, that we can with the same certainty infer a similar cause, or that the analogy is here entire and perfect. The dissimilitude is so striking, that the utmost you can here pretend to is a guess, a conjecture, a presumption concerning a similar cause; and how that pretension will be received in the world, I leave you to consider.

Cleanthes. It would surely be very ill received, replied Cleanthes; and I should be deservedly blamed and detested, did I allow, that the proofs of a Deity amounted

*David Hume (1711-1776) was a Scottish philosopher best known for his skeptical views.

to no more than a guess or conjecture. But is the whole adjustment of means to ends in a house and in the universe so slight a resemblance? The economy of final causes? The order, proportion, and arrangement of every part? Steps of a stair are plainly contrived, that human legs may use them in mounting; and this inference is certain and infallible. Human legs are also contrived for walking and mounting; and this inference, I allow, is not altogether so certain, because of the dissimilarity which you remark; but does it, therefore, deserve the name only of presumption or conjecture? ...

Philo. Experience alone can point out to him the true cause of any phenomenon. Now, according to this method of reasoning ... it follows, (and is, indeed, tacitly allowed by Cleanthes himself), that order, arrangement, or the adjustment of final causes, is not of itself any proof of design; but only so far as it has been experienced to proceed from that principle. For aught we can know *a priori*, matter may contain the source or spring of order originally within itself, as well as mind does; and there is no more difficulty in conceiving, that the several elements, from an internal unknown cause, may fall into the most exquisite arrangement, than to conceive that their ideas, in the great universal mind, from a like internal unknown cause, fall into that arrangement. The equal possibility of both these suppositions is allowed. But, by experience, we find, (according to Cleanthes), that there is a difference between them. Throw several pieces of steel together, without shape or form; they will never arrange themselves so as to compose a watch. Stone, and mortar, and wood, without an architect, never erect a house. But the ideas in a human mind, we see, by an unknown, inexplicable economy, arrange themselves so as to form the plan of a watch or house. Experience, therefore, proves, that there is an original principle of order in mind, not in matter. From similar effects we infer similar causes. The adjustment of means to ends is alike in the universe, as in a machine of human contrivance. The causes, therefore, must be resembling....

But can you think, Cleanthes, that your usual phlegm and philosophy have been preserved in so wide a step as you have taken, when you compared to the universe houses, ships, furniture, machines, and, from their similarity in some circumstances, inferred a similarity in their causes? Thought, design, intelligence, such as we discover in men and other animals, is no more than one of the springs and principles of the universe, as well as heat or cold, attraction or repulsion, and a hundred others, which fall under daily observation.... But, allowing that we were to take the operations of one part of nature upon another, for the foundation of our judgement concerning the origin of the whole, (which never can be admitted), yet why select so minute, so weak, so bounded a principle, as the reason and design of animals is found to be upon this planet? What peculiar privilege has this little agitation of the brain which we call thought, that we must thus make it the model of the whole universe? Our partiality in our own favour does indeed present it on all occasions; but sound philosophy ought carefully to guard against so natural an illusion....

But to show you still more inconveniences, continued Philo, in your Anthropomorphism, please to take a new survey of your principles. *Like effects prove like causes.* This is the experimental argument; and this, you say too, is the sole theological argument. Now, it is certain, that the liker the effects are which are seen, and the liker the causes which are inferred, the stronger is the argument. Every departure on either side diminishes the probability, and renders the experiment less conclusive. You cannot doubt of the principle; neither ought you to reject its consequences.

Now, Cleanthes, said Philo, with an air of alacrity and triumph, mark the consequences. First, By this method of reasoning, you renounce all claim to infinity in any of the attributes of the Deity. For, as the cause ought only to be proportioned to the effect, and the effect, so far as it falls under our cognisance, is not infinite; what pretensions have we, upon your suppositions, to ascribe that attribute to the Divine Being? ...

Secondly, You have no reason, on your theory, for ascribing perfection to the Deity, even in his finite capacity, or for supposing him free from every error, mistake, or incoherence, in his undertakings. There are many inexplicable difficulties in the works of Nature, which, if we allow a perfect author to be proved *a priori*, are easily solved, and become only seeming difficulties, from the narrow capacity of man; who cannot trace infinite relations. But according to your method of reasoning, these difficulties become all real....

But were this world ever so perfect a production, it must still remain uncertain, whether all the excellences of the work can justly be ascribed to the workman. If we survey a ship, what an exalted idea must we form of the ingenuity of the carpenter who framed so complicated, useful, and beautiful a machine? And what surprise must we feel, when we find him a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving? Many worlds might have been botched and bungled, throughout an eternity, ere this system was struck out; much labour lost, many fruitless trials made; and a slow, but continued improvement carried on during infinite ages in the art of world-making. In such subjects, who can determine, where the truth; nay, who can conjecture where the probability lies, amidst a great number of hypotheses which may be proposed, and a still greater which may be imagined?

And what shadow of an argument, continued Philo, can you produce, from your hypothesis, to prove the unity of the Deity? A great number of men join in building a house or ship, in rearing a city, in framing a commonwealth; why may not several deities combine in contriving and framing a world?

To multiply causes without necessity, is indeed contrary to true philosophy: but this principle applies not to the present case. Were one deity antecedently proved by your theory, who were possessed of every attribute requisite to the production of the universe; it would be needless, I own, (though not absurd), to suppose any other deity existent. But while it is still a question, Whether all these attrib-

utes are united in one subject, or dispersed among several independent beings, by what phenomena in nature can we pretend to decide the controversy? Where we see a body raised in a scale, we are sure that there is in the opposite scale, however concealed from sight, some counterpoising weight equal to it; but it is still allowed to doubt, whether that weight be an aggregate of several distinct bodies, or one uniform united mass. And if the weight requisite very much exceeds any thing which we have ever seen conjoined in any single body, the former supposition becomes still more probable and natural. An intelligent being of such vast power and capacity as is necessary to produce the universe, or, to speak in the language of ancient philosophy, so prodigious an animal exceeds all analogy, and even comprehension....

And why not become a perfect Anthropomorphite? Why not assert the deity or deities to be corporeal, and to have eyes, a nose, mouth, ears, &c.? Epicurus maintained, that no man had ever seen reason but in a human figure; therefore the gods must have a human figure. And this argument, which is deservedly so much ridiculed by Cicero, becomes, according to you, solid and philosophical.

In a word, Cleanthes, a man who follows your hypothesis is able perhaps to assert, or conjecture, that the universe, sometime, arose from something like design: but beyond that position he cannot ascertain one single circumstance; and is left afterwards to fix every point of his theology by the utmost license of fancy and hypothesis....

Discussion

1. Clearly outline the argument from design as offered by Cleanthes in the first paragraph.
2. This argument is an argument from analogy and relies on the principle that *like effects prove like causes*. If it were a good analogy, what would follow about God?
3. Hume suggests that the argument might rely on a bad analogy. In what respects is the universe like and unlike a machine?
4. Hume offers an explanation of the "design" of the universe that does not appeal to God. Can you find it? Is it an equally adequate explanation?

The Blind Watchmaker

Richard Dawkins*

Paley's genius. The watchmaker of my title is borrowed from a famous treatise by the eighteenth-century theologian William Paley. His *Natural Theology*—or *Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature*, published in 1802, is the best-known exposition of the "Argument from Design," always the most influential of the arguments for the existence of a God. It is a book that I greatly admire, for in his own time its author succeeded in doing what I am struggling to do now. He had a point to make, he passionately believed in it, and he spared no effort to ram it home clearly. He had a proper reverence for the complexity of the living world, and he saw that it demands a very special kind of explanation. The only thing he got wrong—admittedly quite a big thing!—was the explanation itself. He gave the traditional religious answer to the riddle, but he articulated it more clearly and convincingly than anybody had before. The true explanation is utterly different, and it had to wait for one of the most revolutionary thinkers of all time, Charles Darwin.

Paley begins *Natural Theology* with a famous passage:

In crossing a heath, suppose I pitched my foot against a *stone*, and were asked how the stone came to be there; I might possibly answer, that, for anything I knew to the contrary, it had lain there for ever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given, that for anything I knew, the watch might have always been there.

Paley here appreciates the difference between natural physical objects like stones, and designed and manufactured objects like watches. He goes on to expound the precision with which the cogs and springs of a watch are fashioned, and the intricacy with which they are put together. If we found an object such as a watch upon a heath, even if we didn't know how it had come into existence, its own precision and intricacy of design would force us to conclude

that the watch must have had a maker: that there must have existed, at some time, and at some place or other, an artificer or artificers, who formed it for the purpose which we find it actually to answer; who comprehended its construction, and designed its use.

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Nobody could reasonably dissent from this conclusion, Paley insists, yet that is just what the atheist, in effect, does when he contemplates the works of nature, for:

every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater or more, and that in a degree which exceeds all computation.

Paley drives his point home with beautiful and reverent descriptions of the dissected machinery of life, beginning with the human eye, a favourite example which Darwin was later to use and which will reappear throughout this book. Paley compares the eye with a designed instrument such as a telescope, and concludes that "there is precisely the same proof that the eye was made for vision, as there is that the telescope was made for assisting it." The eye must have had a designer, just as the telescope had.

Paley's error. Paley's argument is made with passionate sincerity and is informed by the best biological scholarship of his day, but it is wrong, gloriously and utterly wrong. The analogy between telescope and eye, between watch and living organism, is false. All appearances to the contrary, the only watchmaker in nature is the blind forces of physics albeit deployed in a very special way. A true watchmaker has foresight: he designs his cogs and springs, and plans their interconnections, with a future purpose in his mind's eye. Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the *blind* watchmaker.

Remarkable complexity. I shall explain all this, and much else besides. But one thing I shall not do is belittle the wonder of the living "watches" that so inspired Paley. On the contrary, I shall try to illustrate my feeling that here Paley could have gone even further. When it comes to feeling awe over living "watches" I yield to nobody. I feel more in common with the Reverend William Paley than I do with the distinguished modern philosopher, a well-known atheist, with whom I once discussed the matter at dinner. I said that I could not imagine being an atheist at any time before 1859, when Darwin's *Origin of Species* was published. "What about Hume?" replied the philosopher. "How did Hume explain the organized complexity of the living world?" I asked. "He didn't," said the philosopher. "Why does it need any special explanation?"

Intellectually fulfilled atheism. Paley knew that it needed a special explanation; Darwin knew it, and I suspect that in his heart of hearts my philosopher companion knew it too. In any case it will be my business to show it here. As for David

Hume himself, it is sometimes said that that great Scottish philosopher disposed of the Argument from Design a century before Darwin. But what Hume did was criticize the logic of using apparent design in nature as *positive* evidence for the existence of a God. He did not offer any *alternative* explanation for apparent design, but left the question open. An atheist before Darwin could have said, following Hume: "I have no explanation for complex biological design. All I know is that God isn't a good explanation, so we must wait and hope that somebody comes up with a better one." I can't help feeling that such a position, though logically sound, would have left one feeling pretty unsatisfied, and that although atheism might have been *logically* tenable before Darwin, Darwin made it possible to be an intellectually fulfilled atheist.

Discussion

1. Dawkins seems to imply that it would have been reasonable, up until the time of Darwin, to believe that God was the explanation of design (even for someone like Hume). Does that seem right?
2. Do you think that Darwinian evolutionary theory is an adequate explanation of, for example, the human eye?
3. If Darwin made it possible to be "an intellectually fulfilled atheist," has he likewise made it impossible to be an intellectually fulfilled *theist*?

The Fine-Tuning Argument

Robin Collins*

Introduction. 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°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”¹—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.”² 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:

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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.³

The evidence of fine-tuning. A few examples 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.⁴
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.⁵
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.⁶
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.⁷
5. If the electromagnetic force were slightly stronger or weaker, life would be impossible, for a variety of different reasons.⁸

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.”⁹ 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.... 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 a 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.

General principle of reasoning used. We will formulate the fine-tuning argument against the atheistic single-universe hypothesis 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.

For example, the fine-tuning is much, much more probable under 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 two illustrations of the principle and then present some support for it.

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.

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.

The argument developed. Let us summarize the fine-tuning 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 in 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. 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 is 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.

Premise (2) may be defended as follows. 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.

Some objection to the fine-tuning argument. 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 of 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.

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 the 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 conclu-

sion 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.¹⁰

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.*¹¹

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 organism’s 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....

The many-universes hypothesis. 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 referred to as 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. 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.¹² Imaginatively, one can think of this pre-existing superspace as an 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 to 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 the atheistic many-universes hypothesis.

Reasons for rejecting the many-universes hypothesis. 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 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.

A second reason for rejecting the atheistic many-universes 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-universes 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....

A third reason for rejecting the atheistic many-universes hypothesis is that it cannot explain other features of the universe that seem to exhibit apparent design, whereas theism can. For example, many physicists, such as Albert Einstein, have observed that the basic laws of physics exhibit an extraordinary degree of beauty, elegance, harmony, and ingenuity. Nobel Prize winning physicist Steven Weinberg, for instance, devotes a whole chapter of his book *Dreams of a Final Theory*¹³ to explaining how the criteria of beauty and elegance are commonly used to guide physicists in formulating the right laws....

Now such beauty, elegance, and ingenuity make sense if the universe was designed by God. Under the atheistic many-universes hypothesis, however, there is no reason to expect the fundamental laws to be elegant or beautiful. As theoretical physicist Paul Davies writes, "If nature is so 'clever' as to exploit mechanisms that amaze us with their ingenuity, is that not persuasive evidence for the existence of intelligent design behind the universe? If the world's finest minds can unravel only with difficulty the deeper workings of nature, how could it be supposed that those workings are merely a mindless accident, a product of blind chance?"¹⁴

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. 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.¹⁵

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....

Notes

1. Freeman Dyson, *Disturbing the Universe* (New York: Harper & Row, 1979) 251.
2. Paul Davies, *The Cosmic Blueprint: New Discoveries in Nature's Creative Ability to Order the Universe* (New York: Simon and Schuster, 1988) 203.
3. Fred Hoyle, quoted in John Barrow and Frank Tipler, *The Anthropic Cosmological Principle* (Oxford: Oxford University Press, 1986) 22.
4. Paul Davies, *The Accidental Universe* (Cambridge: Cambridge University Press, 1982) 90-91.
5. John Leslie, "How to Draw Conclusions From a Fine-Tuned Cosmos," *Physics, Philosophy and Theology: A Common Quest for Understanding*, ed. Robert Russell, et.al. (Vatican City State: Vatican Observatory Press, 1988) 4, 35; Barrow and Tipler 322.
6. Paul Davies, *Superforce* (Touchstone, 1985) 242.
7. John Leslie, *Universes* (New York: Routledge, 1989) 39-40.
8. Leslie, "How to Draw Conclusions" 299.
9. Leslie, "How to Draw Conclusions" 300.
10. George Smith, "Atheism: The Case Against God," *An Anthology of Atheism and Rationalism*, ed. Gordon Stein (Prometheus Press, 1980) 56.
11. J.J.C. Smart, "Laws of Nature and Cosmic Coincidence," *The Philosophical Quarterly* Vol 35, 140: 275-76; italics mine.

12. For example, see Quentin Smith, "World Ensemble Explanations," *Pacific Philosophical Quarterly* 67 (1986): 82.
13. Steven Weinberg, *Dreams of a Final Theory* (New York: Vintage Books, 1994) Chapter 6, "Beautiful Theories."
14. Davies, *Superforce* 235-36.
15. See Lawrence Sklar, *Physics and Chance: Philosophical Issues in the Foundation of Statistical Mechanics* (Cambridge: Cambridge University Press, 1993) Chapter 8, for a review of the non-theistic explanations for the ordered arrangement of the universe and the severe difficulties they face.

Discussion

1. You might not understand all of the science to which Collins appeals. Suppose we assume that what he says is roughly true. How unlikely is it that the universe would have just the right physical constants to permit the evolution of human life?
2. What are some reasons for rejecting some of the non-theistic explanations of the existence of human life? Do you think Collins has made a strong case for rational belief in God? Why or why not?
3. Does Collins's argument avoid Hume's criticisms?