

LECTURE #18: Theism vs. the Many-Worlds Hypothesis

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Overview

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Many-Worlds is at least as Extravagant as Theism

Up to this point, I have consistently set aside the possibility that the anthropic coincidences could be explained in terms of the many-worlds hypothesis, the hypothesis that there actually exists some very large number (perhaps infinite, at least 10 to the 200th power) of universes, similar in scale to our own observable universe, randomly varying in case to case in the precise values taken by the various physical and cosmological constants. With such a large number of actual universes, it would not be surprising that at least one of them would have life-permitting, anthropic values. Further, it is not surprising that we find ourselves in such a universe, since otherwise neither we, nor any other kind of observer, could exist. This principle is called "observer selection".

I have not yet discussed this possibility, instead focussing on two preliminary issues: do the anthropic coincidences require any sort of explanation at all, and is theism a viable explanation of the coincidences? I have argued that the answer to both of these questions is, Yes. I have further argued that theism is the only possible **causal** explanation of the coincidences. The only alternative to a causal explanation of the coincidences is an explanation in terms of observer selection, which requires the postulation of a large number of unobserved universes. Consequently, we have narrowed the wide range of metaphysical possibilities down to just two: theism and the many-worlds hypothesis. Both seem coherent, and both would explain the coincidences. Thus, the posterior probability of each hypothesis must be quite high,

somewhere in the neighborhood of one-half. If we left the matter here, we would be able to say that theism has a non-negligible probability, in light of all the evidence.

Nonetheless, I do not think that we have to leave the matter there. There are several considerations that raise the probability of theism still further, suggesting that theism is a better explanation of the available data, or that theism is needed as an explanation for the existence of such a large number of universes.

Tie-Breakers

We have no evidence of the existence of parallel universes other than the anthropic coincidences. In contrast, we have considerable independent evidence in favor of theism. First, we have the two versions of the cosmological argument that we have already examined in some detail. We know that this universe is the effect of a transcendent cause, located outside space and time. This is the only effect of this cause to which we have access, and we find that this effect shows definite signs of design. In the absence of contrary evidence, the most reasonable thing to do is to attribute intelligence and purpose to this transcendent cause. This inference is fallible: it might be that if we had access to a larger sample of the universes produced by the transcendent cause, we might realize that the evidence of intelligence we see in this universe is misleading. However, the bare possibility of such an error does not change the fact that theism is the most reasonable conclusion on the basis of the evidence actually available.

Second, there are a variety of theistic arguments we have not yet considered. Many, including Swinburne, have argued that theism offers the best explanation of human consciousness. There are a number of arguments for theism based on the existence of moral absolutes and objective values. Finally, there are appeals to the testimony of religious experience, both commonplace and mystical, that seems to involve an awareness of a supernatural agent. Each of these arguments, even if not conclusive by itself, adds weight to the theistic side of the balance.

Supererogatory Goodness of Creation

If the many-worlds hypothesis were true, and the correct explanation of the anthropic coincidences were observer selection, then we would expect to find our universe to be a typical case of an anthropic (life-permitting) universe. Presumably, in most anthropic universes, the form of the physical laws is just barely "good" enough to make life possible. If we find that in our own universe, the constants have been fine-tuned to make life flourish, and not merely scrape by, then we would have evidence that favors theism over the many-worlds hypothesis.

Much further research needs to be conducted before we can draw any confident conclusions in this area. However, there are some early indications that there is a supererogatory degree of fine-tuning in our own universe. First, there is the fact that our universe is much simpler and more uniform than it would need to be to make life possible. We find that nearly all matter in all of the universe is composed of a very few, highly homogeneous types of particles (electrons, protons, neutrons). We find that the properties of matter are extremely stable over billions of years and constant across the cosmos. Second, we find that our own earth and its solar system seems to be ideally suited for the existence of complex life, as evidenced by the astonishing variety of life on earth, filling every conceivable niche.

The Rapidity of the Development of Life on Earth

It is remarkable that life began on earth at almost the earliest possible moment -- within a few tens of millions of years of the first existence of liquid water on the earth's surface. The life span of our own sun is still less than half expended. Prof. Robin Collins of Messiah College has developed an argument that demonstrates that, if the origin of life is the result of a series of very unlikely events, and if the existence of life is explained by positing a large number of planets and relying on observer selection, then we should expect that life on a typical planet would first arise at a stage very close to the end of the associated star's life cycle. Collins assumes that the existence of life depends on the occurrence of a set of thirty to one

hundred very unlikely events. If we posit enough planets that it becomes very likely that in some of these planets, the complete set of unlikely events come to pass, we will find that in almost all of these planets, the set of events is not completed until very close to the end of the life-span of the associated star.

If we suppose that our universe is so constructed that the self-organization of life is not an unlikely event, then we have evidence of the supererogatory goodness of our universe, of its being more than just minimally fit for the existence of life. This supererogatory goodness of the universe would itself call for theistic explanation.

The only gap in Collins's argument is his assumption that the probability of a planetary catastrophe, of the sort that would wipe out all life and all progress toward life, is quite low. If we add to Collins's model a high rate of such planetary catastrophes, then that will have two effects. First, it will make the existence of life even more unlikely, necessitating a still larger number of parallel universes. Second, it will push back the average age of the star at the time of the completion of the set of prebiotic events, since it will make it unlikely that the precursors of life could survive throughout the entire life-span of the star. This gap is something that could presumably be closed in the future, as we learn more about the evolution of stars and planetary systems.

Leslie's "Further Evidence": Fine-tuning of the Form of Laws

John Leslie argues, in Chapter 4 of *Universes*, that the fundamental form of the laws of nature has been fine-tuned to make anthropic fine-tuning possible. As Leslie points out, there are several anthropic constants that must simultaneously satisfy more than one independent anthropic constraint. That is, some of the constants must take the values they do for several independent reasons, if life is to be possible.

This fact makes it quite remarkable that a single range of values could satisfy more than one anthropic constraint. When the value of a single constant is constrained in more than one way, it would be very likely that these independent constraints put contradictory demands on the value of the constraint. By way of analogy, if I consider several algebraic equations, each with a single unknown, it would be very surprising if a single value satisfied all of the equations. Thus, it is surprising that a single range of values satisfies the various anthropic constraints simultaneously. Leslie argues that this higher-order coincidence suggests that the basic form of the laws of nature has itself been designed to make anthropic fine-tuning possible. In other words, Leslie argues that there is evidence of a higher-order fine-tuning.

Theism can explain this higher-order fine-tuning, since presumably God designed the basic form of the laws of nature, and did so in such a way as to make anthropic fine-tuning of the physical constants possible.

Can the many-worlds hypothesis explain the higher-order fine-tuning. It can, but only if we suppose that the basic form of the laws of nature varies randomly from one universe to the next. If we combine this assumption with the assumption that there is a virtual infinity of alternative universes, then observer selection can explain why the basic form of the laws of the universe is fine-tuned.

However, the price to be paid for such a super-many-worlds hypothesis is quite high. It is a fundamental maxim of the scientific method to assume that the basic form of the laws of nature is uniform, that what we observe in our own neighborhood is typical of all of reality. If we abandon this maxim, then all inductive or scientific learning becomes impossible. If the laws of nature vary randomly from universe to universe, then we have good reason to believe that the laws of our own universe are very complex, not at all simple, no matter how much evidence of apparent simplicity we observe. The number of universes with complex laws of nature is much greater than the number of universes with simple laws. No matter how much data we collect, and no longer how simple the curve to which the data can be fit, there are infinitely many more complex curves passing through the data points than there are simple curves. This means that we would never be justified in inferring the existence of simple laws of nature. The super-many-worlds hypothesis would pull the rug out from beneath the scientific enterprise.

Highly Fine-tuned versus Coarse-Tuned Universes

An additional argument for theism depends on the distinction between highly fine-tuned and coarse-tuned universes. Anthropic universes presumably fall into a range: in some cases the range of permitted values around the actual value is extremely narrow, and in other cases the local range is much wider (relatively speaking). The first kind of anthropic worlds I call "highly fine-tuned", and the second kind I call "coarse-tuned". A region of contiguous highly-fine-tuned universes is a highly fine-tuned region, and a region of contiguous coarse-tuned universes is a coarse-tuned region.

Let us assume that the number of highly fine-tuned regions is approximately the same as the number of coarse-tuned regions. By definition, the coarse-tuned regions are each much larger, containing far more worlds, than the highly fine-tuned regions. Consequently, the typical anthropic world is a coarse-tuned world. Highly fine-tuned worlds are atypical cases of anthropic worlds.

If we find evidence that our universe is a highly fine-tuned universe, this would be a very unlikely occurrence that could not be explained by observer selection, since most worlds in which observers occur are coarse-tuned. If this unlikely occurrence were also specified, then it would be something that would require a causal explanation. I would argue that being a highly fine-tuned world is clearly a specified event, since we can pick out the class of highly fine-tuned universes by a very simple description, without any post hoc reference to actual events.

If our universe is highly fine-tuned, this fact could be explained by theism. God might have a preference for creating life under circumstances that demand a high order of intelligence and foresight. Traditional theology includes the claim that God created the world for the sake of his own greater "glory". The successful carrying-out of a project of fine-tuning would make a greater contribution to the glory of the creator than the completion of a coarse-tuned universe.

As we discover more and more evidence of the fine-tuning of our own universe, the probability grows that our universe is highly fine-tuned, and not merely coarse-tuned. Theists can predict that still more anthropic coincidences will be found, a prediction that the many-worlds hypothesis cannot duplicate.

Recent work on computer simulations of the spontaneous development of life, including the so-called "Game of Life", provides evidence that our own universe is highly fine-tuned. These computer simulations provide evidence for the existence of coarse-tuned universes, universes in which the laws of physics and chemistry are, unlike those in our actual universe, robustly conducive to the existence of life (self-replicating systems). These simulated universes include physical states that take only discrete values (like on/off), in contrast to the continuous nature of the actual physical world. This discreteness makes life much easier to create and sustain under a variety of conditions, unlike the conditions in the actual world.

As we discover more instances of fine-tuning, the relative probability of theism over the many-worlds hypothesis is increased for two reasons. First, as we have seen, the existence of more instances of fine-tuning increases the probability that our universe is highly fine-tuned, a fact that theism, but not the many-worlds hypothesis, can explain. Second, as the degree of fine-tuning increases, the many-worlds hypothesis must posit an exponentially increasing number of parallel worlds. Theism, in contrast, can explain any degree of fine-tuning without any material modification of the hypothesis. As the number n increases, the probability that there are at least n worlds decreases. This decrease in probability makes it increasingly unlikely that the many-worlds hypothesis is the correct explanation of the coincidences.

Many-Worlds Itself Requires a Theistic Explanation

Suppose that we accept the many-worlds hypothesis and use observer-selection to explain the existence of anthropic values in our universe. There is still one remarkable fact for which we have no explanation: why there exist a sufficient number of universes to make the existence of life unsurprising. If a few million or billion worlds were enough, this would perhaps not be too surprising. However, the anthropic coincidences

would require that a mind-bending number of universes exist, something on the order of 10 to the 200 th power. If we consider all possible forms that reality might take, it can seem quite surprising that we find ourselves in a version of reality with such a plenitude of universes.

Theism can offer some plausible explanations of this fact. First, as Leslie argues, we could easily imagine that God has a strong preference for variety for variety's sake. This would give God a good reason for creating an infinity of universes, in which physical and cosmological constants take every possible value. Second, God might have had in mind creating such a large ensemble of universes that interesting things, like life, would be bound to happen in at least a few of them by chance alone.

As Leslie points out, theism and the many-worlds hypothesis are not logically inconsistent. If there is only one universe, then the anthropic coincidences point to the existence of God. Alternatively, if there are many universes, this fact too supports theism.

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