The Design Argument has traditionally been considered one of the great proofs of God's existence. As the fifth of Aquinas' Ways (Aquinas, 1952) and the primary argument advanced by Hume's theistic protagonist Cleanthes' (Hume, 1947), this argument for God's existence has long been considered one of the most powerful and persuasive. At the same time, the argument has faced serious criticism from philosophers like David Hume, and Darwin's theory of evolution is widely thought to have rendered the argument obsolete. This way of thinking largely persists to the present day; when confronted with the "Argument from Design," many skeptics will scoff that Darwin has demolished any hope for this theistic proof.

Although formulated in many different ways, the design argument simply claims that apparent design in the universe is evidence of an intelligent Designer. To avoid confusion, it is important to distinguish the different versions of the design argument. Some arguments from design focus on the design of earthly creatures, or even on human beings specifically. Other versions focus on the conditions of the planet earth, and point out that the earth is specially designed to support life. Still other versions focus on the supposed "beauty" of nature and the cosmos. In this paper, I will defend a distinct version of the argument that is based on the suitability of the universe for life, what is commonly referred to as the 'fine-tuning' of the universe. According to this argument, which will be designated the teleological argument, the fundamental laws and constants that govern the universe are just right to allow for the existence of complex, intelligent life. Were these values slightly altered, intelligent observers would not exist anywhere in the cosmos. One of the advantages of this version is that it avoids the Darwinian objection. Indeed, if this argument succeeds, then it demonstrates that an intelligent designer is needed to account for the very fact of evolution.

# Examples of Fine-Tuning

Perhaps the most familiar force in the universe is gravity, yet it is also at times the most mystifying to physicists. The strength of gravity is extraordinarily weak compared to other fundamental forces. The strength of gravity is also very important for holding bodies like our sun and planet together. If gravity were too strong, stars would have lifetimes shorter than a billion years, and if it were too weak (or negative), no solid bodies could exist in the universe. Given the range of forces, gravity must be fine-tuned to one part in 10^36 (Manson, 2007).

The cosmological constant is a term in Einstein's equation that acts a repulsive force when positive and an attractive force when negative. We know that this constant is very close to, but not quite, zero, and that it has a positive value. This is why the universe is expanding at its current rate. This constant must be extraordinarily precise for life to exist, at least accurate to within one part in 10<sup>53</sup> (Manson, 2007).

Carbon is extremely important for the existence of life, and if it were not for the fine-tuning of the nuclear strong force, it would not be produced in sufficient quantities to allow life. An increase or decrease of this force by approximately 1 percent would cause this unwelcome result. Increasing this force more than two percent would prohibit the existence of atoms and a reduction of 5 percent or more would make stellar burning impossible (Leslie, 1996).

The discovery of these and other remarkable instances of fine-tuning of the constants of the universe for the existence of life provides a strong foundation for a theistic argument. We can formally state the argument as;

1. The fine-tuning of the universe is either due to physical necessity, chance, or design.

2. It is not due to physical necessity or chance.

3. Therefore, the fine-tuning of the universe is due to design.

According to the teleological argument, the fine-tuning of the universe is best explained as the result of design. Of course, this provocative hypothesis has been widely criticized. For the remainder of this paper I will consider some of the primary objections to this argument, starting with the so-called anthropic principle, according to which there is actually nothing here that requires an explanation at all.

# The Anthropic Principle

The Anthropic Principle, first proposed by Brandon Carter in 1974, is actually a very modest claim. It merely states that what we expect to observe must be limited by the conditions necessary for us to be observers in the first place (Craig, 1990). Stated this way, the principle appears to be trivially true. However, Barrow and Tipler, in their massive study of cosmological fine-tuning, contend that this simple principle has far reaching implications (1988). They contend that the anthropic principle entails that we should not be surprised to observe that the constants of the universe are compatible with our existence, even though the probability of these constants having life-permitting values is extraordinarily low. They argue that our existence acts as a selection effect that

limits the range the values can take. If this sort of anthropic reasoning is valid, then there is literally nothing to be surprised about and fine-tuning does not beg for an explanation.

Unfortunately, this reasoning seems to be entirely fallacious. John Leslie has offered a persuasive analogy to demonstrate that, in actual fact, we should be surprised to see that we are alive (1996). Leslie asks us to imagine a firing squad of fifty well-trained marksmen. After being convicted of high treason, you are dragged in front of the fifty marksmen to be executed. Your body tenses up as the general counts down 3...2...1...BANG! All fifty marksmen fire their guns, and, to your absolute astonishment, you notice that you are still alive!

It would hardly be sufficient to say; "Well, it seems unlikely that all fifty marksmen would miss me, but there is no reason for me to be surprised that I am still alive. After all, if I weren't alive, then I wouldn't be around to notice it!" Clearly, it is appropriate to be genuinely surprised that we survived the marksmen, and at this point we are probably entertaining the possibility that the whole thing was a hoax or a malicious joke.

We see from Leslie's example that, while it is true that we should not be surprised that we do not observe a life-prohibiting universe (since we would not be around to observe it), we still ought to be surprised to observe a life-permitting universe (since such a universe is extremely unlikely, just like 50 marksmen missing their mark at one time.) Therefore, anthropic considerations do not relieve us of the need to explain the finetuning of the universe.

#### Physical Necessity

The teleological argument hinges on the idea that certain values or constants that describe the universe could be different than they are. However, some scientists hope to find a fundamental theory that explains why the constants have the values they do. Indeed, the dream of finding the ultimate theory is the inspiration for much of the current research in particle physics (Vilenkin, 2007). If such a theory is discovered, it will eliminate all contingency and render the hypothesis of design obsolete.

However, there are several reasons to be skeptical that such a fundamental theory actually exists. First of all, there really is no evidence that such a theory can be found. Even if a more fundamental law explains some of the constants, there is no reason to think that all of the constants will eventually be explained in this way. Secondly, physicists often discuss mathematically consistent universes that do not correspond to our own (Davies, 1993). There is no apparent logical impossibility with such universes, and so this is *prima facie* reason to regard these universes as possible.

Even a theory of everything would not explain away all of the fine-tuning, because such a fundamental theory would lack an explanation of the initial conditions of the universe. Such initial conditions, like the low entropy condition of the early universe, are not accounted for by any laws, and there is nothing in present theories concerning 'laws of initial conditions' (Davies, 1993).

Finally, attempting to avert fine-tuning by means of some fundamental law is doomed to failure. As Collins points out, such a law merely pushes the question of finetuning up one level (n.d.). We are then forced to ask why the values of the parameters of physics are just the ones that are life-permitting. Therefore, physical necessity is not a plausible explanation of the fine-tuning of the universe.

## Chance

Despite the apparently staggering improbability of the universe permitting intelligent life, some still claim that it is reasonable to suppose that the universe happened by chance. There are two main ways such a proposition is justified; the absolute improbability is denied or the probabilistic resources are multiplied to make it probable that at least one universe with life-permitting values should exist.

To deny the absolute improbability, the critic must address the evidence for finetuning provided in the literature and briefly surveyed in this paper. This approach is problematic, however, because some examples of fine-tuning seem to be airtight. Design proponent Robin Collins admits that some widely cited cases of fine-tuning are less than convincing (Manson, 2007). Nevertheless, Collins bases his case on a select few strong cases of fine-tuning. Critics will need to address the strong cases if they wish to eliminate the improbability of a life-permitting universe.

Moreover, even if there are some uncertainties or problems with many examples of fine-tuning, the sheer number of factors points us to the conclusion of improbability (Leslie, 1996). It is highly unlikely that every single case is completely worthless. In a court case, there might be slight problems or uncertainties about each individual piece of evidence, but a persuasive case can still be made if there are several converging pieces of evidence. Likewise, in the case of the universe, the large number of examples gives us confidence in our overall conclusion even with some uncertainties in each individual piece of evidence.

Since the improbability of the universe having life-permitting values is so great, most critics of the teleological argument recognize that they must increase their probabilistic resources in order to make the chance hypothesis plausible. This has led to an increased interest in the concept of a multiverse in the scientific and philosophical literature.

## The Multiverse

Perhaps the most significant counter to the teleological argument today is the concept of the multiverse. This concept has become increasingly popular and has garnered support from some leading astronomers and physicists, including Martin Rees (2000), Lee Smolin (1999), and Alexander Vilenkin (2007). According to this hypothesis, our universe is but one of many, perhaps infinite, universes that actually exist (Craig, 2001). If this is the case, then the fact that 'our' universe is life-supporting may not be very surprising. A multiverse, combined with the anthropic principle discussed earlier, would entail that we shouldn't be surprised to observe a universe with life-permitting values, for it is only in such a universe that we can be observers. If there are a sufficient number of universes, then it is not surprising that at least one of them contains intelligent life. Just as it may be unlikely to receive a Royal Flush in one hand of poker, if we are dealt a billion hands, then it is no longer unlikely at all.

The multiverse hypothesis, however, seems inferior to the design hypothesis for several reasons, and several major criticisms can be levied against it. First, even though it is often assumed that a multiverse automatically implies that a life-supporting universe is probable, this is simply not the case. Consider the following two possibilities;

1.) It's quite possible that, even if there are other universes, there simply aren't enough to make life probable. If, for example, the probability of a life-permitting universe is 1 in 10^120, then trillions and trillions of universes are needed to even bring the possibility close to reasonable. Even if we grant multiple universes, why should we think that there are such a large number of universes?

2.) It's also possible that every single universe in the multiverse has the same (or similar) constants and fundamental structure of our own. If multiple universes are being born out of some sort of 'universe generator," how do we know that this generator produces a wide variety of universes? The generator may well be like a machine in a factory. Although the machine may create billions of parts per year, all the parts it creates are virtually identical. Even assuming that there are multiple universes being created in some way, we have no way of knowing that the generator creates universes with the wide level of variety needed in order to overcome the teleological argument.

These two minor problems aside, the multiverse objection suffers from two fatal problems. The first problem is that there is no evidence for a multiverse apart from fine-tuning itself. In fact, the total lack of evidence for multiple universes is a severe problem for the theory. William Dembski argues that the multiverse hypothesis gratuitously postulates additional probabilistic resources merely to prop up a failing chance hypothesis (2007). He calls this the 'inflationary fallacy.' As he points out, such a fallacy could be used to salvage any chance hypothesis.

Ian Hacking voices a similar concern with the inference to a multiverse, claiming that advocates commit the inverse gambler's fallacy (1987). This fallacy occurs when one assumes that a large number of trials have already occurred, based solely on the observation of an improbable event. If I arrive at a poker game and observe a royal flush on the first hand I witness, this provides no grounds for me to assume that there have already been many hands played. These previous hands have no effect on the probability of a royal flush occurring in any given hand.

The second main problem with multiverse models is that they do not eliminate the need for fine-tuning. This becomes apparent when we reflect on what is required for a universe generator model to work. It must somehow be able to create trillions of universes with varying fundamental constants. It seems obvious that any such universe generator would itself need to be finely-tuned. Indeed, if anything, such a wonderful machine would probably need to be more complex and tuned than a simple universe in the first place. A television is a complex and delicate piece of technology- but imagine the precision and design necessary to create a machine that, without human supervision or guidance, can produce televisions, especially if this machine were capable of producing an extraordinarily wide variety of TVs. The intuition that multiverses would require fine-tuning is borne out by the evidence. Collins demonstrates that inflationary scenarios, regarded to be the most physically viable models of the multiverse, require a multitude of background laws and conditions in order to produce life-permitting universes (Collins, n.d.). Thus, though a fascinating idea, the multiverse fails as a plausible alternative to the design hypothesis.

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## Conclusion

Given the variety of examples of fine-tuning and the amazing precision required for life to be possible, it seems that some sort of explanation is required. The anthropic principle fails to remove the need for explanation. Attempts to explain fine-tuning by means of physical necessity rely on the dubious assumption that all of the laws of the universe can be reduced to a fundamental law, fail to consider initial conditions of the universe, and only manage to push the question of design up one step. Attempts to explain the fine-tuning by means of chance by invoking a multiverse are also problematic. There is no evidence for multiple universes, and once again, this hypothesis only pushes the question of design back one step, since the multiverse itself would require fine-tuning.

We are left, then, with the conclusion that the universe was designed to allow for the existence of life. This remarkable conclusion is as far as the teleological argument can take us, for we can conclude little about the nature of the designer. Yet, we should not underestimate the fascinating implications of this fact for our understanding of the universe and our place in it.

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