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Do Non-Theistic Explanations of Fine-Tuning Undermine the Teleological Argument Based on Fine-Tuning?

Abstract

Modern physics has shown that the universe is fine-tuned for life. Theists have argued that fine-tuning of the universe for life can be used as a premise in for a teleological argument for the existence of God. One possible way to develop such an argument is to argue that best explanation of fine-tuning is theistic design hypothesis. There are two strategies which can be employed against this argument. First one can claim that there are naturalistic explanations of fine-tuning superior than the design hypothesis. In this paper we analyze the two main alternatives of design hypothesis, the more fundamental law and multiverse hypothesis. Second one can object to the claim that design hypothesis can explain fine-tuning. We also analyze two such objections the "God of the gaps" objection and "Who designed the God" objection. We try to show that both approaches do not undermine the teleological argument based on fine-tuning.

Keywords: Fine-tuning, Teleological Argument, Multiverse, Arguments for Theism, Naturalism.

Öz

Çağdaş fizik evrenimizin yaşam için hassas ayarlı olduğunu göstermiştir. Bazı teistler evrenin yaşam için hassas ayarının Tanrı'nın varlığı lehindeki bir Teleolojik argümana öncül oluşturabileceğini iddia etmişlerdir. Böyle bir argüman geliştirmenin bir yolu, teistik tasarım hipotezinin hassas ayarın en iyi açıklması olduğunu iddia etmektir. Bu argüman karşısında uygulanabilecek iki temel strateji vardır. Birinicisi hassas ayarla ilgili teistik tasarım hipotezinden daha güçlü doğalcı açıklamalar olduğunu iddia etmektir. Bu makalede tasarım argümanının iki en önemli alternatifi olan daha temel bir yasa ve çok evrenler hipotezlerini inceleyeceğiz. İkincisi teistik tasarım hipotezinin hassas ayarı açıklayabileceği fikrine itiraz edilebilir. Bu strateji ile yaklaşan iki itiraz "boşlukların Tanrısı" ve "Tanrı'yı kim tasarladı?" da ele alıp değerlendirmeye çalışacağız. Makalemizde iki yaklaşımın da hassas ayara dayalı Teleolojik argümanı çürütemediğini göstermeye çalışacağız.

Anahtar Kelimeler: Hassas Ayar, Teleolojik Kanıt, Çok-Evrenler, Teizm lehindeki argümanlar, Doğalcılık.

1. Introduction

Teleological or design arguments are a form of argument which seeks to demonstrate the existence of God *qua* designer on the basis of some particular feature of the universe which seems to exhibit purpose or order. The argument is one of the oldest argument forms for the existence of God, and has been defended by thinkers such as Platon, Stoics, Ghazali, Ibn Rushd, Thomas Aquinas, Newton, Leibnitz; and criticized by Lucretius, Hume, Kant, Soren Kierkegaard. This argument was considered the best

argument for God's existence by Ibn Rushd, who noted it as a "Quranic argument" (the arguments from *inaya* and *ikhtira*).

After the criticisms of Hume and Kant, and rise of positivism, the teleological argument lost favor. However, in the second half of 20th century, with the rise of modern physics and cosmology, the argument made a comeback. Physicists recognized that the universe seems to be extremely fine-tuned for the emergence of life. This gave rise to new forms of teleological arguments which, unlike their predecessors, are not based upon weak analogical reasoning, but rather are probabilistic, and are formulable in Bayesian or abductive forms. In this paper we will analyse an abductive form of teleological argument, based upon examples of fine-tuning.[1] We will first present the case for the fine-tuning of the universe, then we formulate the argument and defend it against the alternative non-theistic explanations based on multiverse or more fundamental law.

2. The Fine-Tuning of the Universe for life

A universe capable of sustaining life must be able to support beings which are able to reproduce and to store and use energy. These are necessary but not sufficient conditions for the emergence of intelligent life. Such conditions can only be provided by a universe exhibiting stable energy sources and a rich chemistry capable of yielding molecular structures, reproduction and the storage of energy. In the 1970's and 1980's - after classic papers by Carter (Carter, 1974), Carr and Rees (Carr and Rees, 1979), Paul Davies (Davies, 1989) and the extensive study of Barrow and Tipler (Barrow and Tipler, 1986) - physicists realized that the set of possible laws, constants and initial conditions of the universe conducive to the emergence of stable energy sources (stars) as well as chemistry, and therefore life, is extremely small. This was termed the 'fine-tuning' of the universe for life. Since 1970's the examples of fine-

[1] As per the established literature, we will frequently use 'fine-tuning' to denote improbable physical phenomena, variation of which would plausibly have precluded the development of life in the universe. We do not *presuppose* – as the term may suggest – that the examples of 'fine-tuning' which we describe are in fact literally 'fine-tuned' in the sense of being purposefully designed, though we do proceed to argue abductively for that very claim in turn.

tuning increased extensively[2], and physicists and philosophers have sought to account for - or questioned whether we need account for – fine-tuning.

Examples of fine-tuning can be categorised three-fold:

1. The fine-tuning of the laws of nature.
2. The fine-tuning of the fundamental physical constants.
3. The fine-tuning of the initial conditions of the universe.

In the next subsections we will provide several examples from each of these categories.

a. The fine-tuning of the laws of nature

The first category of examples of fine-tuning pertains to the laws of nature. Were the fundamental laws governing the universe different, life would not have developed. To illustrate, let's take two of the four fundamental forces:

Gravity: Gravity is a long-range attractive force between material objects. In classical mechanics this law can be expressed mathematically as $F = GmM/r^2$, where F denotes gravitational force, M and m denote the masses of the objects, r represents the distance between the masses and G is a constant known as 'the universal gravitational constant'. Were there no gravity, or were it repulsive or a short-range force - like the strong nuclear force - then the formation of stars and planets would have been precluded. Stars are formed mostly from Hydrogen and Helium atoms, which come together due to gravitational attraction. Without the formation of stars, any chemical element more complex than Hydrogen, Helium and Lithium would have been impeded – for these heavier elements are formed within the core of the stars. But, as noted above, without complex elements and stable energy sources (i.e. stars), life is not possible. Thus without gravity, or had it been repulsive or a short-range force, then life would not have been possible within our universe.

[2] For technical reviews of the progress in the field, the reader may consult: (Hogan, 2000) and (Barnes, 2013). For popular level presentations see: (Rees, 1999) and (Davies, 2007).

Weak Nuclear Force: The Weak Nuclear Force is responsible for the radioactive decay of subatomic particles. Thereby it plays crucial role in powering stars and creating elements. Were there no such force there would not have developed complex elements and stars, and thus no biological molecules and life.

The fine-tuning of the laws of nature is not limited to the two fundamental forces given above. Two other forces similarly keep the atom together. Besides the fundamental forces, other laws of nature play important role in emergence of life. For example, were electrons bosons rather than fermions, then they would condense to the lowest energy state and complex chemistry would have been impossible. Or, if sub-atomic phenomena were governed by classical mechanics rather that the quantum mechanics, then there would not have been stable atoms – an electron would radiate all its kinetic energy and collide with its nucleus.

b. The fine tuning of the fundamental physical constants

Even assuming our actual laws of nature, such laws do not guarantee the emergence of life. Besides the laws, fundamental physical constants must also fall within a narrow range of values. For example, had G - the gravitational constant - a larger value, masses would have attracted each other with a stronger force than is actually the case. Indeed, these constants allow for the emergence of life only in particularly narrow ranges, as Stephen Hawking and Leonard Mlodinow put it:

> Most of the fundamental constants in our theories appear fine-tuned in the sense that if they were altered by only modest amounts, the universe would be qualitatively different, and in many cases unsuitable for the development of life. . . . The emergence of the complex structures capable of supporting intelligent observers seems to be very fragile. The laws of nature form a system that is extremely fine-tuned, and very little in physical law can be altered without destroying the possibility of the development of life as we know it. Were it not for a series of startling coincidences in the precise details of physical law, it seems, humans and similar life-forms would never have come into being. (Hawking and Mlodinow, 2010: 160-161)

Let us provide two examples of the fine-tuning of the fundamental physical constants. One should note that these two examples are just representative and do not exhaust all the cases of fine-tuning.

The strength of gravity (α_G): Gravity is 10^{40} times weaker than the strong nuclear force, and thus is extremely weak in comparison to our other three fundamental forces. Were the strength of gravity increased by 10^{-37} compared to strength of the strong nuclear force[3], stars with a lifespan of billions of years - like our sun - could not exist. This would have rendered the emergence of life extremely improbable (Collins, 2003: 189-190). Another example of fine tuning can be observed by comparing its strength relative to the factors determining the expansion rate of the big bang, such as the density of mass-energy in the early universe. Had the strength of gravity been weaker or stronger by one part in 10^{60}, *ceteris paribus*, the universe would have either exploded too quickly for stars to form, or have collapsed to quickly for life to emerge (Davies, 1982: 89).

The Dimensonality of the universe (D): Our universe has three observable[4] spatial dimensions and one temporal dimension. This is the only combination capable of sustaining life. Had there been an additional temporal dimension no massive particle would have been stable (Dorling, 1970), and chemistry would thus have been impossible. Similarly, a difference in the number of spatial dimensions would have yielded the instability of atoms and planets (Ehrenfest, 1917), rendering life impossible.[5]

c. The fine tuning of the initial conditions of the universe

The fate of the universe is not only determined by the laws of nature and the fundamental constants, but is also sensitive to its initial conditions. Initial conditions also appear to be fine-tuned. Here is one example:

Initial entropy of the universe (S): Entropy is the measure of the order in a system. As a system becomes more disordered we say that entropy increases. The Second Law of Thermodynamics states that the entropy of the universe will increase with time. The initial entropy of the universe was extremely low (Davies, 1984: 168). Had it been otherwise, the amount of disorder over billions of years would

[3] We assume the strength of the strong nuclear force as the maximum possible value of strength of gravity.

[4] There may be unobservably small spatial dimensions as predicted by string theory. But presence of unobservable dimensions does not effect our argument, what matter is the number of dimensions felt by atoms. And even in string theory that number must be three as it is an experimental fact.

[5] For more carefull analysis of fine tuning of dimensionality of space-time, readers may want to consult (Tegmark, 1997).

have prohibited the emergence of life. Theoretical physicist Roger Penrose has shown that there were $10^{10^{123}}$ different possible initial states of the universe. Since only one of these resembles our own universe, the probability of our universe amongst them is one over $10^{10^{123}}$ (Penrose, 1989: 339-345; Penrose, 2004: 728). This exemplifies incredibly precise fine-tuning - the number of possible initial states far exceeding the total particle number (baryons, electrons, photons all together) in the entire universe (approximately on the order of 10^{90}).

Again, this does not exhaust all the possibilities of the fine-tuning of initial conditions for life. Other examples such as primordial the amplitude of primordial fluctuations (Q) can be provided (Tegmark and Rees, 1998).

3. Fine Tuning as an evidence for theism

The examples of fine-tuning so outlined prompt the questions of whether they require explanation, and of what such an explanation may be. If we can show that fine-tuning requires explanation, and that theism provides a comparably superior explanation than its alternatives, then we will have a strong argument in favor of theism. The argument can be summarized thus:

1. The fine-tuning of the universe requires explanation.
2. There is a theistic explanation: that God designed the universe for the emergence of life.
3. There is no comparably satisfying non-theistic explanation of why universe is fine-tuned.
4. Therefore, the fine-tuning of the universe provides evidential support for theism.

This is an inference to the best explanation form of argument. We base much of our scientific and the everyday beliefs on this kind of inference. For instance, although we have never seen electrons, we strongly believe that electrons exist because positing them provides the best explanation for many phenomena comparable to explanations which do not posit the existence of electrons.

In this paper we will concentrate on the second and third premise. The second premise seems intuitive. According the theistic account, the universe is created by an omnipotent and omniscient God with the intention of creating human beings. Hence, given theism, it is not surprising that the universe has all the

necessary conditions for life. Moreover, everyday experience suggests that low probability outcomes frequently suggest some kind of intention. For instance, take a safe which has very complicated cipher such that it is very unlikely that the safe can be opened by chance. Should one succeed in doing so, the most natural explanation of this observation is that the cipher was entered by a person with the intention of opening it. The cipher's correct entry is seemingly non-random event, but rather clearly implies purpose. Similarly, the fine-tuning of the universe is interpretable as an intentional event indicative of a purposeful agent.

The third premise asserts that alternative non-theistic explanations are comparably less compelling than the theistic explanation. In order to properly assert this claim we must analyze those alternative explanations. Two main alternatives have been proposed: (i) there is some more fundamental physical law which explains why the universe is fine-tuned; and (ii) the multiverse hypothesis. We will evaluate each of these claims separately below, showing that both hypotheses fail to explain the fine-tuning. At best, both arguments simply push the fine-tuning up one level - to that of the most fundamental law or of the multiverse generating mechanism.

If all of these three premises are successful, then we have a powerful argument for theism. In this paper, we will first concentrate on the third premise and analyze the possible non-theistic explanations of fine-tuning. We will also evaluate two objections which aim to undermine the second premise by arguing that God is not good explanation of fine-tuning, who designed the God objection and the God of the gaps objection.

4. Objections to third premise

4.1. The appeal to a more fundamental law

It may be suggested that although currently we do not have an explanation for the fine-tuning of the universe, we may discover some more fundamental law in the future which will entail the current laws and fundamental physical constants. Perhaps, for instance, theories such String Theory[6] or

[6] Given that currently String theory predicts 10^{500} different universes, this seems very unlikely.

Supersymmetry may solve the fine-tuning problem. Hence, no longer would we need be surprised by our universes being fine-tuned.

This popular response suffers several problems. First, some speculative non-existent law cannot be used as a candidate explanation. The person defending this view at least should acknowledge that currently we do not have a viable alternative to theistic explanation. Secondly, why not assume the opposite: that future physics will show that the universe is even more fine-tuned for life? If we take the claim that the universe is fine-tuned as a scientific result, as most physicists do, then given that in the last 50 years, cases of fine tuning continuously increased, we should conclude that the fine-tuning hypothesis is well-confirmed. Given our trust in contemporary science we should expect that the cases of fine tuning will increase as our knowledge increases. Thirdly, if we take this objection seriously, we should conclude that no inference can be drawn from any scientific result given the possibility that in the future this result may turn out to be incorrect. This reasoning will lead to scientific anti-realism.[7] But a scientific anti-realist will deny any cases of fine-tuning in the first place since it is a claim based on science. Hence more fundamental law approach does not seem a promising approach.

But even granting such a more fundamental law, still it cannot satisfactorily explain fine-tuning. First the mathematical form of this law will be a second-order (if not higher-order) differential equation. As a result, it will not be able to specify the initial conditions. Thus, even if we assume that this law explains the fine tuning of the physical laws and fundamental constants, the fine tuning of the initial conditions will remain unexplained. Secondly, such law will not solve the puzzle of fine-tuning, since it will shift the fine-tuning explanandum from the laws and fundamental constants to the fundamental law itself. The existence of a fundamental law which forces the constants of nature to take life permitting values is as surprising as the constants being fine-tuned by chance.

[7] This is hardly surprising, since this objection clearly resembles Lary Landau's argument against scientific realism known as "Pesimistic Meta-Induction" (Laudan, 1981).

4.2 The Multiverse Hypothesis

The most popular naturalistic response to the fine-tuning argument is the claim that there are many universes, perhaps infinitely many, each with different physical laws, initial conditions and constants. Most of these universes will not be able to sustain life, but some of them will – and we happen to live in such a universe. Proponents of this view claim that the multiverse is a sufficient explanation of fine-tuning (Leslie, 1989; Smart, 1989; Parfit, 1998). There are several different models of the multiverse, and those which can be offered to explain fine-tuning can be classified three-fold: as a Spatial Multiverse, a Temporal Multiverse, and a Metaphysical Multiverse.

A Spatial Multiverse is the most popularly advocated. In this model we have a very large - perhaps infinitely large - single space multiverse, subdivided into smaller physical domains (i.e. universes). Each domain has different physical laws and constants. The most famous example of this kind of multiverse is the Anderi Linde's chaotic inflation hypothesis (Linde, 1994). The main idea of this model is that we have a large eternally expanding space, within which quantum effects continuously spawn new universes, which look like bubbles coming out a bath. String theory allows these bubbles to have different laws as well as initial conditions. A Temporal Multiverse is actually a set of universes which exist in different temporally successive periods of time. Such models exhibit a single oscillating universe which expands and then collapses. In each expansion the universe may start with different sets of constants and initial conditions. The Steinhardt-Turok Ekpyrotic model and Penrose's conformal cyclic model are examples of this type of multiverse. In the Steinhardt-Turok Ekpyrotic model (Steinhardt and Turok, 2004), two parallel M-branes collide periodically in some higher dimensional space. These collisions correspond to a big bang, and the universe initiates expansion. Expansion is then reversed by contraction. In this model our universe lies on one of these two branes. As can be seen, this model heavily relies on super-string theory and extra dimensionality. Penrose's Conformal cyclic model (Penrose, 2006) is based upon general relativity. In this model black holes are treated as entropy eaters. Once all the black holes decay, and all matter decays to light, the entropy of the universe is lowered. All the temporal and spatial scales associated with the universe disappear. Once a new big bang initiates we pass to the next cycle. Lastly, a metaphysical type of multiverse is a model where all the universes

are spatio-temporally separated. Whilst both temporal and spatial multiverses involve some kind of physical mechanism through which these universes are created, metaphysical multiverse lack such mechanisms: the existence of these universes is taken as a brute fact. David Lewis's modal realism (Lewis, 2001) and Max Tegmark's 4th level multiverse (Tegmark, 2005) are examples of this type of multiverse. These models predict infinite universes. According to Lewisian modal realism, all the possible universes really exist; according to Max Tegmark, every mathematically consistent universe exists. Both models are similar to each other, in that all the possibilities are accepted to be real.

We should note that although there are many multiverse hypotheses, none has widespread acceptance. The standard ΛCDM model does not posit a multiverse. It is a popular claim that inflation necessitates a spatial kind of multiverse, but this is incorrect: inflation is compatible with existence of a single universe. That nearly all the multiverse theories which imply different constants and laws of physics involve some kind of hypothetical physics is explained by cosmologist George Ellis for the case of chaotic inflation:

> In any case, the key physics involved in chaotic inflation (Coleman-de Luccia tunnelling) is extrapolated from known and tested physics to quite different regimes; that extrapolation is unverified and indeed unverifiable. The physics is hypothetical rather than tested. We are being told that what we have is "known physics → multiverse". But the real situation is "known physics → hypothetical physics → multiverse" and the first step involves a major extrapolation which may or may not be correct (Ellis, 2008).

Before examining the claim that the postulation of a multiverse is a satisfying explanation of fine-tuning, let us comment on the relation between the theism and multiverse hypotheses. First, theism is completely compatible with the multiverse hypothesis. Given that one of the main characteristics commonly attributed to God is His being a Grand creator, it may not be surprising that He may have chosen to create many universes. In fact, one of the oldest multiverse theories is due to Muslim scholar Fakhr Al-Din Al-Razi, who based his theory upon Quranic arguments (Setia, 2004). Secondly, we should note that multiverse and design hypotheses are not necessarily competing. God may have chosen to fine-tune the constants of nature through some multiverse mechanism; therefore the design and multiverse hypothesis are perfectly consistent. Thirdly, even if the multiverse hypothesis is a satisfying

explanation of fine-tuning, given that the multiverse hypothesis is compatible with theism, the theist may further ask which hypothesis better explains fine-tuning. On the non-theistic multiverse hypothesis, life emerges in just a few lucky universes. On the other hand, God - given his all-goodness - may clearly choose to create more life permitting universes than pure chance allows. Hence, hospitable universes may be expected to be higher in theistic variants of the multiverse hypothesis rather than non-theistic variants. As such, fine-tuning appears more likely under a theistic variant of the multiverse hypothesis than non-theistic variants. Thus, fine-tuning favors the theistic multiverse hypothesis over non-theistic variants.

Nevertheless, it seems that there are several good reasons to suspect the explanatory adequacy of the multiverse hypothesis. The first reason is that it commits the inverse gambler's fallacy (Hacking, 1987; White, 2000). Suppose that a gambler enters a room and replaces a player in a poker hand, having no idea how many hands have been played before. When he takes the cards, he observes that he has four aces. Given that this outcome is very unlikely he concludes that many hands have been played before he entered the room. Is this conclusion valid? Obviously not given that each hand is completely independent from the previous played hands. This conclusion commits inverse gambler's fallacy. Many philosophers think that multiverse hypothesis similarly commit the inverse gambler's fallacy. Let us take a case of "lucky person" Emre who won the lottery 20 times consecutively. Given the odds against the claim that Emre won the lottery 20 times consecutively the hypothesis that Emre was cheating becomes considerable option with higher probability than pure chance hypothesis. But suppose we also believe that there are many Emres playing the lottery in a huge number of different universes. Should we believe that, given this information, the outcome is not surprising and that Emre has not cheated? Given that there is huge number of universes, it is not surprising that Emre will win 20 times consecutively in some universes? Still, we will not be happy with this explanation for we will be skeptical that this universe is the universe in which Emre wins without cheating. It seems that the "cheating hypothesis" remains the more likely explanation than Emre's winning the lottery by chance. The existence of many other universes does not affect the outcome in this universe – a seemingly unlikely event still seems unlikely.

But even if we assume that explanations based on the multiverse hypothesis do not commit the inverse gambler's fallacy, it still cannot solve the fine-tuning problem for it only pushes the problem one step back to what I'll term the 'multiverse generator'. If a naturalistic multiverse exists, both spatial and temporal universes should be created by some physical mechanism. This multiverse generator mechanism must itself satisfy several conditions such that universes with different constants and initial conditions can be formed. Taking chaotic inflation as an example, it must satisfy the following conditions, as explained by Robin Colins:

> consider the inflationary type multiverse generator. In order for it to explain the fine-tuning of the constants, it must hypothesize one or more "mechanisms" or laws that will do the following five things: (i) cause the expansion of a small region of space into a very large region; (ii) generate the very large amount of mass-energy needed for that region to contain matter instead of merely empty space; (iii) convert the mass energy of inflated space to the sort of mass-energy we find in our universe; and (iv) cause sufficient variations among the constants of physics to explain their fine-tuning (Collins, 2009).

Thus, even if we assume that there is some multiverse generator, which creates universes with different constants and initial conditions, this multiverse generator must itself be fine-tuned. Since, if any of the above mentioned laws governing this universe generator were lacking, it would not have been able to produce hospitable universes. Using Colins' example of a bread making machine, in order to make bread the machine must function properly: it must have a suitable electrical system, it must produce the right temperature, it must set the correct time, and it requires you to have entered the ingredients of the bread in the right order and proportion. Thus, even a bread generator must be well designed, and given that the universe generator will be much more complex, surely it will require many specific conditions to function adequately.

There is one important further problem for all varieties of multiverse, particularly the infinite ones, which is worth mentioning. According to quantum statistical physics, there is a non-zero probability that a fully-formed brain may pop out of vacuum, with false memories and perception. Such brains are called Boltzmann Brains. It is perfectly possible that we are Boltzmann brains rather that normal human beings. Of course, the probability of the emergence of such Boltzmann brains is extremely low, so if we

are leaving in a single universe then we can be confident that we are not Boltzmann brains (Page, 2008). But if we are living in a multiverse, then since the emergence of Boltzmann brains do not require fine-tuning, they will emerge even in universes which are not suitable for life. Hence, in a multiverse it is extremely more likely that we are hallucinating Boltzmann brains. So, not only do non-theistic multiverse proponents have a fine-tuning problem, they also have a Boltzmann brain problem.

5. Objections to the second premise

Some philosophers have denied the claim that theism can explain the fine tuning of the universe. They either claim that theistic explanation of the fine tuning is a form of "God of the gaps argument" or they claim that the design hypothesis is not adequate because it does not solve the problem of fine-tuning, but merely transfers it to the level of designer itself. We now assess these objections.

5.1 God of the Gaps

Some philosophers have claimed that the fine-tuning argument is a type of "God of the gaps" argument (Stenger, 2004). Since God of the gaps arguments are fallacious, the fine-tuning argument thereby ought to be rejected. "God of the gaps" arguments infer God's existence gratuitously from some natural phenomena which has not been explained by science so far. In other words, these arguments are invalid inferences based upon gaps in our scientific knowledge. An example of such would be: We do not know how lightning is formed; therefore, Zeus makes the lightning. Both (almost all) theist and atheist philosophers agree that "God of the gaps" arguments are bad arguments and should be rejected.

However, the fine-tuning argument is not a God of the gaps style argument. First, the defenders of the argument do not try to fill a gap in our scientific knowledge. Quite to the contrary, defenders of the fine-tuning argument utilize scientific knowledge and emphasize that modern physics has revealed the conditions required for life to emerge. The argument is thus based upon knowledge rather than ignorance. Secondly, the common feature of all the "God of the gaps" arguments is that they claim that the laws of nature fail to account for some unexplained phenomena. Thus all "God of the gaps" arguments assume that there is some domain in nature where laws of nature fail. This is not the case

with fine-tuning argument: it is not based on the claim that there is some domain in nature which cannot be described with science.

One may claim that the fine-tuning argument assumes that science will never be able to explain why the constants have the particular value, and that this is the 'gap' at issue. But as we saw in the previous section, this claim is false: the fine-tuning argument is compatible with some more fundamental law - if such exists- which fixes the constants of nature. Since this law just pushes fine-tuning further to the level of the fundamental law itself.

5.2 "Who designed God?" objection

The most popular response to any type of design argument is the "Who designed God?" objection popularized by Richard Dawkins:

> The whole argument turns on the familiar question "who made God?" which most thinking people discover for themselves. A designer God cannot be used to explain organized complexity because any God capable of designing anything would have to be complex enough to demand the same kind of explanation in his own right (Dawkins, 2008: 109).

A similar objection can be found on J.J.C. Smart:

> 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) (Smart, 1985).

This objection when applied to the fine-tuning argument claims that postulating a designer does not solve the problem of fine-tuning, but merely transfers it to the level of designer itself. Given that designer must be more complex than the design, it will likewise require a designer. Hence the design hypothesis fails.

This objection is a red herring: the nature of the designer is irrelevant for both the premises and the conclusion of the fine-tuning argument. If upon the discovery of a new disease we find evidence suggestive that the best explanation is the existence of a new kind of virus, we should conclude that there is such. That we have no information about this new virus will not undermine this conclusion. The

nature of this new virus is wholly different question from the explanation of the disease. Similarly, if the universe is fine-tuned, and the best explanation of the universe being fine-tuned is that it is designed, then we should conclude that there must be a designer. This conclusion is valid independently of whether the designer itself needs a designer or otherwise.[8]

Moreover, this objection itself is based on a faulty assumption. Why should we believe that the designer must be at least as complex as the designed artifact? It is perfectly conceivable that even we human beings may design complex machines or organisms which are much more complex than us. Besides, the claim seems to be based upon an anthropomorphic conception of God. An object or being which is formed with intricate parts may be termed a complex being which requires a designer. But in traditional theism the designer of the universe is not composed of any physical parts, He is timeless and non-spatial. Why assume that such a being is complex or requires a designer? The objector must provide some good reason to think that God needs to be designed. Without a positive reason to suppose that God needs designer, we can Ockhamistically conclude that God does not need a designer[9].

Lastly even if we assume that God is more complex than the universe, we cannot conclude that He must be designed. Indeed, the objector themselves must hold that a designer being more complex than a designed artefact is insufficient for concluding that he must be designed too. For the objector will of course agree that, though human beings are more complex than their sculptures, it does not follow that human beings must be designed.

[8] Of course if we want to argue for particular form of Theism we need to provide further arguments.
[9] Atheist normally can use the Ockham's razor against the designer hypothesis. But if the design hypthesis has explanatory power as in the case of fine-tuning this move is blocked. Similarly if one can show that designer needs additional explanation or designer than we can no longer use Ockham's razor against this objection.

Conclusion

Modern physics has shown that the universe is fine-tuned for life: that of all the possible ways physical laws, initial conditions and constants of physics could have been configured, only an extremely small range is capable of supporting life. It is widely agreed that the universe being so fine-tuned for life requires explanation. One possible explanation of fine-tuning is the theistic design hypothesis. In this paper we analyzed the two main alternatives of design hypothesis, more fundamental law and multiverse hypothesis. We concluded that both approaches do not succeed in explaining the fine-tuning of the universe. We also analyzed two objections to the claim that theistic design explains fine-tuning, the "God of the gaps" objection and "Who designed the God" objection. We tried to show that both objections fail to undermine the theistic design hypothesis[10].

References

Barnes, L. (2013). Fine-tuning of the universe for life. *Publications of the Astronomical Society of Australia.* 29-4, 529-564

Barrow, J. D. and Tipler, F. J. (1986). *The Antropic Cosmological Principle*. Oxford, Clarendon Press.

Carr, B. and Rees, M. (1979). The anthropic principle and the structure of the physical world. *Nature*, 278, 605-612.

Carter, B. (1974). Confrontations of Cosmological Theories with Observational Data. *IAU Symposium*, *Vol. 63*. (Ed. M. S. Longair). D. Reidel: Dordrecht, 291-298.

Collins, R. (2003). Evidence for fine tuning. *God and Design: The teleological argument and modern science*. (Ed. N. Manson) Abingdon: Routledge.

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Collins, R. (2009). The Teleological Argument: An Explanation of the Fine-Tuning of the Universe. *The Blackwell Companion to Natural Theology*, (Ed. W. L. Craig and J. P. Moreland) Chester: Wiley-Blackwell.

Davies, P. (1982). *The accidental universe*. New York, Cambridge University Press.

Davies, P. (1984). *God and The New Physics*. London: Penguin Books.

Davies, P. (1989). The anthroic principle. *Prog. Part. Nucl. Phys.,* 10, 1 – 38.

Davies, P. (2007). *The Goldilocks Enigma*. Houghton: Mifflin Harcourt.

Dawkins, R. (2008). *The God Delusion*. New York: Mariner Books.

Dorling, J. (1970). *Dimensionality of time*. American Journal of Physics, 38, 539.

Ehrenfest, P. (1917). Can atoms or planets exist in higher dimensions?. *Proceedings of the Amsterdam Academy*, 20, 200-203.

Ellis, G. (2008). Opposing the multiverse. *Astronomy & Geophysics*, 49-2, 2.34.

Hacking, I. (1987). The inverse gambler's fallacy: the argument from design. The anthropic principle applied to Wheeler universes. *Mind*, 96, 331-340

Hawking S., and Mlodinow, L. (2010). *The Grand Design*. New York: Bantam Books.

Hogan, J. (2000). Why the universe is just so. *Reviews of Modern Physics*, 72-4, 1149-1161.

Laudan, L. (1981). A Confutation of Convergent Realism. *Philosophy of Science*, 48-1, 19-49.

Leslie, J. (1989), *Universes*, London: Routledge.

Lewis, D. (2001). *On the Plurality of Worlds*. Malden: Blackwell Publishers.

Linde, A. (1994). The Self-Replicating Inflationary Universe. *Scientific American*, 271-5, 48

Page, D. (2008). Is Our Universe Likely to Decay within 20 Bilion Years. *Physical Review D,* 78-6.

Parfit, D. (1998). Why anything? Why this?. London Review of Books, Jan 22, 24-27.

Penrose, R. (1989). *The Emperor's New Mind: Concerning Computers, Minds and Laws of Physics*. Oxford: Oxford University Press.

Penrose, R. (2004). *The Road To Reality*. Jonathan Cope: London.

Penrose, R. (2006). Before the big bang: An outrageous new perspective and its implications for particle physics. *Proceedings of EPAC 2006,* 2759-2767.

Rees, M. (1999). *Just Six Numbers: The Deep Forces that Shape the Universe*. London: Weidenfeld & Nicolson.

Setia, A. (2004). Fakhr Al-Din Al-Razi on Physics and the Nature of the Physical World: A Preliminary Survey. *Islam & Science*, 2-2.

Smart J. C. (1985). Laws of nature and cosmic coincidence. *The Philosophical Quarterly* 35-140, 272-280

Smart, J. J. (1989). *Our Place in the Universe: A Metaphysical Discussion*. Oxford: Blackwell.

Steinhardt, P.J and Turok, N. (2004). The Cyclic Model Simplified. *New Astron. Rev.* 49-2-6, 43-57.

Stenger, V. (2004). Is the universe fine-tuned for us. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* (Ed. M. Young and T. Edis). NJ: Rutgers University Press, 172-84.

Tegmark, M. (1997) On the Dimensionality of Spacetime. *Classical and Quantum Gravity*, 14, L69-L75.

Tegmark, M. and Rees, M. (1998). Why Is the Cosmic Microwave Background Fluctuation Level 10−5?. *The Astrophysical Journal*, 499, 526.

Tegmark, M. (2005). Parallel Universes. *Scientific American*, 288, 40-51

Tegmark M., Aguirre A., Rees M., Wilczek F. (2006). Dimensionless constants, cosmology, and other dark matters. *Physical Review D*, 73, 023505.

Weinberg, S. (1977). *The first three minutes: a modern view of the origin of the universe*. New York: Basic Books.

Weinberg, S. (1987). Anthropic Bound on the Cosmological Constant. Physical Review Letter, 59, 2607.

White, R. (2000). Fine-tuning and multiple universes. *Nous*, 34, 260-67.