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The Cosmic Lottery

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Abstract One version of the argument for design relies on the assumption that the apparent fine-tuning of the universe for the existence of life requires an explanation. I argue that the assumption is false. Philosophers who argue for the assumption usually appeal to analogies, such as the one in which a person was to draw a particular straw among a very large number of straws in order not to be killed. Philosophers on the other side appeal to analogies like the case of winning a lottery. I analyze the two analogies and explain why the lottery analogy is the right one to use. In the light of such an analysis, we can see that although the cosmic feature of being life-permitting is rare, it does not allow life-permitting possible universes to stand out because there are other rare cosmic features that other possible universes have.

Keywords Analogy · Cosmic · Design · Fine-Tuning · God · Life-Permitting · Probability · van Inwagen · Universe

1. One version of the argument for design[1] focuses on the fact that the universe appears to be fine-tuned for the existence of life. Its conclusion is, of course, that the universe was created and designed by God (or a super-intelligent designer, if that makes any difference to the argument) specially for life to exist in it.[2] This can be understood as an inference to the best explanation: The apparent fine-tuning of the universe for the existence of life requires an explanation, and the best explanation is that God created and designed the universe for the existence of life; therefore, we have good reason to believe that God created and designed the universe.[3] We can, however, reject the argument right at the outset if we can show that the apparent fine-tuning does not require an explanation. In this short paper I will try to show precisely that.[4]

2. Let us first look at a more detailed formulation of this version of the argument for design. Modern physics tells us much about the nature of the elementary particles that make up the universe, the fundamental forces by which these particles interact, and the large-scale structure and history of the universe. Most of this can be represented mathematically in terms of specific numbers, such as the fine-structure constant, which characterizes the strength of the electromagnetic interaction. Let us call these numbers that figure in the description of the universe in physics 'the cosmic numbers'. Our current knowledge of physics allows us to answer the question of what the universe would be

[1] I am following J. L. Mackie (1982) in using 'argument for design' instead of the widely used 'argument from design'. As Mackie points out, "an argument *from* design to a designer would be trivial" (p.133, original italics).

[2] The argument for design addresses the question of why there is a universe that is life-permitting rather than the question of why there is a universe instead of nothing, though an answer to the former question may imply an answer to the latter question.

[3] If the apparent fine-tuning of the universe for the existence of life requires an explanation, the explanation does not have to be theistic. I will not discuss non-theistic explanations here, but my argument works against such explanations as well as the argument for design, for its conclusion is that the apparent fine-tuning does not require an explanation. For an in-depth and scientifically informed discussion of non-theistic explanations, see Leslie (1989) and Davies (2007).

[4] There have been attempts to show this, but none of them that I know of is successful. See Leslie (1989), pp. 106-114 for refutations of some such attempts.

like if some of the cosmic numbers were different, and the answer is that the universe would be utterly different if these numbers were different — utterly different in such a way that the universe would not be life-permitting. In other words, many, if not all, of the cosmic numbers have to be what they are if the universe is to be life-permitting; the universe appears to be fine-tuned, in terms of the precision of these numbers, for the existence of life. Why precisely these numbers rather than other numbers? This is puzzling and requires an explanation.

Besides, if we represent possible universes in terms of possible variations of the cosmic numbers, we can say that among all possible universes, only an extremely small number of them are life-permitting.[5] Let us assume, for the sake of easy exposition, that only one possible universe is life-permitting. This assumption should be happily granted by those who advance the above argument for design, for it can only make their argument appear stronger. The existence of a life-permitting universe is thus highly improbable. Something so highly improbable requires an explanation. The best explanation is that God set the cosmic numbers precisely for the purpose of creating a universe that allows life to exist.

3. An initial objection to the argument is that it simply happened to be the case that the cosmic numbers are what they are. We are lucky that the universe is life-permitting, for otherwise we would not have existed, but there is nothing puzzling that requires an explanation. It is analogous to a person's winning the lottery (call this 'the lottery analogy'). Suppose I won the lottery. I would not have won if the numbers drawn were

[5] The notion of a possible universe employed here is thus different from the notion of a possible world. Although philosophers understand the latter notion differently, most of them would agree that a possible world in which I am a novelist and a possible world in which I am not a novelist are two different possible worlds. On the notion of a possible universe employed here, these two possible worlds may belong to the same possible universe.

not precisely the numbers on my ticket. Other numbers could easily have been drawn, but it happened to be the case that the numbers on my ticket were drawn. I was lucky, but there is nothing puzzling that requires an explanation. The fact that the existence of a life-permitting universe is highly improbable does not seem to help here, for it was also highly improbable that the numbers on my lottery ticket were the winning numbers. The set of numbers on my ticket were as unlikely to be the winning numbers as any of the other sets of numbers, but if one among all the lottery tickets was to win, why not mine? Analogously, the life-permitting possible universe is as unlikely to be the actual universe as any other possible universe, but if one of the possible universes is to be the actual universe, why not the life-permitting one?

4. Peter van Inwagen thinks the above objection to the argument for design "must be one of the most annoyingly obtuse arguments in the history of philosophy" (van Inwagen, 2002, p.151).[6] To show how "annoyingly obtuse" the objection is, he offers a different analogy (call this 'the straw analogy'): Suppose I was in a situation in which a straw was to be drawn from a bundle of over a million straws of different lengths and I would be killed instantly and painfully unless the shortest straw was drawn. A straw was drawn and I was astonished to find that it was the shortest one! The fact that the shortest straw was drawn certainly requires an explanation, and the best explanation is that it was some kind of set-up — the whole episode was *designed* that way for some purpose that I did not know. I would be very silly if I argued, "No, it does not require any explanation. Some straw or other had to be drawn, so why not the shortest one? Drawing the shortest straw is extremely unlikely, but it was no less unlikely than drawing, say, the seventh shortest

[6] The objection van Inwagen considers is formulated in terms of the analogy of tossing a coin and getting twenty 'heads' in a row rather than the analogy of winning the lottery, but the objection is essentially the same.

straw. It was like winning the lottery; I was just lucky."[7]

Most of us would agree both that my winning the lottery does not require an explanation and that the drawing of the shortest straw that would save my life requires an explanation. What van Inwagen argues is in effect that the straw analogy is, while the lottery analogy is not, the right analogy to the fact that the actual universe is life-permitting. He tries to distinguish between highly improbable events the occurrence of which can reasonably be assumed to be a mere matter of chance, such as my winning the lottery, and those the occurrence of which cannot reasonably be assumed to be a mere matter of chance, such as the shortest straw being drawn that would save my life. He constructs a principle that he thinks can mark the distinction. The principle applies to any *n*-membered set of possibilities, A_1, A_2, …, A_k, …, A_n, that satisfies the following conditions: (1) at least one member must be realized, (2) at most one member can be realized, (3) all members are about equally probable to be realized, (4) the number *n* is so large that if a number between 1 and *n* is to be chosen at random, it is highly improbable that that number will be chosen. Suppose A_k is the member that is realized; here is the principle:

(PE) If we can think of a possible explanation of the fact that A_k was realized that is a good explanation if it is true, and if we can see that, if one of the other possibilities in the set had been realized, no parallel explanation could be constructed for the realization of that other possibility, then the fact that it was A_k that was realized — and not one of the other *n*-1

[7] van Inwagen uses the second-person rather than the first-person in his analogy, and it was the person himself who drew the straw. I make the changes so that it corresponds better to the lottery analogy. Obviously such changes do not affect van Inwagen's point. For a similar response to the lottery analogy and an analogy similar to van Inwagen's, see Parfit (1992).

possibilities in the set — cannot be ascribed simply to chance (at least not offhand, not without further argument). (ibid., 2002, p.152)

The principle does not say that the possible explanation has to be accepted as correct; what it says is that if there is such a possible explanation, then it is wrong to assume that no explanation is required.[8]

Applying (PE) to the case of the shortest straw being drawn that would save my life, van Inwagen argues that it is not a mere matter of chance because there is a possible explanation of it that is a good explanation if true, namely, that it was some kind of set-up. He goes on to apply (PE) to the universe being life-permitting and arrives at the same conclusion that it is not a mere matter of chance. If (PE) is a correct principle, it can help us see why the straw analogy is the right analogy to the fact that the universe is life-permitting. Of course, the principle would, if correct, render the straw analogy superfluous, for we can apply it directly to the case of the universe to show that the apparent fine-tuning of it for the existence of life requires an explanation.

5. Is (PE) a correct principle? Given that my winning the lottery is a mere matter of chance and does not require an explanation, (PE) has to be incorrect if it tells us otherwise.[9] If I can think of a possible explanation of my winning the lottery that is a good explanation if true, and if no parallel explanation could be constructed had another person won the lottery, then according to (PE) my winning the lottery is not a mere matter of chance. Well, I can easily think of one: The winning numbers were the numbers

[8] van Inwagen ascribes the principle to John Leslie, though his formulation of the principle is much more complex than Leslie's. Here is Leslie's formulation: "Our universe's elements do not carry labels announcing whether they are in special need of explanation. A chief (or the only?) reason for thinking that something stands in such need, i.e. for justifiable reluctance to dismiss it as how things just happen to be, is that one in fact glimpses some tidy way in which it might be explained" (Leslie, 1989, p.10).

[9] To apply (PE) to this case, let us assume that conditions (1)-(4) are satisfied.

on my ticket because God picked those numbers; God wanted me to win.

It may be objected that even though I can think of this possible explanation of my winning the lottery, my winning the lottery does not satisfy (PE) completely because a parallel explanation could be constructed had another person won it — God wanted that person to win. In that case, however, the fact that the actual universe is a life-permitting one does not satisfy (PE) completely either, for a parallel explanation could be constructed had another possible universe, a non-life-permitting one, been the actual universe — God created and designed the universe *that way*. (Of course, we would not be in such a universe to construct the explanation, but this is beside the point.) On the other hand, if the possible explanation in the case of the universe is supposed to be so specific that it applies only to a life-permitting universe, such as the explanation that God wanted to create a universe that is life-permitting *rather than non-life-permitting*, a specific possible explanation can also be constructed in such a way that it applies only to my winning the lottery — God wanted me, this particular person W.W. *rather than anyone else*, to win this time.

Not only is (PE) an incorrect principle because it tells us that my winning the lottery is not a mere matter of chance, it also fails to serve van Inwagen's purpose of showing that the universe being life-permitting is *not* analogous to my winning the lottery since, as we have just seen, both cases satisfy (PE) in the same way.

6. We don't need (PE) to see that the straw analogy is appealing, but we have not really seen how it is supposed to work. The following table may show how van Inwagen and like-minded philosophers see the straw analogy and the lottery analogy:

The universe	The straw drawing	The lottery
A very large number of possible universes	A very large number of straws (analogous)	A very large number of tickets (analogous)
Only one possible universe is life-permitting	Only the shortest straw would save my life (analogous)	Only one ticket would win[10] (not clearly analogous)
The actual universe is life-permitting	The straw drawn was the one that would save my life (analogous)	My ticket won (not clearly analogous)
If another possible universe were the actual universe, the actual universe would not have been life-permitting	If another straw had been drawn, my life would not have been saved (analogous)	If my ticket had not won, another ticket would have won (disanalogous)

Table A

On this understanding, the case of the universe and the case of the straw drawing are perfectly analogous. The lottery analogy, by contrast, clearly collapses in the last row, and it is there that we are supposed to see why my winning the lottery does not require an explanation — another person could have won and I was just lucky.

However, if we break down the components of the case of the universe differently, we will get a very different picture, one in which it is perfectly analogous to the case of the lottery but disanalogous to the case of the straw drawing. Let us, again, express this in a table:

[10] We are still assuming that (1)-(4) are satisfied so that one and only one ticket must win.

The universe	The straw drawing	The lottery
A very large number of possible universes	A very large number of straws (analogous)	A very large number of tickets (analogous)
Only one possible universe is the actual universe	Only the shortest straw would save my life (not clearly analogous)	Only one ticket would win (analogous)
The life-permitting possible universe is the actual universe	The straw drawn was the one that would save my life (not clearly analogous)	My ticket won (analogous)
If the life-permitting possible universe were not the actual universe, another possible universe would have been the actual universe	If another straw had been drawn, my life would not have been saved (disanalogous)	If my ticket had not won, another ticket would have won (analogous)

Table B

7. Whether the lottery analogy or the straw analogy is the right analogy to the fact that the actual universe is life-permitting thus depends on how the components of the case of the universe should be broken down. But how are we to decide? Let us first see how the case of the straw drawing will look like if we break down its components so that they are completely analogous to those of the case of the universe in Table B:

The universe	The straw drawing
A very large number of possible universes	A very large number of straws
Only one possible universe is the actual universe	Only one straw would be drawn
The life-permitting possible universe is the actual universe	The straw that would save my life was drawn
If the life-permitting possible universe were not the actual universe, another possible universe would have been the actual universe	If the straw that would save my life had not been drawn, another straw would have been drawn

Table C

The question we should ask is whether there is anything wrong with breaking down the components of the case of the straw drawing this way. Although nothing in the table is false of the case, the conditional sentence in the last row of the right-hand column does not express anything important, particularly when we understand the *consequent* of a conditional sentence to be what we should pay attention to. What is important in this case is whether my life would be saved, and if the shortest straw were not drawn, my life would not have been saved and it would not matter at all which of the other straws would have been drawn. The shortest straw was the only straw that would save my life and there is simply no reason to distinguish the other straws from one another — they were not significantly different from one another in any way; they were all the same because the drawing of them would all result in my being killed.

We can now see why the fact that the shortest straw was drawn requires an explanation. Since only the shortest straw would save my life and none of the other straws were significantly different from one another, the straws should be divided into two groups: the shortest straw and all the other straws. The fact that the shortest straw

was drawn requires an explanation not only because it was extremely unlikely to draw this particular straw (i.e. to draw the only member of the first group), but also because it was extremely likely to draw *any* of the other straws (i.e. to draw one of the members of the second group). The question that calls for an answer is adequately expressed not by 'Why was the shortest straw drawn?', but by 'Why was the shortest straw *rather than any of the other straws* drawn?'.

The point that the other straws were not significantly different from one another cannot be emphasized enough. Perhaps I should clarify here what I mean by 'significantly different': X and Y are significantly different with respect to whether *p* if they have some difference by virtue of which one of them is associated with *p* and the other with not-*p*. To see why the point in question is so important, let us consider the case of the lottery again. Should the tickets be divided into two groups, namely, my ticket and all the other tickets? It may be tempting to answer 'Yes', for the tickets could indeed be divided into the two groups by being marked as 'mine' and 'not mine', and it was also true that it was extremely unlikely that my ticket would win and extremely likely that one of the other tickets would win. With respect to whether I would win, my ticket and all the other tickets were significantly different. If one of the other tickets had won, it would have resulted in my not winning; as far as my not winning was concerned, it did not matter which ticket it was — in this respect the other tickets were all the same.

However, it does not mean that the other tickets were not significantly different in other respects. Each of the other tickets could have resulted in a different person winning the lottery: With respect to whether person A would win the lottery, her ticket was significantly different from the other tickets; with respect to whether person B would win,

his ticket was significantly different from the other tickets, and so on. Another important point to note is that the difference each of the other tickets marked is the same kind of difference as the one my ticket marked: Each ticket holder could divide the tickets into 'mine' and 'not mine'. It is because of this that no one ticket *stood out* as far as being the winning ticket was concerned, even though all tickets were significantly different from one another. This is why no matter which ticket won, it does not require an explanation.

8. Let us return to the case of the universe. In the light of the above analysis of the case of the straw drawing and the case of the lottery, we can see that the fact that the universe is life-permitting requires an explanation only if (a) non-life-permitting possible universes are not significantly different from one another so that all possible universes should be divided into two groups, namely, 'life-permitting' and 'non-life-permitting', or (b) the life-permitting possible universe stands out as far as being the actual universe is concerned , even though non-life-permitting possible universes are significantly different from one another.

The reason why the straw analogy is so appealing is that we would naturally treat the life-permitting possible universe as special, for it is the only possible universe in which we could exist. Just as all the other straws save the shortest one would, if drawn, result in my being killed, all the other possible universes save the life-permitting one would, if actual, result in our not existing. Because of this we would naturally divide all possible universes into 'life-permitting' and 'non-life-permitting'. However, what we see from this anthropocentric or life-centric perspective does not establish (a) or (b).

Dividing all possible universes into 'life-permitting' and 'non-life-permitting' is like dividing all lottery tickets into 'mine' and 'not mine'. Although the other possible

universes are all non-life-permitting, they are significantly different from one another with respect to what the actual universe could have been like: Each of them has a unique set of features that could have, *in its own way*, made the actual universe different from how it is. In the case of the lottery, we would not be tempted by the division between 'mine' and 'not mine' to overlook the fact that all tickets are significantly different because we know that we could have had one of the other tickets. By contrast, we may be blind to the fact that all possible universes are significantly different because we could not have existed in any of the non-life-permitting possible universes.

9. We have been assuming for the sake of easy exposition that only one possible universe is life-permitting. The idea is, of course, that a life-permitting universe is highly improbable. In other words, even if there is more than one life-permitting possible universe, the number is very small relative to the number of all possible universes. The lottery analogy still works if there is more than one life-permitting possible universe, for then the case of the universe is analogous to the case of a lottery in which I have more than one ticket:

The universe	**The lottery**
A very large number of possible universes	A very large number of tickets
Only one possible universe is the actual universe	Only one ticket would be drawn
One of the life-permitting possible universes is the actual universe	One of my tickets won
If none of the life-permitting possible universes were the actual universe, another universe would have been the been the actual universe	If none of my tickets had won, another ticket would have won

Table D

Even if there is more than one life-permitting possible universe, it does not change the fact that we could not exist in a non-life-permitting universe and we would still tend to divide all possible universes into 'life-permitting' and 'non-life-permitting'. Again, this tendency is misleading because it may blind us to the fact that all possible universes are significantly different.

10. Some may object that although all possible universes are significantly different from one another, life-permitting possible universes stand out because being life-permitting is a rare cosmic feature — only a very small number of possible universes have this feature.[11] But there are certainly other rare cosmic features resulting from possible variations of the cosmic numbers. Although it may not be true that each possible universe has at least one rare cosmic feature, it is not unreasonable to assume that many possible universes have rare cosmic features. Having a rare cosmic feature thus does not make life-permitting possible universes stand out in such a way that a life-permitting possible universe being the actual universe requires an explanation.

Another analogy may help here. You are to draw a ball randomly from an urn in which there are one thousand balls, each of which is marked with a number. No matter which ball you draw, it does not require an explanation because each ball has the same probability of being drawn. However, if all the balls are white except for the two that are black and you draw one of the black balls, we may find it unusual and think it requires an explanation. This is not because drawing *this* ball is particularly improbable, but because drawing a *black* ball is much more improbable than drawing a white ball. In this case what seems to require an explanation, i.e. drawing a black ball, has a higher probability

[11] We can also treat being life-permitting as *a set of* features that allow life to exist.

(1/500) than what does not require an explanation, i.e. drawing that particular ball (1/1000). This may look strange, but we have an explanation ready at hand: Although all the balls are significantly different from one another, the black balls seem to stand out. To put it another way, although we should not divide all the balls into 'this ball' and 'all the other balls', we may have reason to divide them into 'black balls' and 'white balls'.[12] Those who think the apparent fine-tuning of the universe for the existence of life requires an explanation would, mistakenly, liken the case of the universe to drawing a black ball under the above mentioned circumstances.

What we should liken the case of the universe to is drawing a black ball under the following circumstances: There are still one thousand balls, still only two black balls, but the rest of the balls are not all white; they are in various colors such that for any color, no more than three balls have that color (e.g. two blue, three yellow, one crimson, etc.). I think most of us would agree that your drawing a black ball now does not seem to require an explanation even though black balls are still rare, for black is not the only rare color here. Since all the other colors are rare too, being rare does not make black balls stand out. Likewise, although being life-permitting is a rare cosmic feature, this doe not make life-permitting possible universes stand out because there are many other rare cosmic features that other possible universes have.

[12] This may help explain why most of us would think getting ten 6s on throwing a die ten times requires an explanation. What we think needs an explanation is not getting this particular sequence (which has the same probability as getting any other sequences of ten throws) but getting a sequence with an *obvious* pattern (which is much less probable than getting a sequence with no obvious pattern, given that the number of sequences that we see as having an obvious pattern is much smaller than the number of sequences that we see as having no obvious pattern). This can be seen from the following fact: We would ask 'Why ten 6s rather than, say, 3, 2, 5, 5, 6, 1, 4, 1, 6, 3?', but not 'Why ten 6s rather than, say, ten 3s?'. Obvious patterns like ten 6s in a row stand out not only because they are rare, but also because they are very simple and, as Leslie points out, "[s]implicity suggests the constant operation of some one factor or small group of factors" (Leslie, 1989, p.115). This, of course, does not give us any reason to bet on, say, 3, 2, 5, 5, 6, 1, 4, 1, 6, 3 rather than ten 6s or any sequence with an obvious pattern, for when we bet on ten 6s, we are betting on that particular sequence rather than on a sequence with an obvious pattern (of which there are other instances than ten 6s). Leslie seems to suggest that the universe being life-permitting is analogous to getting a sequence of numbers with an obvious pattern, but it is not clear how the analogy is supposed to work.

Suppose a possible universe U has a rare cosmic feature (or set of features) F that is necessary for the existence of Xs. If U were the actual universe, then the actual universe would appear to be fine-tuned for the existence of Xs. No matter what F is, such apparent fine-tuning does not require an explanation given that many other possible universes have other rare cosmic features. If Xs are inanimate beings, then F would not be understood by Xs as being rare for the simple reason that Xs are not capable of understanding anything in any way. The Xs in our discussion, however, are animate beings, and some of them are so highly intelligent that they are capable of understanding that the cosmic feature of being life-permitting is something rare. There is nothing wrong with recognizing that life-permitting possible universes are rare, but we must guard against moving from such recognition to seeing our universe — the actual universe which is life-permitting — as *special* in the sense that it is especially in need of an explanation. It is difficult for us not to adopt the anthropocentric or life-centric perspective, but we are intelligent enough to be able to understand that such a perspective can at times be misleading.[13]

[13] I would like to thank the Philosophy/Religious Studies Reading Group at CSU, Chico for discussing an earlier version of this paper and giving me helpful comments.

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