On Essentialist and Anti-Essentialist Replies to the This-Universe Objection

by Kenny Boyce

Abstract: Proponents of the this-universe objection to fine-tuning arguments for a multiverse claim that while the multiverse hypothesis raises the probability that *some* universe is fine-tuned for life, it fails to raise the probability that *this* one is. Because that is so, they further argue, those who take the fine-tuning of this universe as evidence for a multiverse are guilty of a probabilistic fallacy. Some opponents of the this-universe objection contend that it turns on contentious assumptions regarding the essential properties of universes and agents. In particular, it is alleged to turn on the assumption that universes fail to have their nomic properties essentially as well as on the assumption that we could not have existed in other universes. I argue by contrast that the this-universe objection does not depend on these assumptions.

Key Words: fine-tuning, multiverse, this-universe objection, confirmation

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Introduction

Our best physical theories contain free parameters that had to take on extremely precise but apparently physically arbitrary values in order for our universe to be life permitting. Since our universe is one in which those parameters have such values, it is sometimes said

to be "fine-tuned" for the existence of life.[1] According to many physicists and philosophers, the fact our universe is fine-tuned provides evidence that it is part of a multiverse.[2] Because of the extraordinary degree of fine-tuning required, the argument goes, the likelihood of the parameters taking on the life-permitting values in a single universe is extremely low. But if there is a sufficiently large number of universes whose constants vary widely, almost certainly, some will be life permitting.

Ian Hacking (1987) accused those who take fine-tuning as evidence for a multiverse of committing a probabilistic fallacy. Roger White (2000; 2003) later took up and expanded upon a similar charge. Both maintain that the values of the constants in each universe are like outcomes of independent rolls of a standard pair of dice. Just as whether any particular roll comes up double six is probabilistically independent of how many rolls there are, they claim, so the values of the parameters of this universe are independent of how many universes there are.

Early objections to Hacking's charge maintained that it failed to take into account the presence of an observation selection effect.[3] Unlike dice rolls, which can be observed regardless of how they turn out, the only universes containing observers are fine-tuned

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[1] For a recent overview of the evidence for fine-tuning, see (Barnes and Lewis 2016).

[2] See for example (Leslie 1989), (Rees 2003), and (Tegmark 2014: 140, 362-363).

[3] (Leslie 1988), (McGrath 1988), (Whitaker 1988). See also (Bradley 2009) for a more recent articulation and (Roche and Sober 2019) for a more general discussion of observation selection effects.

ones. And since the multiverse hypothesis raises the probability of there being such universes, it also raises the probability of a fine-tuned universe being observed.

White (2000) argues, however, that such objections are misguided. According to White, what matters is not merely whether the multiverse hypothesis raises the probability that *someone* observes a fine-tuned universe, but whether it also raises the probability that *we* would do so. And since whether this universe is fine-tuned is probabilistically independent of how many universes there are, White contends, it fails to do the latter. Or rather, it fails to do so provided that we had no chance of existing in other universes. But to maintain we did have such a chance, White claims, requires countenancing bizarre metaphysical hypotheses, such as that "we were disembodied spirits waiting for a big bang to produce some universe which could accommodate us" (268).

In making these arguments, Hacking (1987: 335-336) and White (2000: 264-265) both appeal to a version of the *Principle of Total Evidence*, which requires that we make use of the logically strongest encapsulation of the evidence available to us. The strongest encapsulation of that evidence includes not merely the fact that *someone* is observing *a* fine-tuned universe, but that *we* are observing that *this* universe is fine-tuned.

There is now a sizeable literature concerning whether the this-universe objection succeeds.[4] Recent focus has been on *epistemological* concerns about the legitimacy of the appeal to the Principle of Total Evidence, as well as on formal concerns about the use of

[4] For an overview see (Manson 2022). The label "this-universe objection" was introduced in (Manson and Thrush 2003).

evidential statements couched in indexical terms.[5] A more neglected class of concerns pertains to *metaphysical* worries about the essential properties of universes and agents.

Two such worries are frequently raised. According to the first, universes may have their nomic properties essentially. If so, the worry goes, then the setting of the values of the parameters for any given universe is not analogous to an independent roll of the dice. Rather, for any given universe, it is essential to that universe that its parameters take on the precise values they do. According to the second, it may be that it is not essential to each of us that we occupy this particular universe. If so, it might be true that each of us had some chance of turning up in another universe. So perhaps (contra White) we do need to attend to the presence of an observation selection effect. In this paper I argue that neither of these worries poses a threat to the this-universe objection.

1. Concerning Nomic Essentialism

1.1. A Summary of the Nomic Essentialist Worry

I begin my discussion by spelling out the first of the above worries in more detail. Let 'Nomic Essentialism' refer to the thesis that it is essential to each universe that its parameters take on the precise values they actually have. And following a convention

[5] For critiques of this appeal to the Principle of Total Evidence see (Manson and Thrush 2003: 74-76) and (Epstein 2017). For defenses of the Principle of Total Evidence, see (Draper, Draper, and Pust 2007: 293-295), (Barrett and Sober: 2020), (Draper 2020). For concerns about the manner in which the this-universe objection deploys evidential statements couched in indexical terms, see (Isaacs, Hawthorne, and Russell 2022). For a response to such concerns, see (Boyce n.d.).

introduced by White (2000), let 'α' rigidly denote the particular universe in which we happen to find ourselves.

One might endorse Nomic Essentialism because one takes universes to be at least in part individuated by their laws (Manson and Thrush 2003: 77). Alternatively, one might endorse some more general thesis concerning the laws of nature (together, perhaps, with other claims about the essential properties of universes) from which one takes Nomic Essentialism to follow. Perhaps Nomic Essentialism holds because there is only one metaphysically possible set of laws (Wilson 2013). Or perhaps it holds because a given universe's laws of nature are just those propositions which best systematize the behaviors of the fundamental dispositional properties instantiated therein (Demarest 2017), and it is essential to any given universe just which fundamental dispositional properties are instantiated.

Rodney Holder (2002) was one of the earliest to respond to the this-universe objection by way of an appeal to Nomic Essentialism. Holder argues, first, that universes, including α, have their parameter values essentially, and, second, that the more universes there are, the more likely it is that α would be among them. So, Holder concludes, the fact that this universe exists and is fine-tuned provides evidence for the multiverse hypothesis. Unlike Holder, Neil Manson and Michael Thrush (2003:76-77), as well as Cory Juhl (2005: 337, 343-344), do not commit themselves to the claim that Nomic Essentialism is true. They argue, rather, that its falsehood is an undefended assumption made by proponents of the this-universe objection.

Graham Oppy (2006: 216-227) argues, furthermore, that the this-universe objection fails regardless of whether Nomic Essentialism is true. If Nomic Essentialism is true, Oppy

claims, then it is more likely on the multiverse hypothesis that our universe, along with its fine-tuned parameters, would exist. And if Nomic Essentialism is false, Oppy contends, it is also more likely that our universe would exist on the multiverse hypothesis. Either way, concludes Oppy, the fact that our universe is fine-tuned confirms the multiverse hypothesis.

1.2. A Neglected Dialectical Point

In an early response to Holder, however, Kai Draper, Paul Draper, and Joel Pust (2007) make a crucial but often neglected point regarding the dialectical context surrounding the this-universe objection. They write,

> White takes the existence of our universe to be a part of the background information … Further, he does this presumably for the good reason that he is interested in evaluating a *fine-tuning* argument for [the multiverse hypothesis]. He does not address the question of whether the mere existence of our universe confirms [the multiverse hypothesis]. (296)

As Draper, Draper, and Pust observe, the crucial issue is not whether it is more probable that α is fine-tuned for life given the multiverse hypothesis and an empty body of background information. Rather, we should assess the probabilities at issue relative to a body of background information that already includes the fact that α exists. This is because we are not currently interested in evaluating a *cosmological* argument for the multiverse hypothesis but a *fine-tuning* one.

We may put the point more formally by introducing the following notation: Let 'M' denote the multiverse hypothesis. Let 'α' continue to rigidly denote this universe. Let 'FTα' abbreviate 'α is a universe that is fine-tuned for life'. Let 'Eα' abbreviate 'α exists'. Finally, let 'K' denote a body of background information that includes the stringency of the life-

permitting requirements for universes and all metaphysically necessary truths, but no other relevant information.

Per Draper, Draper, and Pust's observation, the crucial question is not whether $P(FT\alpha \mid M\&K) > P(FT\alpha \mid K)$, but whether $P(FT\alpha \mid M\&E\alpha\&K) > P(FT\alpha \mid E\alpha\&K)$. Thus the *Key Independence Assumption* behind the this-universe objection is not that $P(FT\alpha \mid M\&K) = P(FT\alpha \mid K)$, but rather the following:

(KIA) $P(FT\alpha \mid M\&E\alpha\&K) = P(FT\alpha \mid E\alpha\&K)$.

1.3. Dissolving the Nomic Essentialist Worry

Note that neither Holder's nor Oppy's objections serve to undermine KIA. Even if the multiverse hypothesis does render the mere existence of α more likely, it does not follow that the multiverse hypothesis makes it more likely that α is fine-tuned given that α exists.

Note furthermore that Nomic Essentialism also fails to undermine the Key Independence Assumption. On the contrary, it entails it. If Nomic Essentialism is true, then $P(FT\alpha \mid M\&E\alpha\&K)$ and $P(FT\alpha \mid E\alpha\&K)$ both equal 1. Hence, if Nomic essentialism is true, $P(FT\alpha \mid M\&E\alpha\&K) = P(FT\alpha \mid E\alpha\&K)$. Thus I conclude that Nomic Essentialism poses no threat to the this-universe objection.

Indeed, if Nomic Essentialism is true, then not only does the fact that this universe is fine-tuned fail to raise the probability of the multiverse hypothesis (relative to the specified background information), it fails to raise the probability of any hypothesis whatsoever. This is worth mentioning because the fact that this universe is fine-tuned is also often taken

to support the hypothesis that it was designed.[6] Furthermore, part of what drives an interest in the this-universe objection is that the multiverse hypothesis is frequently taken to be the principal rival to the design hypothesis as a means of accounting for the evidence from fine-tuning. Accordingly, proponents of the fine-tuning argument for design may find this result disappointing, since it threatens to undermine fine-tuning arguments of all sorts, and not merely for a multiverse hypothesis.

But the question of whether the phenomenon of fine-tuning supports a multiverse hypothesis is of independent interest for the philosophy of cosmology, regardless of what implications the answer may have concerning the fine-tuning argument for design. Furthermore, it is open to proponents of the latter to argue that since *our actual background information* does not include the truth of Nomic Essentialism, the epistemic probability *for us* of this universe being fine-tuned is still greater given the design hypothesis than it is given an anti-design hypothesis. No parallel defense of the fine-tuning argument for a multiverse may be offered, however, should it turn out that KIA holds regardless of whether Nomic Essentialism is true.

1.4. In Further Defense of the Key Independence Assumption

KIA may be seen, furthermore, as an instance of the following more general independence assumption:

(GIA) For any possible universe, u, $P(FTu \mid M\&Eu\&K) = P(FTu \mid Eu\&K)$.

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[6] See (Collins 2009: 207) for a standard formulation of a fine-tuning argument for design in terms of likelihood comparisons. For a critical discussion of such arguments, see (Sober 2005, 2019).

White (2000:262-263) himself seems to endorse something in the neighborhood of KIA on the grounds that something like GIA is true. It should be conceded, however, that there are versions of the multiverse hypothesis that violate GIA. Or at least there are some that do so on the assumption that Nomic Essentialism is false.

According to physicist Lee Smolin's (1997) cosmological natural selection theory, for instance, additional universes form by bubbling off from black holes found in previous universes. These "offspring" universes often inherit values for their free parameters that are similar to (though not necessarily identical to) those of their "parents." The more black holes a universe contains, the more likely it is to be a parent to many other universes. There is, furthermore, some significant overlap between the values of the parameters required for life-permitting universes and those had by universes that tend to produce an abundance of black holes. So on the supposition that Smolin's theory is correct (and Nomic Essentialism is false), the information that a given universe is fine-tuned does raise the probability of there being even more universes (via raising the probability that itself, its ancestor universes, and its offspring universes are all generators of many others).

While such multiverse hypotheses are intriguing and worthy of further investigation, however, the claim that fine-tuning confirms them is not what is being targeted by the this-universe objection. If such hypotheses are confirmed by way of fine-tuning, it is (at least in part) by some mechanism other than chance variation combined with an observation-selection effect. But it is the claim that fine-tuning lends itself to confirmation of multiverse hypotheses solely by way of this mechanism that is being challenged by the this-universe objection. Accordingly, it is dialectically appropriate for proponents of the this-universe objection to set such hypotheses to the side.

There is yet another kind of concern one might have about an appeal to KIA in a discussion of the this-universe objection. The probabilities appealed to in KIA take for granted background information that includes all metaphysically necessary truths. I do not claim that such probabilities straightforwardly correspond to the epistemic probabilities most relevant to the credences that beings like us ought to have concerning whether there is a multiverse. Nevertheless, I believe that a focus on such probabilities is dialectically appropriate, given that I am interested in the question of to what extent importing various assumptions about the essential properties of universes and agents into the background information affects the probability judgements at issue.

One might worry, however, that if universes are individuated in a certain way, then the probability of the multiverse hypothesis being true on the assumption that α exists is 1. Suppose, for example, that α is part of a temporally sequential multiverse, and furthermore that universes are individuated by their ordinal location within the sequence. Then it might be essential to α, say, that it is the 137^{th} universe to emerge within that sequence. If so, then it turns out that the claim that α exists entails that there are at least 137 universes in the sequence. So it turns out that $P(M \mid E\alpha\&K) = 1$.

I concede this may be so, but deny it is something to be concerned about. Suppose the claim that α exists does in fact entail the multiverse hypothesis. In that case, Eα&K is equivalent to M&Eα&K. And so it is trivial that $P(FT\alpha \mid M\&E\alpha\&K) = P(FT\alpha \mid E\alpha\&K)$. It is true, given the current supposition, that any perfectly rational being who is aware of all the relevant metaphysically necessary truths would, upon learning that α exists, also come to learn that the multiverse hypothesis is true. But, if Nomic Essentialism is false, it would not be the fact that α is fine-tuned that informs the being of this, but the mere fact that α exists.

And if Nomic Essentialism is true, the information that α exists becomes inseparable from the information that it is fine-tuned and part of a multiverse (relative to background information that includes all necessary truths). Either way, the central claim of the this-universe objection remains intact. The fact that this universe is fine-tuned fails to raise the probability of the multiverse hypothesis relative to background information that includes the fact that it exists. Thus fine-tuning provides no additional evidence for the multiverse hypothesis over and above the fact that this universe exists.

2. Concerning the Denial of Origins Essentialism

2.1. A Summary of the Anti-Origins Essentialist Worry

I now turn to the second metaphysical worry mentioned in the introduction. Perhaps the this-universe objection makes an illicit assumption not about the essential properties of universes, but of agents. Recall that White (2000:268) argues that those who would deny the this-universe objection are committed to some sort of bizarre metaphysical hypothesis such as that "we were disembodied spirits waiting for a big bang to produce some universe which could accommodate us." Individuals might disagree, however, about the extent to which this metaphysical story is bizarre.

As Manson and Thrush (2003: 75) point out, some dualists might find this story eminently acceptable. And as they (75-76) and Bradley (2009: 68) note, one need not even deny that material origins are essential in order to maintain the possibility of our having existed in a different universe. It is enough to maintain that the materials out of which we arose could have also emerged in a different universe.

So perhaps we did have some chance of existing in a universe other than the one we in fact occupy. If so, one might think, then the more fine-tuned universes there are, the

greater the probability that we would show up in one of them. And so, one might conclude, the fact that we find ourselves in this fine-tuned universe provides evidence for the multiverse hypothesis after all. Michael Huemer (2018: 235-236) concludes for these reasons that our observation that this universe is fine-tuned supports the multiverse hypothesis if and only if we had some chance of showing up in other universes.

2.2. The Relevant Independence Assumption

But in fact, the this-universe objection does not turn on the claim that we had no chance of existing in other universes. Nor does it turn on the claim that we would be no more likely to exist were there more universes.[7] It turns instead on the more plausible claim that whether we exist *in α* is probabilistically independent of the multiverse hypothesis relative to background information that includes the fact that α is fine-tuned.

Let 'xOα' abbreviate 'agent x occupies α'. Given this abbreviation, the required principle may be stated more precisely as follows:

> (Occupational Independence) For any agent x who possibly occupies α,
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> $P(xO\alpha \mid M\&FT\alpha\&E\alpha\&K) = P(xO\alpha \mid FT\alpha\&E\alpha\&K)$.

Now let 's' be a (rigidly designating) proper name for someone who in fact occupies α. Note that Occupational Independence entails that $P(M \mid sO\alpha\&FT\alpha\&E\alpha\&K) = P(M \mid FT\alpha\&E\alpha\&K)$. KIA entails, furthermore, that $P(M \mid FT\alpha\&E\alpha\&K) = P(M \mid E\alpha\&K)$. So it follows that $P(M \mid sO\alpha\&FT\alpha\&E\alpha\&K) = P(M \mid E\alpha\&K)$. I.e. it follows that, for any given

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[7] Although see (Draper, Draper, and Pust 2007: 298-304) as well as (Pust 2007) for one way of defending this claim.

person, the conjunction of the fact that person exists in this universe with the fact that this universe is fine-tuned fails to raise the probability of the multiverse hypothesis relative to background information that includes the fact that this universe exists.

2.3. In Support of Occupational Independence

Occupational Independence holds, furthermore, as long as (given that α exists) the probability of any one of us existing in α remains unaffected by how many other universes there are. It seems clear that this condition is met if we essentially occupy α. In that case, there is some specific non-zero chance of our existing in α, and no chance of our existing anywhere else, regardless of how many universes there are.

So suppose instead that, for any given fine-tuned universe there is, each possible agent has some chance of occupying that universe. In that case, each possible agent is analogous to a marble in an urn, and each occupied universe that arises is analogous to an independent draw from that urn. In a typical scenario of the latter sort, the probability of a marble being drawn on a particular occasion, given that a draw does in fact occur on that occasion, is independent of how many other draws occur. Thus the analogy tells in favor of Occupational Independence. The analogy continues to hold up, furthermore, under different ways of varying the metaphysical situation.

Suppose, for example, that we are comparing a single-universe hypothesis with a temporally sequential multiverse hypothesis. Suppose also that the metaphysics of personal identity are such that a form of reincarnation is possible. In that case, the situation is analogous to a sequence of draws from the urn with replacement, and it is clear in the latter case that the probability of any given marble being selected on a particular draw is (given that draw occurs) independent of how many other draws take place.

Suppose instead that the metaphysics of personal identity are such that necessarily, any given agent exists (at most) only once and only ever in one universe. In that case, the situation is analogous to a sequence of draws from an urn without replacement. In such a sequence, there is (for any draw other than the first) some probability that a given marble has already been drawn and is therefore no longer in the urn. However, there are also fewer marbles in the urn, making it more probable for any of those that remain that it will be drawn. For any given marble, these two competing effects exactly cancel out, thereby rendering the probability of a marble being selected on a given draw independent of how many other draws occur.

Conclusion

We have seen that the independence assumptions on which the this-universe objection relies depend neither on denying Nomic Essentialism nor on affirming that we are essentially bound to this universe. While important worries about the cogency of the this-universe objection remain, the particular metaphysical concerns addressed in this paper ought to be laid to rest.[8]

[8] For helpful advice, I would like to thank Sarah Boyce, Dean Zimmerman, the participants of the 2023 Rutgers Summer Seminar on Fine-Tuning, and the faculty and graduate students at the University of Missouri to whom I presented some of the research that led to this paper. I would also like to thank two anonymous referees at *Analysis* for helpful feedback on an earlier draft.

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