Fine Tuning Arguments

Ryan Doody

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Cosmological Constants & Confirmation

1. **The Cosmological Constants are Life-Permitting.** "The inhabitability of our universe depends on the precise adjustment of what seem to be arbitrary, contingent features. ... In the space of possible outcomes of a big bang, only the tiniest region consists of universes capable of sustaining life."
2. **Confirmation.** Evidence E *confirms* hypothesis H, given background knowledge K, if and only if $\Pr(H \mid E \wedge K) > \Pr(H \mid K)$.

LP = *the universe is life-permitting.*

T (for *Theism*) = *there exists a God who fine-tuned the cosmological constants for the purpose of creating life.*

M = the Multiverse Hypothesis: *there are multiple universes, in which the cosmological constants take different values.*

$$\Pr(H \mid E \wedge K) > \Pr(H \mid K) \Leftrightarrow \Pr(E \mid H \wedge K) > \Pr(E \mid \neg H \wedge K) \tag{1}$$

$$\Pr(H \mid E \wedge K) = \Pr(H \mid K) \Leftrightarrow \Pr(E \mid H \wedge K) = \Pr(E \mid \neg H \wedge K) \tag{2}$$

Fine-Tuning Argument for God

Imagine that the room is wired to explode unless some dials outside of room are set to the right combination. The fact that the room didn't explode should make you more confident that someone came along and set the dials to diffuse the bomb. Analogously, that our universe is hospitable to life, should make you more confident that there was a *Fine-Tuner.*

Probabilistic Fine-Tuning Argument for God

$\Pr(LP \mid T) \approx 1$, and $\Pr(LP)$ is low, so

$$\frac{\Pr(LP \mid T) \cdot \Pr(T)}{\Pr(LP)} > \Pr(T)$$

By Bayes' Rule, then, $\Pr(T \mid LP) > \Pr(T)$, i.e. the fact that our cosmological constants are life-permitting *confirms* the existence of a fine-tuning god.

Why think that $\Pr(LP \mid T) \approx 1$? Supposing that the Multiverse Hypothesis is false ($\neg M$), then T makes LP more likely. Why think that $\Pr(LP)$ is low? Again, supposing $\neg M$, it is. But if LP confirms M, and M is a more plausible hypothesis than T, that undermines the Fine-Tuning Argument for God.

Suppose you think the following are all true:

1. $\Pr(\mathbf{M} \mid \mathbf{LP}) > \Pr(\mathbf{M})$. *That our universe is life-permitting confirms the Multiverse Hypothesis.*
2. $\Pr(\mathbf{T} \mid \neg\mathbf{M}) > \Pr(\mathbf{T} \mid \mathbf{M})$. *Theism is more likely given that our universe is the only universe there is than it is if the Multiverse Hypothesis if true.*
3. $\Pr(\mathbf{T} \mid \mathbf{LP} \wedge \neg\mathbf{M}) > \Pr(\mathbf{T} \mid \neg\mathbf{M})$. *Supposing that the Multiverse Hypothesis is false, that our universe is life-permitting confirms Theism.*
4. $\Pr(\mathbf{T} \mid \mathbf{LP} \wedge \mathbf{M}) = \Pr(\mathbf{T} \mid \mathbf{M})$. *Conditional on the Multiverse Hypothesis being true, that our universe is life-permitting doesn't confirm Theism.*

It is consistent with these assumptions that $\Pr(T \mid LP) = \Pr(T)$, i.e., that our universe is life-permitting doesn't confirm Theism.

Fine-Tuning Argument for Multiple Universes

Does the fact that our universe is life-permitting confirm the Multiverse Hypothesis? It is tempting to think so, but White argues that it does not.

"... a *single* life-permitting universe is exceedingly improbable, but if we suppose there are or have been very many universes, it is to be expected that eventually a life-permitting one will show up."

1. **Probabilistic Confirmation.** Distinguish between the following two versions of LP :

   LP *Our* universe is life-permitting.

   LP* Some universe is life-permitting.

   $\Pr(LP^* \mid M) > \Pr(LP^* \mid \neg M)$. So, by (1), $\Pr(M \mid LP^*) > \Pr(M)$. But, White argues, $\Pr(LP \mid M) = \Pr(LP \mid \neg M)$. And so, by (2), $\Pr(M \mid LP) = \Pr(M)$: i.e., LP does *not* confirm M.

2. **Making Improbable Events Less Surprising.** Even if M doesn't make LP less *improbable,* it does make it less *surprising.* What makes an improbable event surprising?

   - An event E is *surprising* if there is some alternative hypothesis H^* such that (a) H^* is not wildly implausible, and (b) $\Pr(E \mid H^*) > \Pr(E \mid H)$, where H is our initial assumption about what is going on.

   The fact that our universe is life-permitting is surprising: (b) $\Pr(LP \mid T) > \Pr(LP \mid \neg T)$, and (a) T isn't wildly implausible. But M renders LP *unsurprising:*

   $$\Pr(LP \mid T \wedge M) \approx \Pr(L \mid \neg T \wedge M)$$

   But, nevertheless, M does not *raise the probability* that our universe is life-permitting. Rather, M *screens off* the probabilistic support that T lends to LP.

Example: Suppose you flip a coin twenty times. Here are two possible outcomes:

(A)
$T, T, T, H, T, H, T, T, H, H, H, H, H, H, T, H, T, T, T, T$

(B)
$H, T, H, T, H, T, H, T, H, T, H, T, H, T, H, T, H, T, H, T$

Both (A) and (B) are equally improbable. But (B) is more surprising than (A).

Theism, Revisited

1. $\Pr(LP \mid T \wedge \neg M) > \Pr(LP \mid \neg T \wedge \neg M)$. If our universe is the only universe there is, then the existence of a Fine-Tuner makes it more likely that our universe is life-permitting.
2. $\Pr(LP \mid T \wedge M) = \Pr(L \mid \neg T \wedge M)$. The Multiverse Hypothesis screens off the probabilistic support that Theism lends to our universe being life-permitting.
3. $\Pr(LP \mid M) = \Pr(LP \mid \neg M)$. The Multiverse Hypothesis doesn't make it any more likely that *our* universe is life-permitting.

From these three, it follows that $\Pr(T \mid LP) > \Pr(T)$.

From (1) and (2), we get the following:

1. $\Pr(T \mid LP \wedge \neg M) > \Pr(T \mid \neg M)$
2. $\Pr(T \mid LP \wedge M) = \Pr(T \mid M)$
3. $\Pr(M \mid LP) = \Pr(M)$

And the proof proceeds as follows:

$$\begin{aligned}
\Pr(T \mid LP) &= \Pr(T \mid LP \wedge M) \cdot \Pr(M \mid LP) \\
&\quad + \Pr(T \mid LP \wedge \neg M) \cdot \Pr(\neg M \mid LP) \\
&= \Pr(T \mid M) \cdot \Pr(M) \\
&\quad + \Pr(T \mid LP \wedge \neg M) \cdot \Pr(\neg M) \\
&> \Pr(T \mid M) \cdot \Pr(M) \\
&\quad + \Pr(T \mid \neg M) \cdot \Pr(\neg M) \\
&= \Pr(T)
\end{aligned}$$

So, $\Pr(T \mid LP) > \Pr(T)$.