The Fine-Tuning Argument, Multiple Universes, and God

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Cosmological Constants and Life

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 if and only if $c(H \mid E) > c(H)$.

$$c(H \mid E) > c(H) \Leftrightarrow c(E \mid H) > c(E \mid \neg H) \qquad (1)$$

$$c(H \mid E) = c(H) \Leftrightarrow c(E \mid H) = c(E \mid \neg H) \qquad (2)$$

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.*

Fine-Tuning Argument for God

Roger White asks us to imagine the following scenario:

> A high security combination lock is wired up to nuclear warheads that threaten to destroy the whole world. The bombs will be detonated unless several dials are set to a very precise configuration of values. Miraculously it turns out that the dials are delicately set within the tiny range that deactivates the bombs. Had they differed ever so slightly from their actual positions all life would be gone. Is this just a lucky accident, or might they have been adjusted that way on purpose?

Learning this, should you become more confident that someone adjusted the dials? Should you become more confident that there must exist many, many other worlds with different dials?

PROBABILISTIC FINE-TUNING ARGUMENT FOR GOD

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

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

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

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.

   $c(LP^* \mid M) > c(LP^* \mid \neg M)$. So, by (1), $c(M \mid LP^*) > (M)$.

   But, White argues, $c(LP \mid M) = c(LP \mid \neg M)$. And so, by (2), $c(M \mid LP) = c(M)$: 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) $c(E \mid H^*) > c(E \mid H)$, where H is our initial assumption about what is going on.

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

   $$c(LP \mid T \wedge M) \approx c(LP \mid \neg T \wedge M)$$

   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 fifteen times. Here are two possible outcomes:

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

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

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

White motivates this claim with an example: *Leslie's Shooting Analogy*. Does the analogy hold?

Theism, Revisited

1. $c(LP \mid T \wedge \neg M) > c(LP \mid \neg T \wedge \neg M)$. 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. $c(LP \mid T \wedge M) = c(LP \mid \neg T \wedge M)$. The Multiverse Hypothesis screens off the probabilistic support that Theism lends to our universe being life-permitting.

3. $c(LP \mid M) = c(LP \mid \neg M)$. The Multiverse Hypothesis doesn't make it any more likely that *our* universe is life-permitting.

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

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

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

And the proof proceeds as follows:

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

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