The Fine-Tuning of the Universe: A Philosophical Analysis

by

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Content Statement

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Abstract

This thesis is a philosophical examination of the fine-tuning of the Universe. It is in two parts, the first part examines the apparent improbability of the fine-tuning and the second examines responses to that apparent improbability.

I begin part one by examining the physical theories that have generated the fine-tuning debate. I argue the debate presupposes a realist interpretation of numbers, scientific theory and laws of nature. Without these presuppositions the concepts of slightly different laws and initial conditions of the Universe should be interpreted as mathematical artifacts. I then go on to analyse the possibility space of universes. Physical possibility is excluded and logical possibility is unsatisfactory, so I introduce ontic possibility space to examine the possibility of other universes. I consider the evidence that slightly different universes are not life-allowing, and I suggest two theories that could explain this evidence. Ontic possibility space may be chaotic such that 'neighbouring' universes are substantially different in structure from our own. Alternatively ontic possibility space may be quantised such that slightly different universes are not ontically possible. I then consider the claim that this fine-tuned universe is improbable. I analyse the role of probability in the debate and use partitions of the probability space to examine the fine-tuning. I conclude that the fine-tuning can be considered improbable only if it is taken to be objectively significant. Without this the fine-tuning is isoprobable, meaning that it is as probable as any other outcome.

In part two I consider the responses to the improbability. Two responses are attempts to explain away the improbability, either by postulating many universes or God. I also consider the possibility that this universe is the isolated result of an indeterministic ontic process. I examine the role of probability in explanation, focusing on the impact of indeterminism on this process. Often explanations are favoured that raise the probability of events. However I show that this can lead to error when considering isolated events in indeterministic systems. To avoid this error I apply the conformity maxim – explanations should generate epistemic probabilities that match ontic probabilities. I then go on to consider what triggers the need for explanation including an analysis of surprising and specified events. In considering the explanations of the fine-tuning, I analyse the multiple universe and design explanations. I conclude that the best response to the fine-tuning is to consider the universe as an isolated outcome of an indeterministic ontic process, possibly grounded in chaos or quantum theory.
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