

WAR OF THE WORLDS

DO YOU BELIEVE IN GOD? OR IN MULTIPLE UNIVERSES?

DO WE LIVE IN A "DESIGNER universe"? This question has been batted around since the 1960s, when cosmologists began to notice that the laws of nature seemed fine-tuned for conscious life to emerge. If the fundamental constants of physics—the strength of gravity, the ratio of the mass of the proton to that of the neutron, the energy density of empty space, and so on—had differed by a hair from their actual values, the universe would have been a lifeless dud: no stars, no stable elements, no evolution. It is as if a cosmic designer had twiddled a bunch of control knobs until they were at precisely the right settings to ensure that beings like us would eventually shimmer onto the scene.

The Cosmic Designer Hypothesis is one way of explaining the improbable fine-tuning of nature's laws. And compared with the Big Fluke Hypothesis (which is really no explanation at all), it may not look so bad. But those who find its deistic flavor unpalatable have suggested a third option: the Many Universes Hypothesis. This hypothesis, which has been around for a couple of decades, has been elegantly spelled out by the physicist Steven Weinberg in his essay "A Designer Universe?," published last year in *The New York Review of Books* and recently anthologized in *The Best American Essays 2000*.

The argument goes like this. Suppose our universe is but one among a vast ensemble of universes that all somehow coexist. Suppose further that the fundamental constants vary randomly across these universes.

Then we could expect that at least one universe out of the ensemble should be hospitable to intelligent life. Add to this the truism that we can only observe a universe that is consistent with our existence—the so-called anthropic principle—and the apparent fine-tuning of our universe suddenly seems wholly unremarkable.

At first blush, the Many Universes Hypothesis would appear rather extravagant, requiring a huge (perhaps infinite) number of additional universes merely to account for some features of our own. The Cosmic Designer Hypothesis looks downright economical by comparison. Since these extra universes are cut off from our own in space and time, and are thus unobservable, they would seem to offend against the principle that our theories of the world should posit no more entities than needed. Shouldn't these universes be shaved away by Occam's razor?

Well, that depends on what grounds we have for believing they exist. In an excellent article in the June 2000 issue of the journal *Notus*, Roger White points out that some philosophers, notably Derek Parfit and John Leslie, think that our universe's otherwise improbable fine-tuning could be grounds enough. Their case turns on an uncontroversial principle of probabilistic reasoning: If the truth of a certain hypothesis (Many Universes) would render a certain observation (fine-tuning) more likely, then making that observation increases the likelihood of that hypothesis.

But one must be careful here. It is true that the existence of



many universes would make it likely that at least one of them would be life fostering. The hypothesis would not, however, have any bearing on the probability that *this particular universe* would be life fostering. Consider the analogy of rolling a pair of dice. If you roll them just once, the chance of getting double sixes is only one in thirty-six. If you roll them twenty-five times, the chance of getting double sixes on at least one of the rolls rises above fifty-fifty. Yet the total number of rolls has no effect on the odds of getting double sixes on any particular roll.

Some people think that if you roll the dice repeatedly and don't get double sixes, then you are more likely to get double sixes on the next roll. They are victims of the notorious gambler's fallacy. In a 1987 article in *Mind*, the philosopher Ian Hacking sees a kindred bit of illogic behind the Many Universes Hypothesis. Suppose you enter a room and see a guy roll a pair of dice. They come up double sixes. You think, "Aha, that is very unlikely on a single roll, so he must have rolled the dice many times before I walked

into the room." You have committed what Hacking labels the inverse gambler's fallacy. Doesn't one make a similar mistake when one argues that because we live in an improbably congenial universe there must also be a great number of uncongenial ones out there?

Proponents of the Many Universes Hypothesis have vigorously denied that any such fallacy taints their reasoning. Interesting as it is, the resulting debate needn't concern Weinberg. His case is different from that of the philosophers. The philosophers argue that the fact that our universe appears to be fine-tuned supports the hypothesis of multiple universes. Weinberg, by contrast, supplies independent grounds for believing in multiple universes. There are several physical theories, he points out, that seem to imply their existence—for instance, Andrei Linde's "chaotic inflation" model, in which cosmos-engendering big bangs are fairly routine.

So if the Multiple Universes Hypothesis is true (as Weinberg qua physicist suspects), there would seem to be no explanatory need for the Cosmic Designer Hypothesis (as Weinberg qua unbeliever desires). It remains possible, of course, that they are *both* true: that there are many different universes, and that a cosmic designer painstakingly tailored one of them for us. But now it is the hypothesis of a cosmic designer that stands in need of independent grounds to be believed. Evidence of design is no longer enough.

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