

The Pluralistic Universe

by Nathan Schneider

Science has a handle on the age of the universe. Now “multiverse” theorists are asking a vexing question: Which one?



One universe is baffling enough. What little we know is that it's composed of tiny blips of light in a cloud of black holes, dark matter, and dark energy, which are in turn describable only through the tunnel vision of quantum indeterminacy and chronic uncertainty. Not to mention the matter of where everything came from and what it ultimately means. But even this may not be all. As scientists work to understand the cosmos we inhabit, some have come to suspect it might be only one among many.

A growing number of physicists now believe that we live not simply in the visible universe that started with a big bang, but in some kind of “multiverse” with a number of such universes. From universe to universe, any parameter might vary, from the force of gravity to what you had for lunch. Today's researchers have the benefit of orbital telescopes, supercomputer simulations, and as much mathematics they can wrap their minds around. But where other universes are concerned, looking beyond the pale of measurable time and space, the line between science and speculation—or even religion—can be difficult to draw. Multiverse theories can seem radically opposed to both the experience of everyday life and our sense of place in the cosmos.

The Discovery Institute, the infamous promoter of intelligent design theory in biology, has begun looking to theoretical physics as another battleground in the struggle against materialism. Evangelical philosopher and Discovery Institute fellow William Lane Craig has called the multiverse idea an act of “desperation” on the part of atheist scientists. Christoph Cardinal Schönborn, the influential Catholic archbishop of Vienna, claimed in a 2005 New York Times op-ed that people devised the idea of a multiverse specifically “to avoid the overwhelming evidence for purpose and design found in modern science.” And by “purpose and design,” of course, he means nothing other than evidence of divine handiwork.

Ostensibly, they could be right. For the past century, astronomy and physics have mounted a tremendous supply of evidence that life in the universe dangles by a very thin thread. If the observable universe had expanded at a slightly different speed, or if the strong nuclear force were just a little off from what it is, life as we know it would be impossible. The chances that the cosmic conditions for even a single living cell might come about in a random toss-up are so astonishingly low that it is hard not to conclude that they're a special act of God.

If we live in a vast and varying multiverse, however, much vaster than the universe that our telescopes are able to see, the need for divine intervention becomes less pressing. Were it so that, as some recent models predict, there are as many as 10500 different stable universes in all, the chances of finding the conditions of ours among them becomes comfortably higher. In the past decade or so, as more cosmologists have accepted the idea of the multiverse, they have also become more open to talking about this so-called fine-tuning for life. What was once regarded as a non-scientific and borderline-religious question has now become, with the prospect of multiple universes, a matter of serious interest. And, as Nobel-laureate physicist

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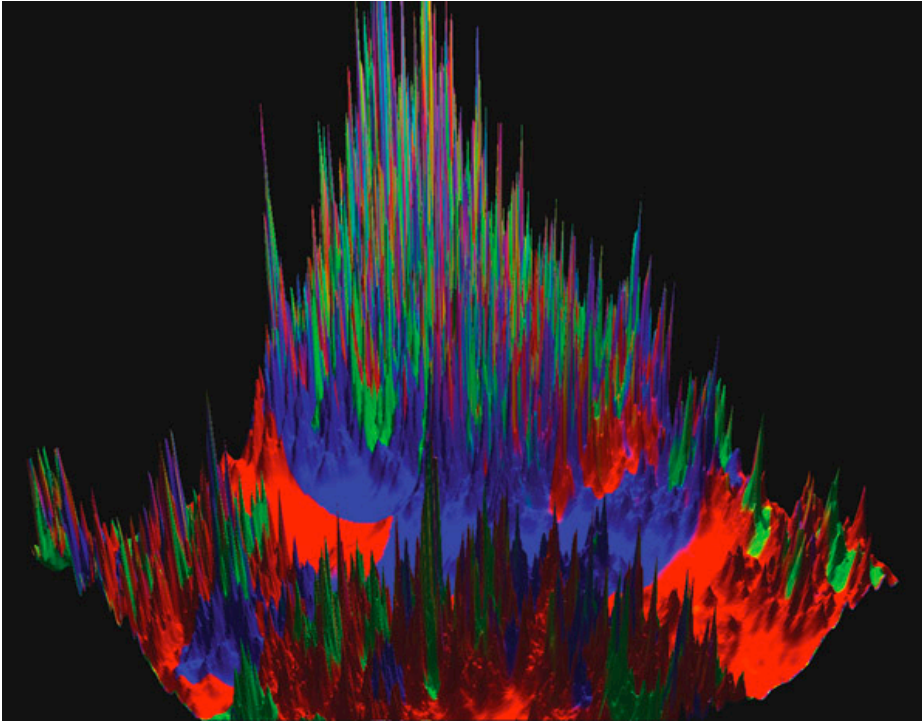
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Steven Weinberg has said, the choice seems to come down to either God or multiverse.



Still, when asked whether the whole idea might be an atheist conspiracy, Columbia University physicist and bestselling author Brian Greene can't help but laugh. "The math leads us to ever more possible universes," he says, "as opposed to what we had hoped, which is that the math would lead us to a unique universe." When he began studying string theory decades ago, he thought it might lead the way, at last, to a theory of everything. But instead, everything has only gotten bigger.

In the early 1980s, cosmologists in the Soviet Union developed a model of chaotic inflation, wherein the universe we see is but one small, stable pocket in a vast and expanding megaverse. Other such pockets, separated from ours by regions of instability, exist elsewhere as effectively separate universes with different laws of physics. At first, says Andrei Linde of Stanford, who helped develop the theory in Moscow, "people were mostly laughing." But in recent years, its convergence with the predictions of string theory has made this model one of cosmology's strongest candidates for the real thing. Linde insists that, despite the claims of Schönborn and Craig, he didn't start thinking about a multiverse for ideological reasons. "I just wanted to find out the most economical way of explaining the properties of the world," he says, "and to study the consequences up to their logical conclusions."

"Maybe the best evidence" that the multiverse isn't a plot hatched by scientists against religion, adds Greene, "is how reluctant the scientific community has been to take on this idea." Some of its most relentless critics are scientists, not theologians. Princeton physicist Paul Steinhardt has called the multiverse "a dangerous idea that I am simply not willing to contemplate." He, like Nobel-laureate David Gross, believes that the whole approach is a cop-out that gives up on the dream of an elegant, unified theory explaining the laws of nature as we observe them.

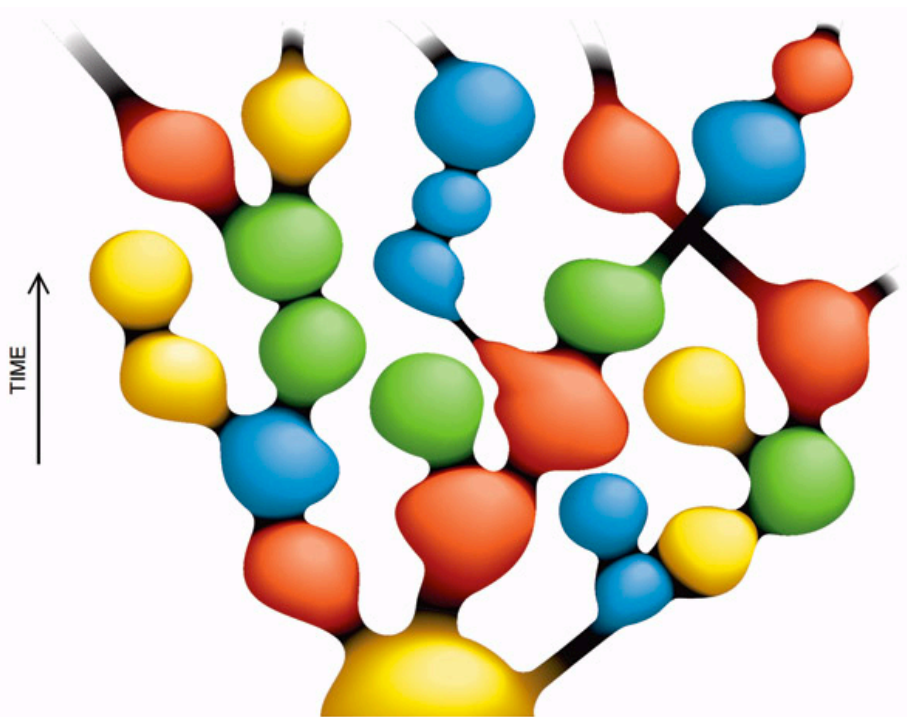
More to the point, however, are concerns that none of the multiverse models under discussion quite count as science. Cosmologists build their theories out of rigorous mathematics, but, from within this universe at least, there is no known way to directly confirm them in the laboratory or the observatory. Greene suggests that the usual scientific methods may be reaching an impasse. "There are features of the world that may not be explainable in the conventional sense," he says. "A multiverse is a very different framework to do science in."

A multiverse means a different way of thinking about God, too. If a model like Linde's is correct, the faithful can no longer point to the apparent fine-tuning of our universe as evidence for intelligent design with human life in mind. This is why some have reacted against such proposals as the unscientific tricks of desperate atheists. But other believers recognize a multiverse as a genuine scientific possibility, and their reflections have already begun to show that God can have a place in the multiverse, too.

Stephen Barr is a particle physicist at the University of Delaware and a Catholic. In 2003 he published *Modern Physics and Ancient Faith*, which points to evidence of supernatural design in the latest science. But Barr has also written scientific papers that assume a multiverse hypothesis and insists, "There are physics reasons why the multiverse has to be taken seriously as an idea. It is absolutely not kooky." It frustrates him that Christian intellectuals like those at the Discovery Institute have been so hostile to these theories. "It seems to me very stupid for religious people to go around and attack ideas like the multiverse because they think it somehow hurts a religious argument," he says. "It may turn out someday that it's demonstrably true, and it backfires on them."

Barr is far from alone. Don Page, an evangelical and a theoretical physicist at the University of Alberta, insists that undercutting one argument for God does not defeat the whole case for divine creation. "The multiverse is not an alternative to design by God," he believes. "God could have designed the whole thing." Page points out that the fundamental design of a multiverse appears to be simpler and more elegant than that of a finely tuned universe—and thus more consistent with traditional representations of God as good, beautiful, and simple.

Last May, Page participated in a conference on the theological implications of multiverse theories at Wheaton College in Illinois. Robin Collins, a Christian philosopher at Messiah College, was there as well. Collins has been exploring the implications of multiple universes for the nature of evil and the uniqueness of Christ. "Whatever multiverse exists under theism," his handout at the conference proposed, "it would not contain morally unacceptable worlds, such as those in which evil significantly predominated over good." Rather than seeing a multiverse as a threat to theology, he sees it as an opportunity for new kinds of thinking.



Jeffrey Zweerink has even bigger ambitions for a Christian version of the multiverse. He's a part-time astrophysicist at UCLA and a research scholar for the creationist think tank Reasons to Believe, which recently published his booklet, *Who's Afraid of the Multiverse?* He has

concluded that any universe capable of supporting life, even a multiverse, requires supernatural design. “Initially, the multiverse looks like it removes that design,” Zweerink says. “It really doesn’t.” In his booklet, he explains how he came to see these theories as a blessing in disguise. “As my understanding of multiverse models increased,” he writes, “I realized the whole issue provided a tremendous opportunity to engage science-minded people and draw them into discussion of the Gospel.” While he does suspect that many proponents of the multiverse are hoping to sidestep God, he believes that they do so in vain.

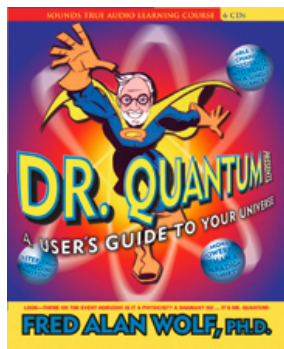
Christians aren’t the only ones with something to appreciate. “Buddhists are definitely proponents of multiverses,” says Donald Lopez, a Buddhist studies professor at the University of Michigan and author of *Buddhism and Science: A Guide for the Perplexed*. According to thousand-year-old sutras from the Mahayana school, Buddhas appear not only in our universe but in others, which lie very far away. While such a teaching might sound something like the inflationary multiverse that Andrei Linde and his colleagues have developed, it is so far from the rigor of a scientific claim that there’s little reason to believe the resonance is anything but coincidental.

No historic religious tradition—not Buddhism nor Christianity nor any other—comes with a ready-made doctrine for dealing with the multiverse ideas that are being discussed in cosmology today. They raise genuinely new questions for believers, though perhaps not new kinds of questions. Over the centuries, the magnitude of the universe has steadily grown, from the planetary spheres, to a galaxy, to a cluster of galaxies, to a universe. If it is true that our universe is only one pocket of something much greater, there is little reason to doubt that religious traditions will find creative ways to adapt. Those who insist that the choice is, simply, between God and the multiverse underestimate the dexterity of both concepts in the minds of those who wield them.

They also overestimate what a multiverse could claim to explain. Where, after all, did it come from? The Stanford University string theorist Leonard Susskind said, even if his vast and messy multiverse scenario were somehow confirmed, “that does not mean that the ultimate origin of the universe is understood.” It only pushes the question back further.

As if multiple universes weren’t perplexing enough, there are multiple multiverses. Physicists today are discussing a handful of separate kinds of multiverse scenarios, any number of which might actually be true. Each has its own set of scientific implications, and each also strikes different chords among those trying to understand its spiritual implications.

The first to be taken seriously was a consequence of Hugh Everett III’s relative-state interpretation of quantum mechanics, which appeared in 1957. In 1971, Bryce Seligman DeWitt argued that Everett’s interpretation of quantum indeterminacy means that the universe is constantly diverging into countless parallel universes, each determined by different outcomes of quantum events. Everything that can happen does, in one universe or another. Physicists have long been skeptical of Everett’s idea, though it has recently enjoyed a resurgence of interest as the standard Copenhagen interpretation of quantum mechanics attracts increasing skepticism. Yet few are ready to adopt it as the most promising account of reality.



Outside of the mainstream scientific community, this so-called “many-worlds” picture has proven quite popular. “It’s part of my repertoire,” says Fred Alan Wolf, a.k.a. Dr. Quantum (*left*), a UCLA-trained physicist who writes and speaks extensively for laypeople about “the new physics” and its intersections with spirituality. “If quantum mechanics is true,” he says, “there isn’t really a material base for the explanation of consciousness, and that’s where spirituality enters the game.” The conscious observer, after all, has a decisive role to play in the basic principles of quantum theory. On the quantum level, the world unfolds through the process of observing it. “What this is telling us,” reasons Wolf, “is that if you change the ‘I’, you change the world.” He believes that understanding this can help people overcome addictive behaviors by calling into

question the observer experiencing the tug of habit. “When you’re doing this, you’re opening yourself to moving into parallel realities, parallel worlds,” he says. This willingness to bring science to bear on ordinary life has made him a sought-after speaker around the world.

Wolf thinks that modern science has rendered many old religious claims about God obsolete. “These ideas are perfectly valid in the fourteenth century,” he chuckles. “They’re not valid in the twenty-first.” But he does see lasting value in ancient mystical traditions like Jewish Kabbalah, Islamic Sufism, and Hinduism. Like quantum physics, they recognize the integral role of the observer—and he thinks, of spirit—in the construction of reality.

While sharing most of Wolf’s spiritual and scientific predilections, University of Oregon physicist Amit Goswami rejects the many-worlds interpretation as unverifiable and unscientific. But he is willing to talk about multiverses within consciousness, which have been discussed for thousands of years by Eastern mystics. Born in India, Goswami believes that quantum physics offers the chance for Western science to access what the East has always known about. “The spiritual traditions have absolutely, in my view, the correct metaphysics,” he says. “Quantum physics, for the first time, has given the West a wisdom path to spirituality.” Together with Wolf, Goswami advocates a paradigm shift in science that would put consciousness, rather than matter, at the center. Frustrated by the resistance to their ideas in scientific journals, they have both turned to writing and speaking for the public.

Wolf’s and Goswami’s ideas help frame the documentary *What the Bleep Do We Know!?* produced by members of Ramtha’s School of Enlightenment, a New Age center in Washington state led by psychic medium JZ Knight. Many mainstream scientists have denounced the film, claiming that it uses quantum physics to legitimize unscientific ideas. Columbia University physicist David Albert, who agreed to appear in *What the Bleep* without understanding its broader agenda, has taken pains to distance himself from it. In a subsequent interview with Salon.com, Albert described himself as “profoundly unsympathetic to attempts at linking quantum mechanics with consciousness.” Wolf holds his ground against such skepticism. “Whenever a new idea comes into being, it is not met with open arms,” he says. “When I have or publish a new idea and no one reacts negatively, I think nobody’s paying attention.”



While the spiritualist tendency of figures like Wolf (*left*) and Goswami ventures far from the scientific mainstream, they’re not so far as Albert’s skepticism suggests. Mind-bending thought experiments about mind and reality have always been part of how scientists think about the quantum world. The question of the observer steps on the toes of religion, too, in multiverse models like chaotic inflation. “It does not remove religion at all,” says Andrei Linde, “and in fact it brings this question of consciousness and interpretation on the first front.” From there, he begins to turn cryptic. “I can talk much more about this subject, but the longer I talk, the more crazy it would sound.”

One possibility that an inflationary multiverse gives rise to has the potential to scare off just about everybody: the so-called Boltzmann brain problem, named after Ludwig Boltzmann, a nineteenth-century Austrian physicist who suggested that the universe might have arisen as a random fluctuation. It is the ultimate solipsism. According to some calculations, it appears more likely that you are nothing more than a brain floating in empty space, complete with all your memories and sensations, than an actual person living in the universe that we see around us. Even if we are really embodied beings in a real universe of real galaxies and stars, Andrei Linde has suggested that we may someday be reincarnated as floating brains flashing in and out of existence due to random fluctuations in the inflationary landscape. It isn’t quite the afterlife most believers have in mind.

Andreas Albrecht and Lorenzo Sorbo, at the University of California, Davis, however, have argued that the best models of cosmic inflation actually show an ordinary universe to be more likely than a fully equipped, floating simulacrum. Though these calculations remain

controversial, they offer the hope that the unpleasant scenario of being a Boltzmann brain might be put to rest, which physicists are eager to do. "It's a curious place to find yourself," says Brian Greene.

A similar prospect has emerged, though, just as unsettling and queued for the information age. While working on his dissertation about selection effects and the anthropic principle, philosopher Nick Bostrom began asking himself whether everything we experience could be a computer simulation orchestrated by an advanced civilization—whether it be humans in the future or some other form of life. One day, while on the way to the gym, Bostrom recalls, he realized that there was more to the idea than just whimsy. By 2003, as a professor at Oxford University, he set out the "simulation argument" in a widely discussed paper. It offers two possibilities. Either such a simulation is highly unlikely to ever occur, or we are probably in one. The germ of Bostrom's argument shares a common assumption with the Boltzmann brain concept: It is simpler to simulate a universe than to physically create it.

If there are multiple universes, of whichever kind, the likelihood further swells that we are not the only forms of life to evolve, that there are others more advanced than us, and that they might run realistic simulations. Meanwhile, the simulation argument represents a whole different kind of multiverse model, one in which there could be as many universes as there is the computational equipment and know-how to run them.


To some, the simulation argument brings to mind the designer-God of the Abrahamic religions. "Since the multiverse argument is often invoked as a way to abolish the need for divine providence," writes physicist Paul Davies in *The Goldilocks Enigma*, referring to Bostrom's idea, "it is ironic that it provides the best scientific argument yet for the existence of a God." In fact, Bostrom reports that the argument has changed at least one person's religious opinions. "I once met a diehard atheist," he said in an e-mail, "to whom I explained the argument, and who became an agnostic as a result, saying it was the best argument for God's existence he'd ever heard."

Once again, the lines between mind and reality seem to dissolve in Bostrom's argument. If we are a simulation and the simulator is a god, the difference between natural and supernatural becomes tougher to discern as well. Bostrom himself has in mind not an all-powerful deity but natural life forms with superior technical knowledge. But, if this were in fact the case, it would be difficult to think of them as any different than a god. Upon them everything we know would rely, and their power over us would seem like nothing if not divine.

Bostrom insists that the argument is valid, but he doesn't think we can say for sure whether or not we're actually in a simulation. As with the inflationary multiverse, or the many-worlds interpretation of quantum physics, nobody has yet devised an experiment that could prove or disprove the simulation hypothesis. Consequently, the line between religious and scientific ideas begins to seem less clear.

Without the benefit of empirical data, guided by imagination and a body of carefully wrought mathematics, thinking about a multiverse inevitably challenges scientists, theologians, and laypeople to ask what far-fetched possibilities they are willing to entertain. Which can you stand, at least long enough to work out its implications: that you are a program on some alien's computer, the creature of an intelligent designer beyond space and time, or a quitter in the search for a theory of everything? Or that, perhaps, you'll never know?

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