

THE MIND OF GOD

Did God Cause the Big Bang?

Many people have an image of God as a sort of pyrotechnic engineer, lighting the blue touch-paper to ignite the big bang, and then sitting back to watch the show. Unfortunately, this simple picture, while highly compelling to some, makes little sense. As we have seen, a supernatural creation cannot be a causative act in time, for the coming-into-being of time is part of what we are trying to explain. If God is invoked as an explanation for the physical universe, then this explanation cannot be in terms of familiar cause and effect.

This recurring problem of time was recently addressed by the British physicist Russell Stannard, who draws the analogy between God and the author of a book. A completed book exists in its entirety, although we humans read it in a time sequence from the beginning to the end. "Just as an author does not write the first chapter, and then leave the others to write themselves, so God's creativity is not to seem as uniquely confined to, or even especially invested in, the event of the Big Bang. Rather, his creativity has to be seen as permeating equally all space and all time: his role as Creator and Sustainer merge."⁴

Quite apart from the problems of time, there are several additional pitfalls involved in invoking God as an explanation for the big bang. To illustrate them I shall relate an imaginary conversation between a theist (or, more properly, a deist), who claims that God created the universe, and an atheist, who "has no need of this hypothesis."

ATHEIST: At one time, gods were used as an explanation for all sorts of physical phenomena, such as the wind and the rain and the motion of the planets. As science progressed, so supernatural agents were found to be superfluous as an explanation for natural events. Why do you insist on invoking God to explain the big bang?

THEIST: Your science cannot explain everything. The world is full of mystery. For example, even the most optimistic biologists admit that they are baffled by the origin of life.

ATHEIST: I agree that science hasn't explained everything, but that doesn't mean it can't. Theists have always been tempted to seize on any process that science could not at the time explain and claim that God was still needed to explain it. Then, as science progressed, God got squeezed out. You should learn the lesson that this "God of the gaps" is

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an unreliable hypothesis. As time goes on, there are fewer and fewer gaps for him to inhabit. I personally see no problem in science explaining all natural phenomena, including the origin of life. I concede that the origin of the universe is a tougher nut to crack. But if, as it seems, we have now reached the stage where the only remaining gap is the big bang, it is highly unsatisfying to invoke the concept of a supernatural being who has been displaced from all else, in this "last-ditch" capacity.

THEIST: I don't see why. Even if you reject the idea that God can act directly in the physical world once it has been created, the problem of the ultimate origin of that world is in a different category altogether from the problem of explaining natural phenomena once that world exists.

ATHEIST: But unless you have other reasons to believe in God's existence, then merely proclaiming "God created the universe" is totally *ad hoc*. It is no explanation at all. Indeed, the statement is essentially devoid of meaning, for you are merely defining God to be that agency which creates the universe. My understanding is no further advanced by this device. One mystery (the origin of the universe) is explained only in terms of another (God). As a scientist I appeal to Occam's razor, which then dictates that the God hypothesis be rejected as an unnecessary complication. After all, I am bound to ask, what created God?

THEIST: God needs no creator. He is a necessary being—he must exist. There is no choice in the matter.

ATHEIST: But one might as well assert that the universe needs no creator. Whatever logic is used to justify God's necessary existence could equally well, and with an advantageous gain in simplicity, be applied to the universe.

THEIST: Surely scientists often follow the same reasoning as I have. Why does a body fall? Because gravity acts on it. Why does gravity act on it? Because there is a gravitational field. Why? Because space-time is curved. And so on. You are replacing one description with another, deeper description, the sole purpose of which is to explain the thing you started with, namely, falling bodies. Why do you then object when I invoke God as a deeper and more satisfying explanation of the universe?

ATHEIST: Ah, but that's different! A scientific theory should amount to much more than the facts it is trying to explain. Good theories provide a simplifying picture of nature by establishing connections between

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hitherto disconnected phenomena. Newton's gravitational theory, for example, demonstrated a connection between the ocean tides and the motion of the moon. In addition, good theories suggest observational tests, such as predicting the existence of new phenomena. They also provide detailed mechanistic accounts of precisely how the physical processes of interest happen in terms of the concepts of the theory. In the case of gravitation, this is through a set of equations that connect the strength of the gravitational field with the nature of the gravitating sources. This theory gives you a precise mechanism for how things work. By contrast, a God who is invoked only to explain the big bang fails in all three criteria. Far from simplifying our view of the world, a Creator introduces an additional complicating feature, itself without explanation. Second, there is no way we can test the hypothesis experimentally. There is only one place where such a God is manifested—namely, the big bang—and that is over and done with. Finally, the bald statement "God created the universe" fails to provide any real explanation unless it is accompanied by a detailed mechanism. One wants to know, for example, what properties to assign this God, and precisely how he goes about creating the universe, why the universe has the form it does, and so on. In short, unless you can either provide evidence in some other way that such a God exists, or else give a detailed account of *how* he made the universe that even an atheist like me would regard as deeper, simpler, and more satisfying, I see no reason to believe in such a being.

THEIST: Nevertheless, your own position is highly unsatisfactory, for you admit that the reason for the big bang lies outside the scope of science. You are forced to accept the origin of the universe as a brute fact, with no deeper level of explanation.

ATHEIST: I would rather accept the existence of the universe as a brute fact than accept God as a brute fact. After all, there has to be a universe for us to be here to argue about these things!

I shall discuss many of the issues raised in this dialogue in the coming chapters. The essence of the dispute is whether one is simply to accept the explosive appearance of the universe as a bald, unexplained fact—something belonging to the "that's-that" category—or to seek some more satisfying explanation. Until recently it seemed as if any such explanation would have to involve

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a supernatural agency who transcended the laws of physics. But then a new advance was made in our understanding of the very early universe that has transformed the entire debate, and recast this age-old puzzle in a totally different light.

Creation without Creation

Since the demise of the steady-state theory, scientists have seemed to be faced with a stark choice concerning the origin of the universe. One could either believe that the universe is infinitely old, with all the attendant physical paradoxes, or else assume an abrupt origin of time (and space), the explanation for which lies beyond the scope of science. What was overlooked was a third possibility: that time can be bounded in the past and yet not come into existence abruptly at a singularity.

Before getting into the details of this, let me make the general point that the essence of the origin problem is that the big bang seems to be an event without a physical cause. This is usually regarded as contradicting the laws of physics. There is, however, a tiny loophole. This loophole is called quantum mechanics. As explained in chapter 1, the application of quantum mechanics is normally restricted to atoms, molecules, and subatomic particles. Quantum effects are usually negligible for macroscopic objects. Recall that at the heart of quantum physics lies Heisenberg's uncertainty principle, which states that all measurable quantities (e.g., position, momentum, energy) are subject to unpredictable fluctuations in their values. This unpredictability implies that the microworld is indeterministic: to use Einstein's picturesque phraseology, God plays dice with the universe. Therefore, quantum events are not determined absolutely by preceding causes. Although the probability of a given event (e.g., the radioactive decay of an atomic nucleus) is fixed by the theory, the actual outcome of a particular quantum process is unknown and, even in principle, unknowable.

By weakening the link between cause and effect, quantum mechanics provides a subtle way for us to circumvent the origin-of-the-universe problem. If a way can be found to permit the universe to come into existence from nothing as the result of a quantum fluctuation, then no laws of physics would be violated. In other words, viewed through the eyes of a quantum physicist, the spontaneous appearance of a universe