Endmatter

HAWKING ON GOD AND PHYSICAL THEORY

by Robert J. Deltete

Abstract. When queried about his objectives, the celebrated theoretical physicist and cosmologist Stephen Hawking has replied, "My goal is a complete understanding of the universe, why it is as it is and why it exists at all." In this essay, I comment on what Hawking has to say about the role of God in the understanding he seeks. I draw from his popular writings and pronouncements, since both are peppered with references to God and with statements about what God can and cannot do. In particular, I focus on his most recent collection of essays intended for a general audience. I argue that the theological implications Hawking has drawn from his cosmological models are shallow and that the narrow naturalistic path he has taken is inadequate to the large task he has set for himself.

Keywords: God; S.W. Hawking; quantum cosmology.

Black Holes and Baby Universes and Other Essays by the celebrated astrophysicist Stephen Hawking (1993) is a collection of essays and transcribed talks, written or given between 1976 and 1992. Unlike his phenomenally successful best-seller *A Brief History of Time* (Hawking 1988), which was intended to present a reasonably coherent narrative—a "feeling for our progress toward a complete understanding of the laws that govern the universe," he now writes (Hawking 1993, 35)—this book does not aim at systematic coherence (see pp. vii–viii).

The result is a potpourri. Hawking discusses black holes, the subject for which he is professionally best known (chap. 10) , and his recent work—for a popular audience, mind you—on these exotic objects (chap. 11). (Hawking conjectures that material falling into a black hole could give rise to "baby universes" that are forever cut off

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from our own—hence the title essay of the collection.) He speculates about the origin of the universe (chap. 9) and about its future (chap. 10). He explains and defends his view of physical theory (chap. 6), and he describes his vision of what a complete physical theory will be like (chap. 7–9). But Hawking also comments on the public's attitudes toward science (chap. 4) and on its reception of *A Brief History of Time* (chap. 5). Moreover, he talks about himself, which he frequently is asked to do by reporters and the curious, but which he does reluctantly. This is a large virtue of the volume—especially for readers who missed the movie based on his previous book or have not read any of the recent biographies, such as those by Ferguson (1991) and White and Gribbin (1992)—because it reveals fascinating and often moving details about the human side of a man who, in spite of enormous disabilities, has accomplished far more than most of us may ever hope to achieve.

As most readers will already know, Hawking is a victim of amyotrophic lateral sclerosis, a degenerative nerve disease that was diagnosed in 1963 when he was a graduate student at Cambridge. He now can move only some facial muscles and one or two fingers on his left hand, which he uses to pick out words on a computerized voice synthesizer attached to his motorized wheelchair. Chapters 1 through 3 and 14 tell us about Hawking's life with this debilitating disease and about the casual life that preceded its diagnosis. There is a good deal of the impish humor for which Hawking is well known in his descriptions of his childhood, his undergraduate studies at Oxford, and his current status as a celebrity. At one point, for example, he reviews titles for a sequel to *A Brief History of Time* in much the way that the producer of another *Rocky* or *Jaws* movie might (p. 38). More poignantly, there is ample evidence that Hawking has not been beaten down by his affliction. He tells us candidly, if not surprisingly, that he did not realize the value of his life until he had to confront the threat of losing it (pp. 14, 23, 26, 167). But he also reveals an indomitable resolve not to give up, but to make the best of his situation and to proceed with his work (e.g., pp. xii, 5, 19, 21, 26, 158, 167). The last chapter, a transcript of an interview Hawking did for the BBC program *Desert Island Discs* in December 1992, provides a nice example. A uniquely British institution, the program asks well-known people to imagine themselves marooned on a desert island and to select seven pieces of music, which are played during the interview, that would make their time alone there more tolerable. Hawking's last choice is Edith Piaf singing *"Je ne regrette rien"* (pp. 174–75).

Readers will come away from this volume with a deep sense of

personal admiration for the author, since its essays and talks radiate an optimistic conviction that the human will is able to overcome adversity and that the human intellect may understand the world. Stephen Hawking is indeed a remarkable man. Still, as a theoretical astrophysicist and cosmologist, he is essentially a man of ideas, who, moreover, clearly wants to be evaluated for his ideas and not as the courageous survivor of a currently incurable disease (chap. 3, pp. 38, 158; see also Ferguson 1991, 11, 43–44; White and Gribbin 1992, 69, 97–99, 118–21, 192–94, 287–88). A fair review of this collection must therefore consider the ideas he defends in it.

Here one has options. One could comment on Hawking's view of physical theory, which he explicates and defends in an essay entitled "My Position," arguing that "some sort of positivist approach, in which one regards a theory as a model, is the only way to understand the universe, at least for a theoretical physicist" (p. 47; see also p. 44). This conclusion clashes with the realist interpretation Hawking gives many of his own conjectures; but I will not address here this large tension in his popular writings (p. 44; Deltete 1993b). One also could critique his essay "Is Everything Determined?" (chap. 12), the conclusion of which states, "Yes, it is. But it might as well not be, because we can never know what is determined" (p. 139). The argument of this strange essay is based on the uncertainty principle of quantum mechanics, which Hawking implicitly construes as a principle of indeterminacy (pp. 130, 133, 138); thus his conclusion should be that a world governed, at bottom, by quantum mechanics is radically indeterministic. This is, in any case, the conclusion that is supported by Hawking's appropriation of Einstein's well-known remark that "God does not play dice" (pp. 70, 113). But an assumption of Hawking's argument, and a belief that grounds his search for "a complete understanding of the laws that govern the universe," is that "there should be a set of laws that *completely determines* the evolution of the universe from its initial state" (p. 128; my emphasis). I also shall ignore the apparent inconsistency in this position (cf. p. 94; Hawking 1988, 172–73).

Instead, I want to comment on what Hawking has to say, here and elsewhere, about the role of God in the sort of understanding he seeks. This is no simple task. Hawking's popular writings are peppered with references to God and with statements about what God can and cannot do, and I cannot sort them all out here. Readers should be aware, however, that it is not at all clear whether Hawking even thinks God exists (cf. pp. 172–73; White and Gribbin 1992, 3), so it is often difficult to know whether he intends his remarks to be taken seriously or merely as intellectual teases.[1] In what follows,

I shall assume that he is serious in what he says. If we do so, what do we find?

"I do not agree with the view that the universe is a mystery," Hawking writes, "something that one can have an intuition about but never fully analyze or comprehend" (p. viii). "My goal," he says elsewhere, "is a complete understanding of the universe, why it is as it is and why it exists at all" (Adler, Lubenow, and Malone 1988, 59). What would achievement of this very ambitious goal involve? The central element, in Hawking's view, is a complete and unified physical theory, which he seems to think is close at hand (see esp. chap. 7). So we ask: What would be required of such a theory? The answer is complex; but a brief description of an adequate answer will allow us to focus on the place of God in Hawking's view of the universe. A theory intended to describe the behavior of a given physical system (in this case the universe as a whole) must specify, nonarbitrarily, both the system's initial state (or its boundary conditions) and the laws that govern its evolution from that state (pp. 50–51). Now, the best current theory of the overall physical evolution of the universe is Einstein's general theory of relativity (GTR), the most natural solutions to which (given the empirical evidence of cosmic expansion) imply that the universe began from a singularity, that is, from a point of infinite mass-energy density and infinite space-time curvature. The theory's field equations, however, do not apply to such a singular point, so that GTR cannot predict what will emerge from a singularity.

Hawking does not like that conclusion. "This is a disaster for science," he writes. "It would mean that science alone could not predict how the universe began" (pp. 89, 92). Nor, in consequence, could it explain the beginning; one could never hope to understand a universe that emerged from a point at which, theoretically, anything could happen (p. 51). Hawking's approach in the last decade has therefore been to try to avoid the singularity implied by GTR by combining this theory with quantum mechanics. The result of this effort is a quantum-gravitational model of the very early universe—developed by him and some of his students, notably James Hartle, now at the University of California at Santa Barbara (pp. 19, 46, 82, 93–94)—that (in some sense, apparently) eliminates the original space-time singularity (pp. 19, 46, 70, 93–98).

I cannot here discuss more fully the Hartle-Hawking (HH) model—except to note that while it has been the focus of much attention, especially in the popular media, it is very speculative and highly implausible (see Deltete 1993b). Allow me instead to note the importance it has for Hawking and some of the theological implications

he draws from it. Of the model's "no boundary" feature Hawking has said, "It really underlies science, because it is really a statement that the laws of science hold everywhere" (Adler, Lubenow, and Malone 1988, 59). And, more recently, "If the [HH] proposal is correct, there would be no singularities, and the laws of science would hold everywhere, including at the beginning of the universe. The way the universe would begin would [therefore] be determined by the laws of science" (p. 19; see also p. 86). Of course, Hawking admits, "It is quite possible that God acts in ways that cannot be described by scientific laws. But in that case one would just have to go by personal belief" (quoted in White and Gribbin 1992, 167), which he finds repulsive—an admission (at least) of intellectual defeat. But Hawking thinks the HH model offers a viable alternative. Indeed, he claims, "if the no boundary proposal is correct, [God] had no freedom at all to choose the initial conditions" (Hawking 1988, 174; see also p. 98).

Hawking's line of thought seems to be the following: If his no-boundary proposal or something similar turns out to be correct, then science can predict the initial state of the universe and so can explain it. And this, he thinks, would mean that God had no choice but to actualize that state, since any divine action would then be constrained by the laws of science (Hawking 1988, 172). If, on the other hand, the universe emerged from a singularity, science would itself be limited. Then, to be sure, "God would still have had complete freedom to choose what happened and how the universe began" (Hawking 1988, 173). But Hawking prefers the former conclusion, since he seems to think that unconstrained divine decisions would be arbitrary. Of the no-boundary proposal, for example, he states: "This would mean that the way the universe began would be determined by the laws of physics. One wouldn't have to say that God chose to set the universe going in some arbitrary way we couldn't understand. It says nothing about whether or not God exists—just that He is not arbitrary" (p. 172). So we seem to be left with this view: Any divine determination of the universe's initial state is either arbitrary or necessary; and since the HH model (or some other model that includes the no-boundary idea) can get physical theory around the problems associated with the first option, we may confidently affirm the second.

If this is Hawking's view, then his argument for it fails, since its disjunctive premise is a false dichotomy: Even if a final physical theory requires a unique initial state for the universe (a very big *if*), this would not imply that God had no choice in actualizing that state; rather, the unique state could have been an object of divine intention,

that is, God could have willfully chosen it. Don Page, a postgraduate assistant of Hawking's at Cambridge and now a professor of physics at the University of Alberta, rightly stressed this point in his review of *A Brief History of Time:* "Even if we correctly hypothesize which state God chose for the Universe, that would in no way eliminate the freedom He may have had in making that choice" (Page 1988, 743). Lest I be misunderstood, the relevant idea here is not that God may have selected from a "menu" of options; rather, it is the idea, ignored by Hawking, that the initial state may have been purposefully intended.

What of the laws of a final theory? Even if the no-boundary proposal turns out to be correct, Hawking writes, "[God] would still have been free to choose the laws that the universe obeyed. [But] this may not have been all that much of a choice." Why not? Because it may also turn out that there is only one, or a small number, of self-consistent complete unified theories that allow for beings, such as us, who can investigate the nature of the universe and ask about God (p. 98; Hawking 1988, 174). This implicit appeal to some version of the "anthropic principle," the idea that the universe is the way it is because we are here, also fails—as Hawking himself seems to admit (pp. 52–53, 151; Hawking 1988, 128–130, 132–133). It may turn out that specific laws (as well as specific initial conditions) are, in fact, necessary conditions for human life. But the necessity, if it is such, is one of consequence: *Given* the fact of human life, the laws of nature *had to be* thus and so, else we would not be around to ask about them (Deltete 1993a; see also Leslie 1989; Rolston 1991). But that sort of necessity would in no way constrain or limit God, since a theist may properly reply that the (eventual) existence of humans was (at least part of) God's intent in creation. Hawking remarks on this possibility in passing: "One could always say that the laws of science are the will of God" (p. 137). But then, this too would apparently just be a matter of "personal belief."

What would a final theory, if successful, actually provide? Here Hawking is alternately honest and evasive. "Even if there is only one possible unified theory," he writes, "it is still just a set of rules and equations. [But] What is it that breathes fire into the equations and makes a universe for them to describe?" (p. 99; Hawking 1988, 174). This seems just the right question to ask of a cosmological model, and Hawking's answer—which appeals (obscurely) to the distinction between *how* questions and *why* questions—seems equally frank: If the no-boundary proposal is correct, "I would have succeeded in my ambition to discover *how* the universe began. But I still don't know *why* it began" (p. 19; see also pp. 99, 173; Hawking

1988, 174). This appears to be an honest admission of defeat, or at least of humility. Still, that is not likely. Referring to the question of what "breathes fire" into his model, he tells his *Desert Island Discs* interviewer, "If you like, you can define God to be the answer to that question" (p. 173). But Hawking evidently does not like this answer (his biographers White and Gribbin tell us that appeals to personal belief have "never been Hawking's way" and that "surely Hawking is not here suggesting that there may be a role for a Creator after all" [White and Gribbin 1992, 167, 169]); instead, he suggests alternatives.

"Why does the universe go to all the bother of existing," Hawking wonders. "Is the unified theory so compelling that it brings about its own existence?" (Hawking 1988, 174; p. 99). Such musing is silly, since he knows that even the dynamical laws of science merely describe what happens and do not actively cause anything. But it is especially so given Hawking's avowedly positivist stand on the ontological status of physical theories, which views them only as models, that is, mental constructs, that "do not pretend to describe reality (whatever that means)" (Hawking 1988, 9, 139; p. 44). He also suggests that the universe may have spontaneously emerged, quantum mechanically, from literally nothing (p. 97); but he does not seem to believe that, either (Deltete and Guy, forthcoming). Finally, in an egalitarian spirit, Hawking suggests that once we have formulated a final theory, it will "be understandable in broad principle by everyone, not just a few scientists. Then we shall all, philosophers, scientists, and just ordinary people, be able to take part in the discussion of the question of why it is that we and the universe exist. If we find the answer to that," he declares, "it would be the ultimate triumph of human reason—for then we would know the mind of God" (Hawking 1988, 175). Here one wonders who Hawking is trying to kid—especially since, as he now reveals, he nearly cut, in proof, the last, triumphal sentence of the quotation, which is also the last sentence of *A Brief History of Time.* And since, as he also tells us, "Had I done so, the sales [of the book] might have been halved" (p. 37).

Where, then, *does* Hawking stand? A measured statement of his current position may be this: "I am still trying to understand how the universe works, why it is the way it is and why it exists at all. I think there is a reasonable chance that we may succeed in the first two aims, but I am not so optimistic about finding why the universe exists" (quoted in White and Gribbin 1992, 291). This evaluation claims more than it should, since, while Hawking has contributed importantly to the first aim he mentions, the latter two remain

unfathomable to his dominant naturalism or his naive (and disingenuous?) theology. It is regrettable that Hawking is apparently unwilling, and perhaps unable, to consider seriously a theistic answer, for it does not seem to this reviewer that he can achieve his ambitious objectives in any other way.

NOTE

1. For example, the last quotation in the preceding paragraph is followed by the remark, "These laws may have been ordained by God. But it seems that He (or She) does not interfere in the universe to break the laws" (p. 128).

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