

Prof. Grünbaum on Creation

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Adolf Grünbaum claims that the question of creation is a pseudo-problem because it is incoherent to seek an external, prior cause of the Big Bang, which marks the beginning of time. This claim is unwarranted, however, for the theological creationist has a number of options available: (i) The Creator may be conceived to be causally, but not temporally, prior to the origin of the universe, such that the act of creating is simultaneous with the universe's beginning to exist; (ii) The Creator may be conceived to exist in a metaphysical time of which physical time is but a sensible measure and so to exist temporally prior to the inception of physical time; or (iii) The Creator may be conceived to exist timelessly and to cause tenselessly the origin of the universe at the Big Bang singularity. Grünbaum also claims that theological creationism is pseudo-explanatory because it is in principle impossible to specify the causal linkage between the cause and the effect in this case. At best this objection only shows that theological creationism is not a scientific explanation. In fact Grünbaum's objection strikes not against theology *per se*, but against all appeals to personal agency as explanatory, which evinces a narrow scientism.

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Introduction

In a number of recent publications, Adolf Grünbaum (1989, 1990, 1991) has criticized the application of the theological notion of *creatio ex nihilo* to the origination of the universe. Since I have elsewhere responded to his covey of objections to the traditional cosmological argument for a chronologically First Cause of the origin of the universe (Craig, 1991, 1992), I shall in this paper confine myself to an examination of Grünbaum's arguments "that pseudo-explanations offered in response to pseudo-problems vitiate current attempts to harness the influential cosmological models of recent decades in support of

theological creationism." (Grünbaum, 1991, p. 236) Two questions arise in assessing the alleged support lent by recent cosmological models to theological creationism: (1) Is the question of the creation of the universe a pseudo-problem, and (2) Is the response of theological creationism a pseudo-explanation? Let us address each in turn.

1. Is Creation a Pseudo-Problem?

If the universe began to exist, would its temporal origin imply that it was created? Thomas Aquinas thought so. According to Thomas, "If the world and motion have a first beginning, some cause must clearly be posited to account for this origin of the world and of motion." (*Summa contra gentiles* 1. 13. 30) Thomas therefore always sought to construct demonstrations of God's existence on the more difficult Aristotelian assumption of the eternity of the world, demonstrations which would hold *a fortiori* were the universe shown to be temporally finite in the past. But to presuppose that the universe did have a temporal beginning made things too easy for the natural theologian, in his opinion, for then the necessity of a creating cause of the origin of the universe becomes patent. That most persons would agree with Thomas's judgement in this last regard is evident not only from the statements cited by Grünbaum on the part of scientific proponents and detractors alike of Big Bang cosmology, but even more so from the question ubiquitously posed by lay audiences to lecturers on contemporary cosmology, "What caused the Big Bang?" {1} Such statements and questions evince a pre-philosophical intuition that whatever begins to exist has a cause, that things do not simply come to be without a distinct cause. Such an intuition strikes me as altogether reasonable and plausible and so affords *prima facie* justification for thinking that if the universe did begin to exist, its origination must have been the effect of some transcendent cause. {2}

But Grünbaum argues that on none of the contemporary cosmogonic theories is the inference from the *origin* of the universe (that is, its being temporally finite in the past) to the *creation* of the universe (that is, its having an external cause) a sound one. Although he distinguishes quantum cosmological models from classical cosmological models and sub-divides the latter into two sorts, those positing a first instant of time at $t=0$ and those conceiving the initial singularity to lie on the boundary of space-time rather than within it, it fortunately turns out that "despite the replacement of the classical big bang theory by quantum cosmology, the philosophical issues . . . , as well as their resolution, remain essentially the same." (Grünbaum, 1991, p. 248) Indeed, the fundamental issue raised repeatedly by Grünbaum is disarmingly simple: it is unwarranted and, indeed, incoherent to seek an external, prior cause of the Big Bang because according to that very model there were no instants of time prior to the initial cosmological singularity. Hence, Grünbaum writes,

To suggest or to assume tacitly that instants existed after all before the big bang is simply *incompatible* with the physical correctness of the putative big bang model at issue, and thus implicitly denies its soundness.

. . . it is *altogether wrongheaded* . . . to complain that--even when taken to be physically adequate--the putative big bang model fails to answer questions based on assumptions which it denies as false. (Grünbaum, 1991, pp. 238- 239)

Thus, the problem of the creation of the universe is simply a pseudo- problem.

I must confess, however, that the force of this popular objection to theological creationism strikes me as grossly exaggerated. In fact, it seems to me that the creationist has a number of cogent options open to him to meet the objection.

(i) *The Creator may be conceived to be causally, but not temporally, prior to the origin of the universe, such that the act of causing the universe to begin to exist is simultaneous with its beginning to exist.* Grünbaum generates his alleged incoherency only by stipulating that the cause of the universe's origin be chronologically prior to that origin. But the causal principle that *whatever begins to exist has a cause* makes no such stipulation. Neither Aquinas nor, for that matter (*pace* Grünbaum), Maddox (1989, p. 425) claims that the cause of the origin of the universe must be temporally prior to the first effect. When

creationists use locutions like "The universe came into being out of nothing," they mean, not that there was a state of nothingness temporally prior to the origin of the universe, but simply that the universe lacks a prior material cause, that it is false that the universe was made out of anything. Thus, the theological creationist may happily agree with Grünbaum that the following questions are illicit: "What happened *before* $t=0$?", "What *prior* events caused matter to come into existence at $t=0$?", "What *prior* events caused the Big Bang to occur at $t=0$?" (Grünbaum, 1991, p. 238) He may concur with Hawking, who is cited approvingly by Grünbaum, that "To ask what happened *before* the universe began is like asking for a point on the Earth at 91 north latitude." (Hawking, 1987, p. 651)

But the theological creationist will also point out that Grünbaum's inference that "Precisely the hypothesis that $t=0$ simply had no temporal predecessor obviates the misguided quest for the elusive cause" (1991, p. 239) does not follow. The quest is neither misguided (since it is *prima facie* plausible that whatever begins to exist has a cause) nor obviated (since causal priority does not imply temporal priority). Contemporary philosophical discussions of causal directionality deal routinely with cases in which cause and effect are simultaneous; {3} indeed, a good case can be made that all temporal causal relations involve the simultaneity of cause and effect. On the creationist theory under discussion, the Creator *sans* the world would exist changelessly and, given some relational view of time, therefore timelessly and at the Big Bang singularity create both the universe and, concomitantly, time. For the Creator *sans* the universe, there simply is no time because there are no events; time begins with the first event, not only for the universe, but also for God, in virtue of His real relation to the universe. The act of creation is thus simultaneous, or coincident, with the origination of the universe.

Grünbaum objects to the Augustinian assertion that time was made by God because this locution presupposes that there was a time at which time did not yet exist. (Grünbaum, 1991, p. 244) But this objection merely begs the question by assuming that causal priority implies temporal priority. According to the present theory, God did not exist temporally prior to the origin of the universe, for no such time existed; but with the creation of the universe time also comes into being, so that the creative causal act and the physical effect occur simultaneously. Against this notion, all that Grünbaum has to offer is the single sentence: "I consider the notion of simultaneous causation, as applied to the purported *creation of time*, either unintelligible or, at best, incoherent." (Grünbaum, 1991, p. 244) But until Grünbaum provides some argumentation in support of this opinion, {4} no creationist is obliged to abandon belief in a cause of the universe's origin.

(ii) *The Creator may be conceived to exist in a metaphysical time of which physical time is but a sensible measure and so to exist temporally prior to the inception of physical time.* Grünbaum's whole enterprise is based on a reductionistic view of time which the theological creationist is at liberty to reject. Confronted with the absolute origination of the universe, the creationist posits a cause for the universe's beginning to exist. But the Big Bang singularity need not be the first effect of such a transcendent cause. If the Creator has a discursive mental life, then there will have been a succession of mental events, which is itself alone sufficient to generate a temporal series, leading up to the moment of creation. Such a temporal series in the life of an ultra-mundane being constitutes a metaphysical time in which our universe comes to exist.

Such a view has a very impressive pedigree: it was essentially the view of Isaac Newton. According to Newton,

Absolute, true, and mathematical time, of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration: relative, apparent, and common time, is some sensible and external (whether accurate or unequable) measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year. (Newton, 1966, vol. 1, p. 6)

Twentieth century physicists and philosophers of space and time have largely abandoned Newton's theory of absolute time as "metaphysical" or even falsified by Relativity Theory. But such attitudes are merely symptomatic of a secular age which has forgotten the theistic foundations of Newton's doctrine of absolute

time. In the *General Scholium* to the *Principia*, which Newton added in 1713, he explained that absolute time and space are constituted by the divine attributes of eternity and omnipresence:

He is eternal and infinite . . . ; that is, his duration reaches from eternity to eternity; his presence from infinity to infinity He is not eternity and infinity, but eternal and infinite; he is not duration or space, but he endures and is present. He endures forever, and is everywhere present; and, by existing always and everywhere, he constitutes duration and space. Since every particle of space is *always*, and every indivisible moment of duration is *everywhere*, certainly the Maker and Lord of all things cannot be *never* and *nowhere*. (Newton, 1966, vol. 2, p. 545)

On such a view, God's time is sempiternal, and physical time, which begins at creation, represents our best efforts to measure sensibly His absolute time. That the physical time we employ, defined in STR in terms of certain conventions concerning clock synchronization via light signals, should turn out to be relativistic would not have disturbed Newton in the least. {5} Neither does it disturb contemporary theists like Wolterstorff (1982, pp. 79-98) who hold that God exists in an infinite metric time prior to His creation of the world or like Padgett (1992) and Swinburne (1993) who hold that God prior to creation exists changelessly in a non-metric time in which there is no lapse of temporal intervals.

Theological creationists who thus do not follow Grünbaum in his reductionistic analysis of time can therefore agree with Hawking, who is again cited approvingly by Grünbaum, when he writes, "*In general relativity* [my emphasis], time . . . does not have any meaning outside the spacetime manifold" and even that "the use of the word 'create' would seem to imply that there was some concept of time in which the universe did not exist before a certain instant and then came into being" (Hawking, 1987, pp. 650-51) and yet see no incompatibility with the necessity of a creative cause of the Big Bang, since the requisite concept of time is metaphysical time, not the cosmic time defined in GTR via parameterized hyper-planes of homogeneity. The latter provides at best a sensible measure of the former, but cannot pretend to supplant or obviate the existence of the Creator's metaphysical time. The theological creationist will claim with justification that when Grünbaum asserts that it is incoherent to posit an external, prior cause of the Big Bang, he is just doing poor metaphysics. {6}

(iii) *The Creator may be conceived to exist timelessly and to cause tenselessly the origin of the universe at the Big Bang singularity.* Grünbaum assumes without argument that causation is an essentially temporal activity or relation. But classical theological creationists like al-Ghazali (1963, pp. 23, 33, 36) maintained that the cause of the origin of the universe is timeless, and contemporary defenders of divine timelessness such as Stump and Kretzmann (1981), Helm (1988), Yates (1990), and Leftow (1992) also conceive of God's causal relation to the world to be one which involves no temporal succession on God's part, whereas the effect is temporal in its existence. The coherence of such a model on an A-theory of time is a matter of philosophical debate; but such a theory is obviously coherent on Grünbaum's own preferred B-theory of time: the entire space-time manifold of events and its boundary simply exist tenselessly, and God exists timelessly and spacelessly apart from it and tenselessly produces it in being. In response to divine timeless causation of the Big Bang, all Grünbaum has to offer is the following:

Let me stress, however, that, since it is not relevant to current physics, I shall not be concerned at all with this *atemporal* metaphysical version of Augustine's creation *ex nihilo*. Suffice it to say, however, that I find this version quite obscure, if not incoherent. And, in any case, I know of no cogent argument for it. (Grünbaum, 1991, p. 244)

But atemporal causation *is* relevant to current physics, in that the best physical theory shows that the universe began to exist, and the model of atemporal causation provides an understanding of how that beginning can have been caused without the cause's existing temporally prior to the Big Bang. And Professor Grünbaum notwithstanding, it certainly does not suffice for him merely to say--without supporting argument or evidence--that this version of theological creationism is obscure or incoherent. Finally, in demanding a cogent argument for atemporal causation, Grünbaum seems to have forgotten who bears the burden of proof here: it is he who, in response to the creationist demand for a cause of the origin of the universe, asserts that such a demand expresses a pseudo-problem because it is incoherent to ask for

an external, prior cause of the Big Bang. By appealing to a model of atemporal causation, the theological creationist shows that there is no incoherence or conceptual confusion in the quest for a cause of the universe's origin. If Grünbaum is to carry his objection, he must now show that such a model is broadly logically impossible, for so long as it is even possible, such a model defuses the objection that to seek an external cause of the Big Bang is incoherent.

In sum, there are a number of possible options open to the theological creationist to meet Grünbaum's objection that the origin of the universe cannot have an external cause and that creation is therefore a pseudo-problem. The cause of the origin of the universe can be coherently conceived to be either (i) simultaneous with the Big Bang, (ii) temporally prior to the Big Bang in metaphysical time, or (iii) timeless. Which of these alternatives supplies the most plausible model is a matter of spirited (and very intriguing) debate in the field of philosophy of religion. Philosophers of space and time and physicists interested in the metaphysical problems of creation would do well to familiarize themselves with the work of their colleagues in this field. The availability of these various alternatives shows that the question of the creation of the universe is a genuine philosophical problem.

2. Is Theological Creationism a Pseudo-Explanation?

If the problem of creation is a genuine philosophical problem, is theological creationism a licit explanation of the universe's origin? Grünbaum argues first on general grounds that a theological explanation is inherently defective:

. . . the invocation of a divine creator to provide causal explanations in cosmology suffers from a fundamental defect vis-à-vis scientific explanation: As we know from two thousand years of theology, the hypothesis of divine creation does not even envision, let alone specify, an appropriate *intermediate* causal *process* that would *link* the presence of the supposed divine (causal) agency to the effects which are attributed to it In physics, there is either an actual specification or at least a quest for the *mediating causal dynamics* linking presumed causes to their effects Yet despite the failure of theology to provide such dynamical linkage, Newton invoked divine intervention in the belief that it could plug explanatory lacunae which his physics had left unfilled.

In the face of the inherently irremediable dynamical inscrutability of divine causation, the resort to God as creator, ontological conserver of matter, or intervener in the course of nature is precisely a *deus ex machina* that lacks a vital feature of causal explanations in the sciences. (Grünbaum, 1991, pp. 234-235)

Grünbaum takes these considerations to constitute a general *caveat* "against the tacit misassimilation of purported divine causation in cosmology to causal explanations in the sciences." (Grünbaum, 1991, pp. 235-236)

But these considerations at the very best show only that theological creationism does not constitute a *scientific* explanation of the origin of the world. And while Newton believed that "to discourse of [God] from the appearances of things does certainly belong to natural philosophy," (Newton, 1966, vol. 2, p. 546) I suspect that most theological creationists today, including those whom Grünbaum cites, would not think of themselves as offering a theistic Big Bang theory distinct from the usual models nor of God as a sort of theoretical entity akin to, say, quarks, postulated by some cosmological model. Rather most, I am sure, would agree with Robert Jastrow when he says with respect to questions about the cause of the Big Bang in the standard model: "Science cannot answer these questions The scientist's pursuit of the past ends in the moment of creation." (Jastrow, 1978, p. 115) This does not mean that science cannot attempt to avert the problem of creation by introducing certain quantum effects aimed at eliminating the troublesome initial cosmological singularity; but insofar as an absolute origin of the universe remains a recalcitrant feature of

cosmogonic models, the question of the explanation of that origin, as well as its answer, will be regarded by most theological creationists as meta-scientific, or metaphysical, in nature.

Nevertheless, it may be profitable to press the question: why on Grünbaum's view can theological explanations not qualify as scientific explanations? I suggest that on Grünbaum's analysis, the disqualifying feature of theological explanations has nothing to do with supernaturalism or theology, but with a feature shared by other commonly employed sorts of explanation: the appeal to personal agency. Grünbaum's complaint is that theological explanations inherently lack the causal linkage between cause and effect which is essential to scientific explanations. Now at face value, this seems manifestly untrue. There seems to be no reason why the theological creationist who believes that "In the beginning God created the heavens and the earth" (Gen. 1:1) needs deny the presence of mediating causal linkage such as is described in contemporary astrophysical theories concerning the Big Bang, galaxy formation, and the like. Grünbaum is right that Genesis neither envisions nor specifies the intermediate causal process between the divine causal agency and the effects attributed to it. But why think that this is inherently so? Could not the author of Genesis, if sufficiently apprised of the facts, have described the causal linkage involved in God's creation of the heavens and the earth?

Grünbaum's response is instructive. He holds that in such a case the theological explanation becomes superfluous and is supplanted by the explanation afforded by the physical causal linkage itself. Thus, for example, in models postulating an inflationary era, "general relativity turns out to tell us why there is an 'inflationary' expansion, thereby obviating any explanatory resort to an external divine creative cause!" (Grünbaum, 1991, p. 241; cf. p. 250) Thus, it is logically impossible to specify the causal linkage between the divine causal agency and its purported effect because once the linkage is given, the divine agency is expunged as an explanatory entity. {7} On Grünbaum's analysis, in order to serve as a causal explanation, divine agency must produce its effect immediately, in which case the explanation is by definition not scientific.

The above account makes it evident that the stumbling block here has nothing to do with theology *per se*, but with the notion of personal agency. If a personal agent is said to be responsible for some event, then, on Grünbaum's analysis, insofar as it is feasible to specify intermediate causal linkage between them, the appeal to personal agency becomes superfluous. It is only when one is pushed back to an event which is a "basic action," {8} that is to say, an action which an agent immediately performs, that personal agency can count as explanatory, and then such an explanation cannot be scientific. Thus, when Grünbaum says that "so far as divine causation goes, we are being told . . . that an intrinsically elusive, mysterious agency X inscrutably produces the effect," (Grünbaum, 1991, p. 235) that could be said against any agent cause. Similarly, when Grünbaum says, "I, for one, draw a complete *explanatory* blank when I am told that God created photons," (Grünbaum, 1991, p. 235) such a complaint could be voiced with regard to the personal performance of any basic action. It is really the admission of personal agency into scientific explanation to which Grünbaum objects, and theological explanations turn out to be excluded, not because they are theological, but because God is conceived as a personal agent. His creation of the initial cosmological singularity in the standard model is a sort of basic action on His part. (Alston, 1988; Padgett, 1992, pp. 20-21)

Now even if we agree that explanations involving appeal to personal agency (and, hence, theological explanations) are not scientific explanations, why cannot personal explanations count as a legitimate, distinct category of explanation? Grünbaum seems to assume that the only true (causal) explanations are scientific explanations. But that is to evince a narrow and dogmatic scientism, which will simply be rejected even by a good many thinkers who are not theological creationists. (*e.g.*, Chisholm, 1986, pp. 60-64) {9} Unless one is a thorough-going physicalistic determinist, the scientific explanation of the actions wrought by a personal agent will remain incomplete unless and until the agent is brought in. Perhaps Grünbaum is such a determinist and so rejects final explanatory appeals to personal agency. But such physicalistic determinism not only far outstrips the scientific evidence we have about the functioning of the human brain, but it also can never be rationally affirmed, since if it were true one's belief in its truth would be purely the result of determining physical causes. (Plantinga, 1991) Believing in determinism would be no more rational than having a toothache.

In any case, even if physicalistic determinism did hold for human agents, such a notion is inapplicable to God, since His mind is not linked to any material substratum, as are the minds of embodied agents, nor can His action in *creatio ex nihilo* be the result of determining physical causes, since His creative activity is responsible for the very origination of any physical causes that exist. {10}

If, then, we accept personal agency as a legitimate (non-scientific) category of explanation, theological creationism may be regarded as a legitimate explanation of this type. Moreover, it should be noted that explanations involving personal agency may or may not be causal in nature, depending upon one's theory of agency. Causal agency theorists appeal at some point to agents as the causes of the actions they perform and so espouse a doctrine of agent causation. (e.g., Clarke, 1993) On such a theory God could be conceived to be the agent cause of the Big Bang event. But appeals to personal agency are not always causal in nature. On Chisholm's most recent view, certain human actions have no sufficient causal conditions. Goetz (1988) argues that events normally ascribed to agent causation are better regarded as "uncaused events done for a reason." Application of such an analysis to the problem of creation would completely dissolve Grünbaum's objection, since the Big Bang would be uncaused, but still done for a reason, and would therefore require the existence of a personal Creator. {11} Whether, then, one's appeal to personal agency to explain the origination of the world involves agent causation (as seems to me preferable) or a non-causal conception of agency, Grünbaum has failed to show that theological creationism's appeal to personal agency to explain the origin of the universe is not a licit (non-scientific) form of explanation. William Alston, who has devoted considerable analysis to the notion of divine agency and action, concludes, "the concept of divine action is, by any reasonable standards, quite intelligible, coherent, and acceptable, and . . . impressions to the contrary stem from confusions, uncritical acceptance of current shibboleths, or bad arguments." (Alston, 1990, p. 51)

All this has been said on the assumption that Grünbaum is correct that scientific explanation precludes reference to personal agents as causes. But surely that is a moot point. In quantum physics, for example, Eugene Wigner's interpretation of the collapse of the wave-function of a quantum system appeals explicitly to consciousness or personal agency to bring about the collapse, since any merely mechanical observer could itself be given a quantum physical description and would so share in the indeterminacy of the observed system. (Wigner, 1964) Intriguingly, the application of the received Copenhagen Interpretation to quantum cosmology requires a transcendent observer who collapses the wave-function of the universe itself, a conclusion which is very suggestive of theism. (Barrow, 1988, p. 156) Perhaps Grünbaum would say that such interpretations of quantum theory are not part of the theory itself, but represent philosophy of science, rather than science. But then the lines of demarcation become so blurry or arbitrary that we can repose no confidence in Grünbaum's claim that appeal to personal (divine) agency is pseudo-explanatory because it is not part of "science" proper.

Grünbaum has, however, a second implicit reason why theological creationism is a pseudo-explanation. In his discussion of the steady state model, Grünbaum argues that demands for a cause of the origination of matter are illegitimate because in that theory the origination of matter from nothing is *natural*. Against characterizations of matter creation in the model universe as miraculous, Grünbaum states, "the hypothesized matter-increase in a steady-state universe is turned into a divine miracle only by the gratuitous, dogmatic insistence on matter- conservation as *cosmically* the natural state, *no matter what the empirical evidence*. Those who share [the] view of miraculousness cannot justify a criterion of 'naturalness' that would turn the continual accretion of new matter into something 'outside the natural order'." (Grünbaum, 1992, p. 248) By extension, in the standard Big Bang model, the origination of the universe from nothing is to be regarded as natural and so as requiring no miraculous cause.

In response to this argument, I should simply deny that it is any part of the standard model or any other model positing an initial cosmological singularity that the origin of the universe is uncaused. It is true that the singularity can have no spatio-temporal, physical cause, but it would be fanciful to think that Big Bang models include as a theoretical component that the origin of the universe does not have a supernatural cause. {12} As for the allegation that on such models the origination of the universe from nothing is taken to be natural, I should say that such theories, being descriptive in nature, do not presume to make such a judgment. Of the classical Big Bang model, Adrian Webster comments,

Choosing to work backward from the present state of the universe to gain some knowledge of the initial conditions is not at all arbitrary, but it does not suffice to *explain* the initial conditions. Probably the most we can expect from this approach is that we shall be able at least to describe those conditions. (Webster, 1974, p. 31)

Similarly, with respect to quantum cosmology, Isham distinguishes between a description and an explanation of the universe's origin, remarking,

The minimal requirement is to construct a theory that affords a singularity-free description of the origination event and that gives satisfactory meaning to the 'beginning' of time Note that one question even a very ambitious creation theorist cannot (or, perhaps, should not) address is 'Why is there anything at all?'. That is strictly a job for philosophers and theologians! (Isham, 1990, pp. 3-4)

Such descriptive accounts of the beginning of the universe make no pronouncement as to whether the origin of the first physical state of the universe is a natural occurrence or not. Indeed, it seems to me that Grünbaum finds himself hoist on his own petard in this matter, for what criterion of "naturalness" can he possibly offer that would serve to determine that an uncaused origin of the universe is natural? What can he mean when he speaks of the "empirical evidence" for what is natural, especially in the case of a unique origination event? The empirical evidence can at best, it seems, indicate that the universe began, but that its beginning is natural is not a judgment that can be read off an empirical description of the universe's beginning. In fact when one realizes that to call a physically uncaused beginning of the universe "natural" just is to assert that theological creationism is false, one sees that Grünbaum's argument is question-begging. The crux issue to which we are brought round again is whether something can begin to exist without a cause. Intuitively, that seems absurd. The fact that the universe began to exist without a physical cause does not undermine this intuition, but logically implies that the origin of the universe had a metaphysical cause.

Conclusion

Despite Grünbaum's disdain for theological creationism, it seems to me, therefore, that he has failed to show either that the problem of the creation of the universe is a pseudo-problem or that the answer of theological creationism to that question is a pseudo-explanation. Multiple solutions are available to the alleged problem of the creative cause's existing temporally prior to the beginning of time, solutions which Grünbaum has yet to begin to explore. How the universe could begin to exist without any sort of cause is most definitely a genuine and significant philosophical problem. The answer of theological creationism to that problem cannot be dismissed merely because it is not scientific, if in fact it is non-scientific. Contemporary cosmogonic models do not presume to exclude the possibility of a supernatural cause of the universe's creation. Therefore, it seems to me that a theological answer to the problem of creation is worthy of philosophical consideration.

Endnotes

{1} Davies reports, "When giving lectures on cosmology, I am often asked what happened before the big bang. The answer, that there was no 'before,' because the big bang represented the appearance of time itself, is regarded with suspicion--'Something must have caused it.'" (Davies, 1983, p. 39; cf. p. 44) The impasse here results from the conflation of causal priority with temporal priority on the part of Davies and his auditors.

{2} This conclusion is not undermined by the query of an anonymous referee for this journal: "Why does the big bang imply that the universe begins to exist without a cause? In the standard big bang models, for every time t there is a $t' < t$, and the state at t' is a cause of the state at t ." It seems to me that this objection is confused, albeit in an interesting way. The referee cannot mean to deny the premiss that *whatever begins to exist has a cause*, because he affirms that every instantaneous state of the universe has a cause in a prior

state. So he is not claiming that the origin of the universe is uncaused and, hence, an exception to this principle. But neither does he appear to be denying the premiss that *the universe began to exist*. For a beginning of time (and the universe) does not entail that a first instant of time existed. Time began to exist iff there is a finite interval of time which is such that every other congruent temporal interval is later than that interval, and prior to any finite interval of time there is at most a finite number of congruent temporal intervals. Hence, it is standard to regard the universe as having a beginning even though any initial temporal interval of arbitrary length is open in the past. But then what, exactly, does the referee mean to deny? From the two premisses it follows that the universe has a cause, which is the position of the theological creationist. Thus, *pace* our referee, the creationist does *not* take the Big Bang model to imply that the universe begins to exist without a cause; quite the contrary. The disagreement must be as to the nature of that cause. The creationist posits a transcendent metaphysical cause, the referee only immanent physical causes. That the referee cannot be right becomes evident when one reflects on the fact that the universe is not distinct from the instantaneous states of the universe, so that if the former began to exist, the beginning of that entity as a whole cannot be explained by the causal connections which obtain between its immanent temporal slices. What is needed is a cause of the whole entity, including all its instantaneous slices. Here the only plausible physical candidate would be the initial cosmological singularity existing on the boundary of time. But such an explanation is unavailing, since the singularity itself is not eternal but came into being and so requires a cause; moreover "the universe" may reasonably be taken to include all its boundary points as well as its space-time points and so, having begun to exist, requires an extra-mundane cause.

{3} For some discussion of the notion of causal directionality, see Dummett and Flew, 1954; Mackie, 1966; Suchting, 1968-69; Brier, 1974, pp. 91-98; Brand, 1979. Fortunately, we need not be concerned, as these discussions are, with the epistemic question of a criterion which will enable us correctly to discern the causal asymmetry between two simultaneous events, for our concern is only with the ontological question of the coherence of the notion of simultaneous causation. It is at any rate metaphysically impossible that God should be caused by the world, so that the asymmetry of cause and effect in this case is perspicuous.

{4} Notice that objections to the simultaneity of God's creating the universe and the universe's beginning to exist cannot be based on physical considerations such as the finite velocity of the transmission of causal influences in relativity theory, since God is not a physical entity and is immediately causally present to every point in space. If we assume *a priori* a doctrine of physicalism, then a dialogue between the creationist and anti-creationist is simply pointless. I do not pretend that interesting and difficult questions cannot be raised about the present alternative; but they will tend to be metaphysical, rather than physical.

{5} As Lucas nicely puts it,

"The relativity that Newton rejected is not the relativity that Einstein propounded; and although the Special Theory of Relativity has shown Newton to be wrong in some respects, . . . it has not shown that time is relative in Newton's sense, and merely some numerical measure of process."
(Lucas, 1973, p. 90)

{6} See John Earman's remark:

"It seems to me that Newton demonstrated a much deeper understanding of the nature of space and time than Berkeley, Leibniz, and Mach. And so far as I can see, neither modern philosophers of science like Reichenbach, Whitrow, Nagel, Grünbaum, and Smart, nor the people identified by modern philosophers as major philosophical figures of the 17th, 18th, and 19th centuries, have succeeded in raising any compelling philosophical objections to absolute space, absolute time, or absolute space-time" (Earman, 1970, p. 317)

This verdict is reinforced when the theistic context of Newton's views is taken into account.

{7} Once this is understood, we can see that Grünbaum's apparently conciliatory *caveat*

A. If the best model of recent physical cosmogony were evidentially supportive of divine creation *ex nihilo*, then it would be an impermissible apriorism to reject the model for that reason, as some atheists have done (Grünbaum, 1992, p. 234)

is in fact vacuous. For given his argument, the antecedent of (A) is broadly logically impossible, so that (A), on the customary possible worlds semantics for the truth conditions of counterfactuals, is vacuous in its truth value. (A) would be equally true if the consequent read, "then it would be impermissible to accept theological creationism, as some theists have done."

{8} On this notion, see Danto (1965). before a

{9} On the theological front, see the very interesting remarks by P. T. Landsberg conference on the history and philosophy of thermodynamics concerning what he takes to be the lifting of a scientific taboo which occurred around 1975: "To talk about the implications of science for theology at a scientific meeting seems to break a taboo. But those who think so are out of date. During the last 15 years this taboo has been removed, and in talking about the interaction of science and theology I am actually moving with a tide" (Landsberg, 1991, p. 380). Landsberg endorses the view of Polkinghorne that "our concern is with those questions which by their nature science is powerless to discuss, but without answers to which its view of the world remains intellectually incomplete and unsatisfying." (Polkinghorne, 1988, p. 23)

{10} Again, if one simply assumes *a priori* the truth of physicalism, *i.e.*, that there are no immaterial agents, debate over theological creationism cannot even get off the ground. In that case we should be discussing the intelligibility, not of God's creating the universe, but of His very existence. causal premiss

{11} It would also require some modification of the that *to the activity whatever begins to exist has a cause*, for example, that *whatever begins to exist is to be attributed of either a cause or a personal agent*. who therefore

{12} This fact is recognized by Q. Smith, also an anti-creationist, feels constrained to offer further justification for why the initial cosmological singularity cannot have been caused by God, reasons which have nothing to do with Grünbaum's pseudo-problem of the cause's temporal priority to its effect. (Craig and Smith, 1993)

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