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PROFESSOR WILLIAM CRAIG'S CRITICISMS OF CRITIQUES OF *KALAM* COSMOLOGICAL ARGUMENTS BY PAUL DAVIES, STEPHEN HAWKING, AND ADOLF GRUNBAUM

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Kalam cosmological arguments have recently been the subject of criticisms, at least *inter alia*, by physicists—Paul Davies, Stephen Hawking—and philosophers of science—Adolf Grunbaum. In a series of recent articles, William Craig has attempted to show that these criticisms are "superficial, ill-conceived, and based on misunderstanding." I argue that, while some of the discussion of Davies and Hawking is not philosophically sophisticated, the points raised by Davies, Hawking and Grunbaum do suffice to undermine the dialectical efficacy of *kalam* cosmological arguments.

In some recent articles, Professor William Craig (1986) (1990) (1992) has argued that critiques of *kalam* cosmological arguments by Paul Davies, Stephen Hawking, and Adolf Grunbaum are superficial, ill-conceived, and based on misunderstanding. These judgements seem to me to be unfair. While I concede that some of the discussion of Davies and Hawking is not philosophically sophisticated, it seems to me that Davies, Hawking and Grunbaum do raise serious difficulties for the view that *kalam* cosmological arguments are rationally compelling pieces of natural theology. Of course, this is not to say that Davies, Hawking and Grunbaum offer compelling reasons for Craig to give up his belief that *kalam* cosmological arguments are sound—but it is important to see that this is an entirely separate issue. At several points in his critiques, Craig makes things easy for himself by supposing that Davies, Hawking and Grunbaum must demonstrate that he—Craig—ought to give up his belief in the soundness of the argument; when, in fact, all that Davies, Hawking and Grunbaum need to show is that there is no good, non-question-begging, reason for them to be persuaded that the arguments which Craig offers are sound. What is at issue is a choice between two quite different kinds of models of the origins of the universe; if it turns out that there are no *suitably independent* reasons for preferring Craig's favoured theistic model, then there is sufficient justification for those who wish to pursue alternatives.[1]

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We may suppose that the standard form for *kalam* cosmological arguments is as follows: *Whatever begins to exist has a cause; the universe began to exist; therefore the universe has a cause.*[2] Different arguments are obtained by providing different supporting arguments for the two premises. Both premises admit of different kinds of subsidiary justification—e.g. by appeal to broadly logical or metaphysical arguments or by appeal to the current physical evidence. Craig contends that there are broadly logical or metaphysical arguments, concerning the metaphysical impossibility of physically instantiated infinities, which establish the second premise independently of the current physical evidence, though he also holds that the current physical evidence strongly supports the second premise. Moreover, Craig contends that the first premise is a fundamental metaphysical principle which cannot be intelligibly denied, and that there is nothing in the physical evidence which suggests that it could conceivably turn out to be false. However, it seems to me that one could reasonably reject all of these contentions—and that the discussions provided by Davies, Hawking, and Grunbaum all contain important clues about how to do so.

1

Grunbaum (1990) (1991) worries about the propriety of the claim, that the universe began to exist, in the context of classical Big Bang models of the origins of the universe. In particular, he considers two cases: (i) models which are closed at the Big Bang instant t=0, in which t=0 is the location of a singular, temporally first event in the history of the universe; and (ii) models which are open at the Big Bang instant t=0, in which there is no singular, temporally first event in the history of the universe.

In connection with the first type of model, Grunbaum observes that it is misleading to say that in these models the universe began because this suggests that there were moments of time before t=0. Craig (1992:237f.) objects that "x begins to exist" should not be analysed as "x exists at time t and there are times immediately prior to t at which x does not exist," but rather as "x exists at t and there is no time immediately prior to t at which x exists." Of course, this analysis would commit Craig to the unwanted claim that God began to exist—since, on the theistic version of this model, there is no time immediately prior to t=0 at which God exists—so Craig further suggests that, within a theistic context, the analysis should be amended to "x exists at t; there is no time immediately prior to t at which x exists; and the actual world contains no state of affairs involving x's timeless existence." But this amended suggestion invokes the extremely puzzling notion of "(God's) timeless existence." Moreover, even the unamended analysis naturally provokes the question whether anything which begins to exist in this sense must have a cause.

Craig (1992:238) claims that it is "philosophically unobjectionable" to conceive of God as causally prior to the Big Bang, since "God's act of creation may be regarded as simultaneous with the origin of the universe." However—as Grunbaum observes on several occasions—many of us find it hard to make any sense of this suggestion. It is true that there are contexts in which it clearly makes sense to speak of "simultaneous causation"—e.g. as Craig notes, there is no impropriety in the claim that the downward pressure exerted by the otherwise unsupported head causes the indentation in the pillow—but this is compatible with the claim that, strictly speaking, causation must be local and mediated by finite signals. On this view, given a sufficient margin of error, causation can appear simultaneous—but there is no reason to think that there is any genuinely simultaneous causation.[3] Of course, the above considerations are not incompatible with the view that simultaneous causation is narrowly logically possible—but they do suggest that one could reasonably hold that simultaneous causation is not broadly logically, or metaphysically, possible. Furthermore, even if it is conceded that simultaneous causation is broadly logically possible, it is far from clear that we can make sense of the idea that the creative actions of a rational agent could be simultaneous with the effects of those actions. In particular, it seems plausible to think that the creative actions of rational agents require lapses of time between the formation of appropriate intentions and the carrying out of those intentions. At the very least, Craig's "philosophically unobjectionable" conception involves the application of a range of concepts to a situation which lacks many of the features which characterise all situations in which many of us ordinarily apply those concepts.

Of course, there is much more which could be said here. However, the most important point to note is that many obviously reasonable people find it far easier to believe that the universe has no cause than to believe that the universe was instantaneously created by a supernatural agent. In order to give these people a reason to change their minds, Craig needs to make clear *to them* both (a) that it is metaphysically impossible for the universe to have no cause; and (b) that it is metaphysically possible that the universe was instantaneously created by a supernatural agent. Here, it seems to me that Grunbaum is clearly in the right: it is very hard to see how one could formulate a good, *non-question-begging* argument for the view that a closed Big Bang universe requires a cause. Reasonable people can differ about ever so many things; here is one.

In connection with the second type of model, Grunbaum observes that, since there is no first moment of time, it is correct to say that the universe has always existed, and not correct to say that the universe began to exist. Perhaps surprisingly, it seems that Craig ought to agree with this judgement; for, following his analysis discussed above, there is no time t_0 of which it is

true both (i) that the universe exists at t_0; and (ii) there is no time immediately prior to t_0 at which x exists. No doubt, Craig would object that this is to countenance physically instantiated infinities of a particularly objectionable kind—since it suggests a temporal model which is analogous to certain kinds of infinity machines—but it should hardly comes as news to him that Grunbaum is prepared to countenance such models. Craig (1992-239) also claims that Grunbaum's objection is "mere word play—the key concept here is permanence, and that is a much more subtle issue than Grunbaum allows. The universe has 'always' existed in the sense that there is no past moment of physical time at which it did not exist; but it has not always existed in the strong sense of being permanent, since it had a beginning of its existence." But as we have just seen, this isn't correct: even by Craig's own lights, it isn't necessarily true that a temporally finite universe begins to exist—unless, of course, there are successful objections to physically instantiated infinities. Given the subtlety and care of Grunbaum's well-known defences of the possibility of various kinds of physically instantiated infinities, I conclude that here it is Craig, not Grunbaum, who is guilty of superficiality.

On the basis of the above discussion, I conclude that Grunbaum does raise a legitimate worry about the conjunction of the premises in the *kalam* cosmological argument. A non-theist *may* concede that there is a sense in which everything which begins to exist has a cause, namely: that for each thing which begins to exist, there is an earlier state of the universe which caused that thing to come into being; and a non-theist may concede that there is a sense in which the universe began to exist, namely: that it is finite in time; but a non-theist almost certainly will not concede—what is required for the *kalam* cosmological argument—that anything which is temporally finite has a cause. As Grunbaum claims, slipperiness in such notions as "beginning to exist," "create," etc. helps to give the *kalam* cosmological argument an air of cogency which it does not genuinely possess.[4]

2

Davies (1983) raises objections to the first premise of the argument. As Craig (1986:165) puts it, what he hopes to show is that "it is physically possible that the universe originated uncaused out of nothing, space-time springing spontaneously into being in accordance with a theory of quantum gravity."

A natural first thought is that the spontaneous production of subatomic particles in a vacuum fluctuation is an instance of things beginning to exist uncaused. However, while it may be true that these vacuum fluctuations lack *efficient* causes, it is certainly not true—as both Davies and Craig note—that they lack *material* causes: these processes merely involve the possibly uncaused conversion of pre-existing energy into material form. Perhaps the same is true of the spontaneous production of *virtual* particles in the quantum-

mechanical vacuum—though here the issue seems much less clear. At the very least, it seems to me that, in virtue of its treatment of the spontaneous production of virtual particles in the quantum-mechanical vacuum, current physics may already tell us that it *is* possible for things to begin to exist uncaused, i.e. without either material or efficient cause.[5]

A natural second thought is that, even if there are no processes in nature in which things begin to exist without material causes, nonetheless, there may be reason to think that the universe could have evolved from a state of zero mass-energy without violating conversation of mass-energy, provided that the total mass-energy of the universe—ignoring the fluctuating contribution of the quantum-mechanical vacuum—is zero.[6] Craig [1986:165] objects: "Davies' examples [of the spontaneous production of subatomic particles in a vacuum fluctuation] only serve to underscore that *ex nihilo* creation is not at issue here: in an intense electric field surrounding an atomic nucleus no new input of energy is required for spontaneous pair production when the negative energy generated by the new pair of particles offsets the energy of their masses." But this is irrelevant: in the case under consideration, there is no prior state from which the system evolves—rather a system with neither efficient nor material cause evolves in such a way as to preserve certain zero sums.

Admittedly, Davies muddies the water by suggesting that the evolving system evolved "out of empty space" by a quantum conversion of the energy of the curved space into matter, on the analogy of pair production. For this suggests that "empty space" should be invested with some kind of reality, to parallel the role of the vacuum in pair production. And, as Craig points out, there are numerous questions which are raised by this suggestion—e.g. whether the notion of empty space-time is compatible with relationalist accounts of space-time; whether one can be justified in accepting substantivalist accounts of space-time; etc. However, it seems to me that this is an uncharitable construal of Davies' suggestion. What he ought to be taken to be suggesting is that a quantum theory of gravity might provide the foundations for a descriptive account of the uncaused evolution of space-time.[7]

Craig [1986:169] claims that Davies is faced by a fundamental dilemma: "Either the necessary and sufficient conditions for the appearance of spacetime existed or not; if so, then it is not true that nothing existed; if not, then it would seem ontologically impossible that being should arise out of absolute non-being." But—harking back to the discussion of the previous section—it should be noted that many non-theists would object to the idea that their position can be encapsulated in the slogan that "being arises out of absolute non-being." On the view in question, the universe does not "arise" from anything: there are no external conditions—necessary, sufficient, or otherwise—which need be invoked in a complete explanation of the evolution of the universe.

It should be noted that it might be possible to hold a less ontologically spartan view of the origins of the universe than the one sketched above. In particular, it seems that one might take the universe to be a distribution of properties across an at-least-four-dimensional manifold, and also hold that time is merely a local phenomenon—i.e. that none of the dimensions of the manifold is essentially temporal. Those parts of the manifold which are non-temporal might be able to provide an explanation of the origins of the temporal parts. Of course, this picture still leaves one with an ontic surd; but then so does Craig's version of theism.[8] Moreover, one might not wish to embrace the four-or-more-dimensionalism and substantivalism which seem to be required. However, it seems dubious that Craig's kind of theist is well-placed to make this kind of objection: for it is surely clear that his theism is no better placed in point of commitment to controversial metaphysical doctrine.

Finally, it is perhaps worth noting that often when physicists talk about "explanation," what they mean is "subsumption under a mathematical model." In this mode of talk, the evolution of the universe is "explained" provided that one has a set of equations which correctly predicts the currently available evidence. Of course, this notion of explanation will hardly be acceptable to a metaphysician; and it leaves open the question of how best to assign ontological commitments to the theories in question in order to get explanations in a more substantial sense. While this is a controversial matter, it is not clear that there is a way of making such an assignment on which it turns out that Craig's favoured position has the minimal commitments which he supposes that it has.[9] The problem is that Craig requires that the physical theories are ontically committed to the temporal boundedness of the universe—i.e. it won't do for his purposes to allow merely that the theories assign, say, instrumental utility to that hypothesis. However, it is far from clear that Craig can get a suitably grounded commitment to the reality of the initial space-time singularity—or even to the reality of the very early stages of the standard cosmological models—without taking on the commitments which he seeks to disparage in his opponents. Consequently, it is not clear that his theism is even as well placed as the naturalism of his opponents in point of commitment to controversial metaphysical doctrine. Moreover, if we use a Quinean criterion to measure ontic commitment, then it seems fairly plausible to suggest that Craig's theism must carry an extra ontic load, allegedly justified by the further explanatory power which it provides.

3

Hawking (1988) raises objections to the second premise of the argument. As Craig (1990:478) puts it, he "challenges the assumption that a beginningless universe entails an infinite past." Now, in fact, as we have already seen, there

is an easy way to challenge this assumption, by countenancing models which are both bounded and open in the past. But, of course, this challenge does not amount to much in the context of the attempt to produce physically realistic models of the universe which are beginningless and yet finite. The achievement of Hartle and Hawking is to have produced a physically plausible model of the universe which has these features—i.e. to use the mathematical formalism of quantum field theory and general relativity to generate a model of the universe in which space-time is a four-dimensional analogue of the surface of a sphere. In this model—which, as far as I know, has not yet been shown to be inconsistent with the available evidence—space-time is finite, but possesses no initial or terminal singularities.

Craig objects to various features of Hawking's model including: (i) its use of Feynman's sum-over-histories approach to quantum field theory; (ii) its use of "imaginary time" in summing the waves for particle histories; and (iii) its alleged reliance on the Everett-Wheeler interpretation of quantum mechanics. In particular, Craig (1990:483) claims that Hawking's need to treat the resulting model as physically realistic entails that his use of these devices involves him in dubious metaphysical commitments and "egregious self-deception." However, these alleged problems do not seem to be very pressing. It is true that a realistic interpretation of Hawking's model requires some kind of commitment to the reality of the space over which the histories are summed—but this implies no further commitment to a realistic interpretation of the formalism of quantum mechanics. In particular, *pace* Craig (1990:480), it does not require commitment to the claim that "an elementary particle really does follow all possible space-time paths."[10] Moreover, it may be that all that is required is a commitment to the instantiation of certain kinds of spatial relations—i.e. it is far from clear that Hawking is committed to a substantivalist interpretation of the space over which the histories are summed. For similar reasons, Hawking's use of "imaginary time" seems innocuous, especially since it is modelled on the standard formalism for the description of quantum-mechanical tunnelling. In the end, it may be that all that one is really committed to by the Hawking model is the instantiation of a particular kind of geometry, where this instantiation can be given either a relationist or a substantivalist construal. That this geometry is described using complex numbers is neither here nor there.[11]

Craig is especially upset by Hawking's [1988:139] suggestion that "the so-called imaginary time is really the real time, and that what we call real time is just a figment of our imaginations. In real time, the universe has a beginning and an end at singularities that form a boundary to space-time and at which the laws of science break down. But in imaginary time, there are no singularities or boundaries. So maybe what we call imaginary time is really more basic, and what we call real is just an idea that we invent

to help us describe what we think the universe is like." However, while I agree that this formulation of Hawking's view is obnoxious, it seems to me that there is a way of restating Hawking's view which makes it more palatable. What he ought to say is that what we call "real time" is not a physically fundamental property of the universe; i.e. from the standpoint of basic physical description, what we call "real time" has the same status as "potable water" or "visible light." Of course, contra Hawking, this is not to impugn the reality of real time—and nor is it to impugn the reality of the singularities in real time—though it will, I think, require the insistence that real time is merely a local feature of the universe. Since, on this view, the singularities in real time are properly contained in the universe, one can be a realist about them without giving up the idea that the universe has no boundaries.

Now, of course, Craig will object that this interpretation of Hawking's claim involves "naive ontologising," especially in virtue of features (i)-(iii) cited above. However, there are various avenues of reply. First, one might be a Quinean about ontological commitment; in that case, one is necessarily committed to whatever it is that one's best physical theory quantifies over, at least absent consideration of niceties about the possibility of paraphrase. As suggested above, this view is not necessarily incompatible with relationalism about space-time, though it does seem to sit more naturally with substantivalism. Second—as suggested in the previous section—one might not be a realist about the model and its allegedly problematic features, but then insist that, from this standpoint, there is no good reason to be a realist about the initial singularities in space-time either. After all, in order to move from the observations which we make to the conclusion that there was an initial space-time singularity, we need to use a lot of high-powered theory; but, if we are instrumentalists about that theory, it is far from clear that we shall be entitled to be anything other than instrumentalists about the theoretical conclusions which we draw from the theory: that the universe began from a space-time singularity is hardly an *observational* consequence of the theory! Either way, the alleged need to invoke God as the best explanation of the available evidence seems to be removed.[12]

To sum up: In the abstract, there are two ways in which one can accommodate the data which point to an initial singularity while allowing that the universe is temporally finite but unbounded, *viz.*: (i) by excising the singularity; and (ii) by embedding the space which contains the singularity in a more extensive, appropriately contoured, manifold. On the former approach—favoured by Grunbaum—one will simply deny that the resulting theory is in any way incomplete. On the latter approach—favoured by Davies and, on my construal, Hawking—one will also deny that there is any good reason to invoke further entities in order to explain the existence of the

entities required by the theory. Either way, it seems that a reasonable proponent of these theories can reasonably resist the conclusion of *kalam* cosmological arguments.

Postscript

Prompted by some very helpful comments from an anonymous referee for *Faith and Philosophy*, I add here some remarks about the nature of my criticisms of Craig's arguments, and, in particular, about my contentions: (i) that all Davies, *et al.* need to show is that there is no good, non-question-begging reason for them to be persuaded that the arguments which Craig offers are sound; and (ii) that Craig's arguments are not rationally compelling pieces of natural theology. There are many controversial issues which arise; but even the sketchy remarks which I do make will, I think, be of some use.

The worry raised by the referee is this: It seems plausible to think that no "positive" philosophical argument is rationally compelling in the following sense: the argument is logically valid, and it would be irrational for someone who can see that it is valid, who understands its premises, and who knows all of the relevant facts which can be established by everyday methods of enquiry and the special sciences, to reject its conclusion. But this seems to be the relevant standard of rational compulsion invoked in my assessment of Craig's arguments; so all that my arguments show is that Craig's arguments fail to pass a test which no philosophical argument has ever passed. Moreover, this feature of my argument would not be mitigated even if it were true: (i) that Craig writes in such a way as to suggest that his argument is designed to meet this standard; and *even* (ii) that most philosophers write in such a way as to suggest that the arguments which they are presenting meet this standard. Why should Craig's arguments be criticised for failing to meet a standard which philosophical arguments never achieve, even if he seems to suggest that his arguments do meet that standard?

In order to keep my discussion brief, let me grant that no "positive" philosophical argument is rationally compelling in the sense described: no "positive" philosophical argument can be compelling for all rational beings, because the procedural constraints on belief revision which are constitutive of rationality do not sufficiently constrain the sets of beliefs which can be adopted by reasonable beings. Some alternative conception of the virtue of arguments is now required. I suppose that it is something like this: an argument is provisionally rationally compelling for its intended audience if it is logically compelling and proceeds from premises to which the intended audience is committed; a provisionally rationally compelling argument for an intended audience is rationally compelling for that audience if it is also true that the audience will accept the conclusion of the argument rather than give up one of the premises *without* violating any of the canons of rationality.

I then suppose that the dialectical situation is like this: One begins with the assumption that one's dialectical opponents—the intended audience—are reasonable, in the sense that they respect procedural constraints on belief revision, e.g. to aim for consistency, coherence, simplicity, unity, explanatory power, etc. One endeavours to construct an argument for the conclusion which one wishes to have accepted which is at least provisionally rationally compelling for the intended audience. If one is lucky—or if one possesses further knowledge about the psychological dispositions of one's opponents—one may hit upon an argument which is in fact rationally compelling for the intended audience. However, even to hit upon an argument which is provisionally rationally compelling counts as a success: for it forces one's opponent either to accept one's conclusion (outright success) or to revise other beliefs (which may then leave room for follow-up successes).

In some circumstances, one will go wrong because one advances arguments with premises which one supposes one's opponents will accept—perhaps because one thinks that any reasonable person will accept those premises—when, in fact, it turns out that one's opponents do not accept those premises. In such a case, one has two options: one can give up on the argument; or one can seek to construct arguments for the contentious premises. In the former case, one may be led to revise one's opinion of the reasonableness of one's opponent, at least with respect to the subject matter in question: perhaps they are insincere, or cognitively divided, or prone to dissociation, etc. If so, then one can conclude that one's argument failed through no fault of one's own; but one mustn't make the further, mistaken claim, that one's own argument prevailed. Once the conditions for debate—including the possession of respect for one's opponents—break down, questions about dialectical success or failure become nugatory.

How do these remarks bear upon Craig's *kalam* cosmological arguments? Well, I take it that the intended audience for these arguments consists of presumptively reasonable agnostics and atheists who hold a wide range of physical and metaphysical beliefs. Moreover, I take it that the members of the intended audience are perfectly entitled to draw on those prior physical and metaphysical beliefs in responding to Craig's argument. But then, as I attempted to show in my paper, it seems quite clear that Craig's argument are not even presumptively rationally compelling: they rely on physical and metaphysical theses which members of the target audience reject. Since I take it that Craig is not unaware of this fact, I find it completely mysterious why he then continues to advance the arguments. Perhaps Craig could reply that his argument is intended just for those atheists and agnostics who buy all of the required physical and metaphysical theses; the problem with this line is that it is fairly plausible to think that there are no such people.

Must all "positive" philosophical argument fall in the same manner as Craig's *kalam* cosmological arguments? Surely not! In particular, "positive" philosophical arguments directed at specific target audiences are very often successful: philosophers do modify their positions in response to "positive" (and "negative") arguments all the time. Of course, philosophers also modify their positions for lots of other reasons as well: it isn't always the force of argument which leads to the acceptance of the conclusions of an argument. But I don't see any reason, in anything which I have just said, to be sceptical about the utility of "positive" philosophical argument. Consider the following: (i) Putnam's "twin earth" argument for the view that, in some sense, the content of beliefs supervenes on, or is partly determined by, what's outside the head; (ii) Black's "two sphere" argument for the view that objects are more than bundles of properties; (iii) Mundy's "embedding" arguments for the possibility of relationist construals of STR; and (iv) Grunbaum's argument that the story of the Thomson lamp is kinematically consistent. I hold that, at the times at which these arguments were propounded, at least, these were paradigm examples of good "positive" philosophical arguments. Moreover, these examples are easily multiplied.[13]

Perhaps it might be objected that I have incorrectly identified the intended audience of Craig's argument. In particular, it might be suggested that the argument is intended for theists—i.e. people who already accept the conclusion—and that it can show *them* something about the structure or rationality of their own beliefs, or about the structure or irrationality of the beliefs of non-theists. I think that these suggestions are massively implausible. Of course, theists are committed to the claim that non-theists make a *mistake* in failing to believe that God exists, but it is hard to see how the construction of *kalam* cosmological arguments could provide evidence of further, *independent* errors which are made by non-theists. In particular, there is a question about the robustness of the theistic conclusion *vis a vis* the physical and metaphysical premises of the argument which needs to be addressed. I am fairly confident that there are virtually no theists for whom the premises of, e.g., *kalam* cosmological arguments are more epistemically robust—less open to revision, less centrally placed in the web of belief—than the theistic conclusion. Or, to put the point another way, I find it quite implausible to think that there are theists for whom the belief in the theistic conclusion is dependent upon their acceptance of the premises of a *kalam* cosmological argument. But then, I take it that the construction of *kalam* cosmological arguments doesn't really show anything interesting about the structure of theistic beliefs, or about the rationality of acceptance of the conclusion of those arguments. Nor does the construction of these arguments show anything about the structure or rationality of non-theistic arguments either. What the arguments do show, if valid, is that one could not accept a particular package of physical

and metaphysical theses and also reasonably deny that God exists. But, if there is no suitably independent attraction in the package of physical and metaphysical theses amongst likely target audiences for the argument—i.e. attraction which is independent of belief in the conclusion of the argument—then it seems to me that there will be no real work which the constructed argument can do.[14]

RSSS

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NOTES

1. My assessment of the dialectical situation is discussed further in an appendix to the present paper. See also my *Ontological Arguments and Belief in God*, Cambridge, Cambridge University Press, 1995, and my "Weak Agnosticism Defended," *International Journal for Philosophy of Religion*, 36, pp. 147-67.

2. See Craig (1992:235).

3. Craig (1990:486ff.) suggests that Aspect's experimental work in connection with Bell's Theorem appears to show that there are non-local correlations in nature. But other interpretations—e.g. in terms of backwards causation—are available. Moreover, as Craig notes, it might well be held that the correlations in question are acausal—i.e. that the synchronised correlations are not cases of simultaneous causation.

4. Note, by the way, that this is not to say that Craig is unreasonable in supposing that the argument is sound—i.e. it is not to say that *he* should suppose that the argument involves a fatal equivocation; rather, it is to say that non-theists can justifiably contend that, by their lights, the most plausible construal of the arguments imputes a fatal equivocation. But, if the argument is not dialectically effective, then it is useless. So this is to say that the argument is a failure.

5. Note that the virtual particles in question have detectable effects; i.e. it won't do simply to dismiss them as unreal.

6. Here, we are to imagine that there is neither efficient nor material cause; rather, there is an uncaused evolution in which certain zero-quantities are preserved.

7. Here, I pass over Davies' further suggestion that such a theory would entail a certain mathematically determined probability that a blob of space would appear where none existed before. As Craig notes, this seems to involve an incoherent understanding of the notion of something's coming from nothing—incoherent because it supposes that something which comes from nothing comes from a pre-existent state—and a consequently incoherent understanding of the notion of the probability of something's coming from nothing.

8. If Craig replies that God requires no cause because he did not being to exist, the non-theist can make the same point about the non-temporal parts of the manifold.

9. Recall that one of Craig's gambits is to object to heavily ontological committing construals of physical theories—substantivalism about space-time; four-or-more-dimensionalism about space-time; the Everett-Wheeler interpretation of quantum mechanics; ontically committing interpretations of Feynman's sum-over-histories approach to quantum field theories; etc.

10. Recall that the sum-over-histories approach is one of several mathematically equivalent methods for solving the Shroedinger (Wheeler—De Witt) equation; its advantages lie merely in its technical and conceptual simplicity.

11. Of course, none of the above should be taken to deny that Hawking might take himself to have far more substantive commitments; the point is that one should distinguish between what he takes to be his ontic commitments—e.g. to the worlds of the Everett-Wheeler interpretation of quantum mechanics—and what one is obliged to take as the ontic commitments of his model.

12. Perhaps I should add that I am inclined to favour the first strategy: if it turns out that there are independent reasons for supposing that the Hartle-Hawking model is the best physical theory—assessed in terms of simplicity, explanatory power, fit with data, etc.—then we have good reason to believe in the reality of all the entities which the theory quantifies over. However, for current purposes, I don't need to insist on this choice.

13. I am indebted to John O'Leary-Hawthorne for suggesting the first two examples, and for discussion of the issues involved here.

14. One last possibility is that Craig—following the Thomistic tradition—supposes that his *kalam* cosmological argument has the virtue that it consists of premises which any non-theist would grant were she free of the tainting effects of sin and were she to attend seriously to them. If this is the case, then my main complaint is that he doesn't say so clearly, and at the outset, so that non-theists are made aware: (i) that the argument isn't in any sense intended as an internal challenge to their beliefs or rationality; and (ii) that the argument is predicated on the assumption that the argument would not be dialectically effective for a typical audience of non-theists *because* that audience is rendered constitutionally incapable of appreciating the argument by the debilitating effect of sin. At this point, dialogue is at an end, and rationalisation takes over—as it does when non-theists turn to Marx, or Feuerbach, or Nietzsche, or Freud, or other debunking theorists, in order

to explain to each other why theists accept false premises. Moreover, there is still the further question what the construction of such an argument is supposed to show *to* theists; in particular, there is a hard question about the direction of the doxastic connections between (i) the claim that anyone free of the incapacitating influence of sin would accept the premises, and (ii) the conclusion, i.e. the claim that God exists. And it is also unclear to me why even theists should grant that the premises have the status which this interpretation requires; surely sinless belief in God could perfectly well go along with rejection of Craig's controversial physical and metaphysical premises.