

How to deal with singularities

Comment on Craig's paper

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Introduction

William Craig's rich paper contains a mass of material, and as a non-physicist I will not try to enter into a discussion of the physical issues dealt with in the first part of his paper. As far as I can judge, however, Craig's account of recent cosmological theories is adequate and complete (see, for example, Kanitscheider 2004). And I take it that it can be summarized by saying that all alternatives so far put forward to the standard Big Bang Model have one or more serious flaws: they are merely speculative and have little or no evidence in favour of them; some of them even have substantial evidence against them; some of them are internally contradictory or involve serious conceptual implausibilities; and some of them, at a rather remote level, require a sort of temporal beginning or an initial singularity themselves – although the original motivation to establish those models was to avoid such a beginning or singularity. Craig takes these flaws as an argument for a temporal beginning of the universe. In the second part he sketches an argument which (by pleading for a wider account of causation and by invoking a version of the metaphysical principle of causality) shows that there is a cause of the universe which displays the traditional theistic properties and can hence be identified with God.

Out of broad sympathy with Craig's views, my comments fall into four parts. After a short remark from the perspective of the philosophy of science, I will try to clarify which kinds of naturalisms and anti-naturalisms are found in the debate here. After that, I will reflect on the sources of (anti-)naturalistic claims, and, finally I will briefly explore the anti-naturalistic strategy behind Craig's paper and estimate its prospects. I shall constrain my comment to the naturalism/anti-naturalism issue; an appropriate discussion of Craig's theistic argument would go beyond the scope of this brief comment.

A note: Is the standard model corroborated by the flaws of its competitors?

Regarding the first part, I have only one little critical remark. It concerns Craig's interpretation of the impact of the flaws of the competing theories

on the standard model. At least twice in his paper (Craig, 'Summary', p. 115), he talks about the increasing 'corroboration' of the standard Big Bang model by the successive failures of its competitors. If 'corroboration' is to be taken in Popper's sense (and Craig's overall realist account of scientific theories strongly supports this Popperian reading), I do not think that this is really appropriate. A theory is corroborated if it 'survives' an attempt to falsify it in an empirical test. But things are quite different here with the standard model and its competitors. Craig himself points out that one big problem of many competing models is their *lack* of evidential backing. They were not proposed as better explanations for odd pieces of evidence, not even as empirically testable alternative theories. They rather appear as cosmological speculations, primarily designed in order to avoid the singularity problem. Hence, if these extravagant speculations fail, this does not mean that the standard model is 'corroborated'. According to Popper, a reasonable theory with considerable evidence on its side is not corroborated by the failure of some less reasonable competitors which have no good evidence in favour of them. So it seems to me that Craig cannot both claim Popperian corroboration of the standard Big Bang model while attacking the competing models on the grounds of lack of evidence.

It might nevertheless seem intuitively rational to be more confident about the Standard Model if the competitors are proven implausible. But as Craig describes it, the situation rather fits within the framework of Bayesian epistemic probabilities (and in his conclusion, Craig indeed talks about 'the inductive evidence of contemporary cosmology'): there is a variety of competing theories with prior probabilities greater than 0; their respective probabilities must sum up to 1; and the standard Big Bang model becomes epistemically more probable as the competing models decrease in probability. Their decrease in epistemic probability can have various reasons, ranging from internal incoherence to conceptual extravagances to empirical failure. In other words, and somewhat more loosely: the claim that a theory is corroborated turns on its empirical success in the *past*; a claim that a theory is probable is a claim about its *future* prospects.

But as I said, this minor point leaves the substance of Craig's argument untouched. My further comment focuses on some methodological aspects, both of Craig's position as well as of his description of naturalism.

Which (anti-)naturalism?

Craig says that 'Naturalists ... have typically claimed that the space-time universe is itself at least factually necessary – that is to say, eternal, uncaused, incorruptible, and indestructible – while dismissing the demand for a logically necessary being' (Craig, p. 97), and in his conference abstract he calls the eternity of the universe a 'perennial naturalistic assumption'. (It goes without saying that the understanding of 'eternity' here has varied as we have moved from simple pre-Einsteinian accounts towards the extravagant cosmologies of the past decades.)

How should we classify this description of naturalism? Against the background of a widespread (and I think useful) distinction between *semantical*, *methodological* and *ontological* naturalism (Löffler 1999), it appears as a quite strong form of ontological naturalism – the attribution of some highly substantial, non-trivial, ontological properties to the universe, and in connection with that, the claim of the nonexistence of a traditional God-like being with similar properties. It should be noted that physicists – *qua physicists!* – would not be inclined towards such a thesis. Such an ontological naturalism is not a part of physics. For physicists, such doctrines as the eternity and indestructibility of the universe are framework assumptions implicit in their normal scientific method as physicists. When they began to appear questionable, given what was emerging regarding the apparent history of the universe, some physicists tried, quite understandably, to rescue them by speculating about various alternative hypotheses to the Big Bang. However, developing a full-blown *ontology* from such alternative hypotheses is not the business of physicists. It is rather a business for physicists doing naturalistic philosophy or for naturalistic philosophers interpreting physical theories.

Moreover, not even every philosophical naturalist would subscribe to Craig's version of naturalism. *Methodological* naturalists are committed only to the claim that philosophical investigations should use those methods, and only those methods, which would also be acceptable in the sciences. Of course physical theories are likely to presuppose what we might call a 'local ontology', containing, for instance, their theoretical entities. But methodological naturalism can co-exist well with a sort of ontological agnosticism beyond that. Thorough methodological naturalists would restrict themselves to the declaration that we cannot reasonably say anything about the status of the universe before the Big Bang, on the ground that a singularity is a singularity, and hence neither our concepts of space and time nor the known laws of physics are applicable. In the eyes of the methodological naturalist, any attempt to theorize into that field, especially any further ontological claims, would end up in dubious claims transgressing the limits of physics proper.

Admittedly, there could be some discussion whether a rule like 'try to extend the limits and explanatory claims of science as far as possible, and try to avoid singularities as far as possible' belongs to the methods of science and is hence also a legitimate claim of philosophical naturalism. From this point of view, we could say that a physicist or philosophical naturalist with a preference for one of the competing models could well be within their methodological rights (we might add, of course, that they should keep an eye on other methodological rules as well, e.g. the rules of simplicity and parsimony). But in this context, some of Craig's observations are particularly interesting: if it is really true that some alternative models to the Big Bang have their roots not only in a certain (and methodologically acceptable) *horror singularitatis*, but in the atheistic or pantheistic background

convictions of their authors, then these models would be clear cases where a sort of ontological naturalism is the fuel not only for methodological naturalism, but for physical theorizing itself. And this would deserve more attention from historians and psychologists of science.

But let us now turn to Craig's position. That Craig ultimately defends a sort of ontological anti-naturalism, namely Christian theism, is only obvious. But this is not the whole story. I read Craig as defending a methodological anti-naturalism as well. In an aside, Craig says that 'moreover, even methodological naturalism is far from unchallengeable', and in fact, what he does in the second part of his paper amounts to an attack on the narrow-minded concepts of explanation and causation which are typical of methodological naturalisms. Craig strives for the rehabilitation of something like the traditional doctrines of the manifold senses of 'cause' and 'explanation', and I think this is quite a promising way of attacking naturalism. In the subsequent paragraphs, I want to sketch out why.

Do cosmological theories alone favour (anti-)naturalism?

One could think that the result of Craig's investigation concerning the standard Big Bang models and its competitors is already a victory for the anti-naturalist, especially the theistically-minded anti-naturalist. Conversely, if the competitors had scored better, this would have been the victory for the naturalist. However, this is not the case. There are at least two worrying facts: first, there are people who find a purported eternity of the universe just as mysterious as a creation 'ex nihilo' in a singularity. For them, the Big Bang and some variant of an eternal universe are equally wrong answers to the question 'Why is there something rather than nothing?' Second, there are people like Quentin Smith who draw atheistic conclusions from the Big Bang model. The main premise of their argument is the lawlessness of the Big Bang singularity. In an old article from 1976, before his move to quantum cosmology, Stephen Hawking writes:

A singularity is a place where the classical concepts of space and time break down as do all the known laws of physics because they are all formulated on a classical space-time background . . . [T]his breakdown is not merely a result of our ignorance of the correct theory but represents a fundamental limitation to our ability to predict the future [of the singularity], a limitation that is analogous but additional to the limitation imposed by the normal quantum-mechanical uncertainty principle.

(Hawking 1976: 2460)

One could conclude from this lawlessness and unpredictability that the singularity 'would thus emit all [possible] configurations of particles with equal probability' (ibid.), or, as Paul Davies puts it: 'Anything can come out

of a naked singularity – in the case of the big bang the universe came out' (1981: 161). Quentin Smith concludes from this:

if God caused the universe to begin to exist with the intention that the universe contains intelligent life, he would have created an initial state that certainly or probably evolves in a lawlike manner that is conducive to the existence of intelligent organisms . . . Since big bang cosmology implies that the initial state is instead a lawless singularity, big bang cosmology disconfirms the theistic hypothesis.

(1997: 125)

If Smith is correct, and I think in that point he is, then we either are back to the mysterious fact of a giant cosmic chance that we are here, or it shows us that the Big Bang theist must indeed defend a little additional hypothesis: that God not only caused the initial singularity, but that he also moved it towards a certain development.

The theist is surely not irrational in doing that – a singularity is a singularity, and we are not breaking *physical* laws if we assume some Divine interaction in it. I think we can learn from this that cosmological theories and models are open to several interpretations, to embeddings in several *Weltanschauungen*, of both the naturalistic and anti-naturalistic kind. And indeed, this is a very important result of Craig's paper, a result which is quite uncomfortable for many naturalists: theists are within their rights to interpret Big Bang cosmology non-naturalistically, as some supernatural action of God. Belief in a theistic God should not be seen as a suggestion by the findings of modern cosmology, let alone a consequence of them. Nevertheless, it is at least fully compatible with modern cosmology, and can be regarded as an epistemologically legitimate completion of the physical world picture. Hence, the answer to the question in the heading of this section is negative: it is not a cosmological theory alone which tells in favour of naturalism or anti-naturalism, it is, rather, its embedding in a *Weltanschauung* or certain metaphysical background assumptions.

Beyond methodological naturalism

But is not Craig's paper meant as a positive argument for God's existence from Big Bang cosmology (and not only the 'soft' compatibility argument I made from it so far)? Of course it is. But my foregoing remarks should have made clear that its argumentative power does not rest ultimately on physical cosmology alone, but on the *interpretation* of that cosmology by means of metaphysical principles, especially the principle of causality, the regress principle, etc. Is it rational to appeal to such principles? I think it is, and a proof of their indispensability would yield a serious argument against methodological naturalism.

Craig makes a clever move here by citing naturalists like Kanitscheider and Bunge who invoke principles like 'out of nothing comes nothing' in

their arguments against a Big Bang cosmology with a singularity. This amounts to a sort of *tu quoque*-argument. I doubt whether they can appeal to such principles *qua* methodological naturalists. It is well known that the applicability of the concept of causality in science has been disputed for decades, chiefly for the reason that it is hard to explain a non-circular comprehensive concept of causation. Moreover, modern science is characterized by a move from the search for *causes* to the qualitative description of *processes*, and consequently, the concept of 'cause' does not even appear prominently in modern physics. Kanitscheider is of course aware of all that when he labels the principle a 'metaphysical' one, but he admits that the principle is omnipresent in science. This shows that scientific activities are intertwined with a set of background assumptions which are not parts of the scientific discipline proper, but which nevertheless display rational structures and can be critically discussed. Methodological naturalism tends to underrate such principles, but it is easy to find arguments showing that they are indispensable for science as well as for our everyday life. Even more, there are good arguments showing that our scientific activities depend on the stable functioning of the pre-scientific, everyday practices of our *Lebenswelt*. And in the everyday context, we have few intellectual scruples about such things as explanations which have much in common with Aristotle's manifold senses of 'cause' (as answers to various forms of *why*-questions), or about something like the metaphysical principle of causality, even if modern science is supposed to have discredited them. There is no room to develop this point here in more detail. It should nevertheless be noted that methodological naturalism has awkward and uncongenial consequences: it makes a whole range of our everyday, pre-scientific practices, communication processes, patterns of theorizing and explaining, etc. appear irrational.

If my position is correct, then natural science loses its air of the paradigm and benchmark of all rationality – it rather appears as a highly derivative, dependent form of rational activity. Consequently, methodological naturalism loses its attractiveness right from the beginning. I think that this line of methodological anti-naturalism is fruitful, and I read the second part of Craig's paper as an argument in that direction. By acknowledging this area of pre-scientific reasoning, explaining and problem-solving as a field of rational enterprise we not only cut off the naturalist's most important source of argument, but also rehabilitate a number of metaphysical concepts and patterns of explanation of the kind that are indispensable for any promising form of philosophical theology.