

Methodological Naturalism?

Alvin Plantinga

Department of Philosophy
Decio Hall
University of Notre Dame

Abstract

The philosophical doctrine of methodological naturalism holds that, for any study of the world to qualify as "scientific," it cannot refer to God's creative activity (or any sort of divine activity). The methods of science, it is claimed, "give us no purchase" on theological propositions--even if the latter are true--and theology therefore cannot influence scientific explanation or theory justification. Thus, science is said to be religiously neutral, if only because science and religion are, by their very natures, epistemically distinct. However, the actual practice and content of science challenge this claim. In many areas, science is anything but religiously neutral; moreover, the standard arguments for methodological naturalism suffer from various grave shortcomings. [This is the first part of a two-part article.]

According to an idea widely popular since the Enlightenment, science (at least when properly pursued) is a cool, reasoned, wholly dispassionate¹ attempt to figure out the truth about ourselves and the world, entirely independent of ideology, or moral convictions, or religious or theological commitments. Of course this picture has lately developed some cracks. It is worth noting that 16 centuries ago, St. Augustine provided the materials for seeing that this common conception can't really be correct. It would be excessively naïve to think that contemporary science is religiously and theologically neutral. Perhaps *parts* of science are like that. The size and shape of the earth and its distance from the sun, the periodic table of the elements, the proof of the Pythagorean Theorem--these are all in a reasonable sense religiously neutral. But many other areas of science are very different. They are obviously and deeply involved in a clash between opposed religious world views. There is no neat recipe for telling which parts of science are neutral with respect to this contest and which are not; what we have is a continuum rather than a simple distinction. But here is a rough rule of thumb: the relevance of a bit of science to this contest depends upon how closely that bit is involved in the attempt to come to understand ourselves as human beings. Perhaps there is another variable: how "theoretical" the bit in question is, in the sense of being directed at understanding, as opposed to control.

In this article I begin by pointing to three examples of the religious non-neutrality of scientific claims or hypotheses. I shall then argue that a Christian academic and scientific community ought to pursue science in its own way, *starting from* and taking for granted what we know as Christians. (This suggestion suffers from the considerable disadvantage of being at present both unpopular and heretical; I shall argue, however, that it also has the considerable advantage of being correct). Now one objection to this suggestion is enshrined in the dictum that science done properly necessarily involves "methodological naturalism," or (as Basil Willey calls it) "provisional atheism."² This is the idea that science, properly so-called, cannot involve religious belief or commitment. My main aim in this paper is to explore, understand, discuss, and evaluate this claim and the arguments for it.

Is Science Religiously Neutral? Three Examples

Simon and Altruism

First, then, some examples that suggest that science is not religiously neutral.³ I begin with Herbert Simon's article, "A Mechanism for Social Selection and Successful Altruism."⁴ This article is concerned with the problem of altruism: Why, asks Simon, do people like Mother Teresa do the things that they do? Why do they devote their time and energy and indeed their entire lives to the welfare of other people? Of course it isn't only the great saints of the world that display this impulse; most of us do so to one degree or another.

How, says Simon, can we account for this kind of behavior? The *rational* way to behave, he says, is to act or try to act in such a way as to increase one's personal fitness; i.e., to act so as to increase the probability that one's genes will be widely disseminated in the next and subsequent generation, thus doing well in the evolutionary derby.⁵ A paradigm of rational behavior, so conceived, was reported in the *South Bend Tribune* of December 21, 1991 (dateline Alexandria (Va.)). "Cecil B. Jacobson, an infertility specialist, was accused of using his own sperm to impregnate his patients; he may have fathered as many as 75 children, a prosecutor said Friday." Unlike Jacobson, however, such people as Mother Teresa and Thomas Aquinas cheerfully ignore the short- or long-term fate of their genes. What is the explanation of this behavior?

The answer, says Simon, is two mechanisms: "docility" and "bounded rationality":

Docile persons tend to learn and believe what they perceive others in the society want them to learn and believe. Thus the content of what is learned will not be fully screened for its contribution to personal fitness (p. 1666).

Because of bounded rationality, the docile individual will often be unable to distinguish socially prescribed behavior that contributes to fitness from altruistic behavior [i. e., socially prescribed behavior that does not contribute to fitness--AP]. In fact, docility will reduce the inclination to evaluate independently the contributions of behavior to fitness. By

virtue of bounded rationality, the docile person cannot acquire the personally advantageous learning that provides the increment, d , of fitness without acquiring also the altruistic behaviors that cost the decrement, c . (p. 1667).

The idea is that a Mother Teresa or a Thomas Aquinas displays bounded rationality; they are unable to distinguish socially prescribed behavior that contributes to fitness from altruistic behavior (socially prescribed behavior which does not). As a result, they fail to acquire the personally advantageous learning that provides that increment d of fitness without, sadly enough, suffering that decrement c exacted by altruistic behavior. They acquiesce unthinkingly in what society tells them is the right way to behave; and they aren't quite up to making their own independent evaluation of the likely bearing of such behavior on the fate of their genes. If they *did* make such an independent evaluation (and were rational enough to avoid silly mistakes) they would presumably see that this sort of behavior does not contribute to personal fitness, drop it like a hot potato, and get right to work on their expected number of progeny.

No Christian could accept this account as even a beginning of a viable explanation of the altruistic behavior of the Mother Teresas of this world. From a Christian perspective, this doesn't even miss the mark; it isn't close enough to be a miss. Behaving as Mother Teresa does is not a display of bounded rationality--as if, if she thought through the matter with greater clarity and penetration, she would cease this kind of behavior and instead turn her attention to her expected number of progeny. Her behavior displays a Christ-like spirit; she is reflecting in her limited human way the magnificent splendor of Christ's sacrificial action in the Atonement. (No doubt she is also laying up treasure in heaven). Indeed, is there anything a human being can do that is *more* rational than what she does? From a Christian perspective, the idea that her behavior is irrational (and so irrational that it needs to be explained in terms of such mechanisms as unusual docility and limited rationality!) is hard to take seriously. For from that perspective, behavior of the sort engaged in by Mother Teresa is anything but a manifestation of 'limited rationality'. On the contrary: her behavior is vastly more rational than that of someone who, like Cecil Jacobson, devotes his best efforts to seeing to it that his genes are represented *in excelsis* in the next and subsequent generations.

Simon suggests or assumes that the *rational* course for a human being to follow is to try to increase her fitness. Rationality, however, is a deeply *normative* notion; the rational course is the right course, the one to be recommended, the one you ought to pursue. Simon, therefore, seems to be making a normative claim, or perhaps a normative assumption; it is a vital and intrinsic part of what he means to put forward. If so, however, can it really be part of science? Science is supposed to be non-evaluative, non-normative, non-prescriptive: it is supposed to give us facts, not values. Can this claim that the rational course is to pursue fitness then be part of science, of a scientific explanation, or a scientific enterprise?

But perhaps there is a reply. What, exactly, does Simon mean here by such terms as 'rational' and 'rationality'? At least two things; for when he says that the rational course,

for a human being, is to try to increase her fitness, he isn't using the term in the same way as when he says Mother Teresa and people like her suffer from bounded rationality. The latter means simply that people like this aren't quite up to snuff when it comes to intelligence, perspicacity, and the like; they are at least slightly defective with respect to acuteness. It is because of the lack of acuity that they fail to see that the socially prescribed behavior in question is really in conflict with their own best interests or the achievement of their own goals. This limited rationality is a matter of running a quart low, of playing with less than a full deck, of being such that the elevator doesn't go all the way to the top floor.

When he says that the rational course for a human being is to strive to promote fitness, he presumably means something different by the term 'rational', namely, that a properly functioning human being, one not subject to malfunction (one that isn't insane, or retarded, or reacting to undue stress, or in the grip of some other malfunction or dysfunctional state) will as a matter of fact have certain goals, try to attain certain conditions, aim to bring about certain states of affairs. Presumably survival would be one of these goals; but another one, says Simon, is promoting or maximizing fitness.

And there are two things to say about this claim. In the first place, we might ask what the evidence is that, as a matter of fact, properly functioning human beings do indeed all or nearly all display this goal. It isn't easy to see precisely how to answer this question. One suspects that a study done by way of the usual polling and questionnaire techniques wouldn't yield this result; most of the properly functioning people I know, anyway, wouldn't give as one of their main goals that of increasing their fitness. (Perhaps you will retort that this is because most of the people I know are past childbearing age, so that directly increasing their genetic representation in the next generations is no longer a live option. Of course they could do their best to see that they have a lot of grandchildren--judiciously distributed bribes, perhaps, or arranging circumstances so that their daughters will become pregnant, or encouraging their younger relatives to drop out of school and have children). But obviously there is always another option: we can say that the goals or aims in question aren't conscious, are not available to conscious inspection. They are rather to be determined by behavior. It is your behavior that reveals and demonstrates your goals, no matter what you say (and, indeed, no matter what you think).

Well, perhaps so. It would still remain to be shown or argued that properly functioning human persons do as a matter of fact display in their behavior this goal of increasing their fitness--where, of course, we couldn't sensibly take their displaying this goal as a criterion of normality or proper function. As a matter of fact, Simon doesn't proceed in this way; his procedure, with respect to this question, is *a priori* rather than *a posteriori*. He doesn't tell us what it is that leads him to think that properly functioning human beings will have this goal, but one suspects his answer would be that human beings acquire this goal somehow by virtue of our evolutionary history. I suspect he thinks it would follow from any proper evolutionary account of human beings (and for many other species as well) that they have maximizing fitness as a goal. How exactly this story would go is perhaps not entirely clear; but for the moment we can ignore the difficulties.

The second thing to say about this claim is that the same question arises with respect to *it*: isn't the idea of proper function itself a normative notion? There is a connected circle of notions here: proper function, health, normality (in the normative, not the descriptive sense) dysfunction, damage, design (a properly functioning lung is working the way lungs are designed to work), purpose, and the like. Perhaps none of these notions can be analyzed in terms of notions outside the charmed circle (so that this circle would resemble that involving the notions of necessity, possibility, entailment, possible worlds, and so on). And aren't these notions normative? Indeed, there is a use of 'ought' to go with them. When the starter button is pressed, the engine ought to turn over--i.e., if the relevant parts are functioning properly, the engine will turn over when the starter button is pressed. When you suffer a smallish laceration, a scab ought to form over the wound; that is, if the relevant parts of your body are functioning properly, a scab will form over the wound. A six-month-old baby ought to be able to raise its head and kick its feet simultaneously; that is, a healthy, normal (in the normative, not the statistical sense) six-month-old baby can do these things. Must we not concede, therefore, that this notion of proper function is itself a normative notion, so that if Simon uses 'rationality' in a way explicable only in terms of proper function, then what he says is indeed normative and thus not properly a part of science?

Perhaps; but if the employment of the notion of normality or proper function is sufficient to disqualify a discourse from the title of science, then a lot more than Simon's account of altruism will turn out not to be science. Consider *functional generalizations*--the sorts of generalizations to be found in biological and psychological descriptions of the way in which human beings or other organic creatures work. As John Pollock points out, such generalizations seem to involve an implicit presupposition:

when we formulate similar generalizations about machines, the generalizations we formulate are really about how machines work when they work properly; or when they are not broken. Similarly it seems that generalizations about organisms should be understood as being about the way they work when they are 'working normally.'⁶

Here 'working normally' and 'not being broken' mean something like 'subject to no dysfunction' or 'working properly' or 'not malfunctioning'. Functional generalizations about organisms, therefore, say how they work when they are functioning properly. But of course biological and social science is full of functional generalizations. Thus, if Simon is appealing to the notion of proper function in his idea of rationality, he may be appealing to a kind of normativity; but that kind of normativity is widely found in science. Or, at any rate, it is widely found in what is called science. Some will maintain that the notion of proper function doesn't belong in science unless it can be explained, somehow, in other terms--finally, perhaps, in terms of the regularities studied in physics and chemistry. We need not enter that disputatious territory here; it is sufficient to note that if Simon is appealing to the notion of proper function, then what he does appeal to is in fact to be found over the length and breadth of the social and biological sciences. Therefore, we should not deny the title 'science' to what Simon does unless we are prepared to raise the same strictures with respect to most of the rest of what we think of

as social and biological science. And even if we do say that Simonian science isn't really science, nothing substantive changes; my point will then be, not that religious considerations bear on science properly so-called, but rather that they bear on what is in fact called science, which is a very important, indeed, dominant part of our intellectual and cultural life.

I shall therefore assume that Simonian science is science. So in Simon's account of altruism we have an example of a scientific theory that is clearly not neutral with respect to Christian commitment; indeed, it is inconsistent with it. Simon's theory also illustrates another and quite different way in which religious considerations are relevant to science; they bear on what we take it needs explanation. From Simon's perspective, it is altruism that needs explanation; from a Christian or theistic perspective, on the other hand, it is only to be expected that human beings would sometimes act altruistically. Perhaps what needs explanation is the way in which human beings savage and destroy each other.

The Grand Evolutionary Myth

Since I have dealt with this example elsewhere (in the essays referred to in footnote 3) I can be brief here. Consider the Grand Evolutionary Myth (GEM). According to this story, organic life somehow arose from non-living matter by way of purely natural means and by virtue of the workings of the fundamental regularities of physics and chemistry. Once life began, all the vast profusion of contemporary flora and fauna arose from those early ancestors by way of common descent. The enormous contemporary variety of life arose, basically, through natural selection operating on such sources of genetic variability as random genetic mutation, genetic drift and the like. I call this story a myth not because I do not believe it (although I do not believe it) but because it plays a certain kind of quasi-religious role in contemporary culture. It is a shared way of understanding ourselves at the deep level of religion, a deep interpretation of ourselves to ourselves, a way of telling us why we are here, where we come from, and where we are going.

Now it is certainly possible--epistemically possible,⁷ anyway--that GEM is true; it certainly seems that God could have done things in this way. Certain parts of this story, however, are, to say the least, epistemically shaky. For example, we hardly have so much as decent hints as to how life could have arisen from inorganic matter just by way of the regularities known to physics and chemistry.⁸ (Darwin found this question deeply troubling;⁹ at present the problem is enormously more difficult than it was in Darwin's day, now that some of the stunning complexity of even the simplest forms of life has been revealed).¹⁰ No doubt God could have done things that way if he had chosen to; but at present it looks as if he didn't choose to.

So suppose we separate off this thesis about the origin of life. Suppose we use the term 'evolution' to denote the much weaker claim that all contemporary forms of life are genealogically related. According to this claim, you and the flowers in your garden share common ancestors, though we may have to go back quite a ways to find them. Many contemporary experts and spokespersons--Francisco Ayala, Richard Dawkins, Stephen Gould, William Provine, and Philip Spieth, for example--unite in declaring that evolution

is no mere theory, but established fact. According to them, this story is not just a virtual certainty, but a real certainty.¹¹ Now why do they think so? Given the spotty character of the evidence--for example, a fossil record displaying sudden appearance and subsequent stasis and few if any genuine examples of macroevolution, no satisfactory account of a mechanism by which the whole process could have happened, and the like¹²--these claims of certainty seem at best wildly excessive. The answer can be seen, I think, when we realize that what you properly think about these claims of certainty depends in part on how you think about theism. If you reject theism in favor of naturalism, this evolutionary story is the only game in town, the only visible answer to the question: Where did all this enormous variety of flora and fauna come from? How did it all get here? Even if the fossil record is at best spotty and at worst disconfirming, this story is the only answer on offer (from a naturalistic perspective) to these questions.

From a theistic or Christian perspective, however, things are much less frantic. The theist knows that God created the heavens and the earth and all that they contain; she knows, therefore, that in one way or another God has created all the vast diversity of contemporary plant and animal life. But of course she isn't thereby committed to any particular way in which God did this. He could have done it by broadly evolutionary means; but on the other hand he could have done it in some totally different way. For example, he could have done it by directly creating certain kinds of creatures--human beings, or bacteria, or for that matter sparrows¹³ and houseflies--as many Christians over the centuries have thought. Alternatively, he could have done it the way Augustine suggests: by implanting seeds, potentialities of various kinds in the world, so that the various kinds of creatures would later arise, although not by way of genealogical interrelatedness. Both of these suggestions are incompatible with the evolutionary story.

A Christian therefore has a certain freedom denied her naturalist counterpart: she can follow the evidence¹⁴ where it leads. If it seems to suggest that God did something special in creating human beings (in such a way that they are not genealogically related to the rest of creation)¹⁵ or reptiles or whatever, then there is nothing to prevent her from believing that God did just that. Perhaps the point here can be put like this: The epistemic probability of the whole grand evolutionary story is quite different for the theist and for the naturalist. The probability of this story with respect to the evidence together with the views a theist typically holds, is much lower than its probability with respect to evidence together with the views the naturalist typically holds. So the way in which the theory of evolution is not religiously neutral is not, as with Simon's explanation of Mother Teresa, that it is straightforwardly incompatible with Christian teaching; it is rather that the view in question is much more probable with respect to naturalism and the evidence than it is with respect to theism and that evidence.

There is a connected issue in the same area, but with a different twist. Prominent writers in the scientific community--for example, Dawkins, Futuyma, Gould, Provine, Simpson, and others--unite in declaring that evolutionary biology shows that there is a substantial element of randomness or chance involved in the origin and development of the human species; therefore, human beings (so they claim) have not been designed by God or

anyone else. Gould writes that before Darwin, we thought that a benevolent God had created us. After Darwin, though, says Gould, we realize that:

No intervening spirit watches lovingly over the affairs of nature (though Newton's clock-winding god might have set up the machinery at the beginning of time and then let it run). No vital forces propel evolutionary change. And whatever we think of God, his existence is not manifest in the products of nature.

Gould's sentiments are stated more clearly by Futuyma:

By coupling undirected, purposeless variation to the blind, uncaring process of natural selection Darwin made theological or spiritual explanations of the life processes superfluous. Together with Marx's materialistic theory of history and society and Freud's attribution of human behavior to processes over which we have little control, Darwin's theory of evolution was a crucial plank in the platform of mechanism and materialism--of much of science, in short--that has since been the stage of most Western thought.16

Clearer yet, perhaps, is George Gaylord Simpson:

Although many details remain to be worked out, it is already evident that all the objective phenomena of the history of life can be explained by purely naturalistic or, in a proper sense of the sometimes abused word, materialistic factors. They are readily explicable on the basis of differential reproduction in populations (the main factor in the modern conception of natural selection) and of the mainly random interplay of the known processes of heredity. ...Man is the result of a purposeless and natural process that did not have him in mind.17

The same claim is made by Richard Dawkins:

All appearances to the contrary, the only watchmaker in nature is the blind forces of physics, albeit deployed in a very special way. A true watchmaker has foresight: he designs his cogs and springs, and plans their interconnections, with a future purpose in his mind's eye. Natural selection, the blind, unconscious automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the blind watchmaker.18

These writers, therefore, unite in declaring that modern evolutionary thought has shown or given us reason to believe that human beings are, in an important way, merely

accidental; there wasn't any plan, any foresight, any mind, any mind's eye involved in their coming into being. But of course no Christian theist could take that seriously for a moment. Human beings have been created, and created in the image of God. No doubt God could have created us via evolutionary processes; if he did it that way, however, then he must have guided, orchestrated, directed the processes by which he brought about his designs.

Now again (as with Simon) we might say that strictly speaking, when these people make such declarations, they are neither speaking as scientists nor doing science. They are instead commenting on science, drawing conclusions from scientific results--conclusions that don't follow from the scientific results themselves, requiring extra and extra-scientific (perhaps philosophical) premises. Perhaps this is true, although it has become increasingly difficult to draw a sharp line between science and such other activities as philosophical reflection on science. Whether or not what we have here is science strictly so-called, however, isn't really the important question for my present purposes. Whether or not what we have here is science or only parascience, we have deep involvement with the spiritual struggle Augustine points out. In either case that involvement must be noted and dealt with by the Christian intellectual community, and in particular by the part of the Christian intellectual community involved in the science in question.

Cosmic Fine-Tuning

My third example concerns 'fine-tuning' in cosmology. Starting in the late sixties and early seventies, astrophysicists and others noted that several of the basic physical constants must fall within very narrow limits if there is to be the development of intelligent life--at any rate in a way anything like the way in which we think it actually happened. Thus Car and Rees:

The basic features of galaxies, stars, planets and the everyday world are essentially determined by a few microphysical constants and by the effects of gravitation. ...several aspects of our Universe--some of which seem to be prerequisites for the evolution of any form of life--depend rather delicately on apparent 'coincidences' among the physical constants.¹⁹

For example, if the force of gravity were even slightly stronger, all stars would be blue giants; if even slightly weaker, all would be red dwarfs; in neither case could life have developed.²⁰ The same goes for the weak and strong nuclear forces; if either had been even slightly different, life, at any rate life of the sort we have, could probably not have developed.

Even more interesting in this connection is the so-called flatness problem: the existence of life also seems to depend very delicately upon the rate at which the universe is expanding. Thus Stephen Hawking:

...reduction of the rate of expansion by one part in 10^{12} at the time when the temperature of the Universe was 10^{10} K would have

resulted in the Universe's starting to recollapse when its radius was only 1/3000 of the present value and the temperature was still 10,000 K. 21

--much too warm for comfort. Hawking concludes that life is possible only because the universe is expanding at just the rate required to avoid recollapse. At an earlier time, the fine-tuning had to be even more remarkable:

...we know that there has to have been a very close balance between the competing effect of explosive expansion and gravitational contraction which, at the very earliest epoch about which we can even pretend to speak (called the Planck time, 10^{-43} sec. after the big bang), would have corresponded to the incredible degree of accuracy represented by a deviation in their ratio from unity by only one part in 10 to the sixtieth.22

These are striking facts; one sympathizes with Paul Davies: "the fact that these relations are necessary for our existence is one of the most fascinating discoveries of modern science."23

Now, one reaction to these apparent enormous coincidences is to see them as substantiating the theistic claim that the universe has been created by a personal God and as offering the material for a properly restrained theistic argument.24 Another is to claim that none of this ought to be seen as requiring explanation: after all, no matter how things had been, it would have been exceedingly improbable that they be that way. Appropriately taken, that is perhaps right; but how is it relevant? We are playing poker; each time I deal I get four aces and one wild card; you get suspicious; I allay your suspicions by pointing out that my getting these cards each time I deal is no less probable than any other equally specific distribution over the relevant number of deals.25

Would that explanation play in Dodge City or Tombstone?

Still another reaction is to invoke the Anthropic Principle, which is exceedingly hard to understand and comes in several varieties²⁶ but (in the version that makes most sense) seems to point out that a necessary condition of anyone observing these values of the constants is that those constants have very nearly the values they do have; we are here to observe these constants only because they have the values they *do* have. Again, this seems right, but what does it explain? It still seems puzzling that these values should have been just as they are. Why weren't they something quite different? One cannot explain this by pointing out that we are indeed here--anymore than I can explain the fact that God decided to create me (instead of passing me over in favor of someone else) by pointing out that if God had not thus decided, I wouldn't have been here to raise the question.

But the reaction that most interests me here is still different, and very striking:

Spatially homogeneous models can be divided into three classes: those which have less than the escape velocity (i.e., those whose rate of expansion is insufficient to prevent them from recollapsing), those which

have just the escape velocity, and those which have more than the escape velocity. Models of the first class exist only for a finite time, and therefore do not approach arbitrarily near to isotropy. We have shown that models of the third class do in general tend to isotropy at arbitrarily large times. Those models of the second class which are sufficiently near to the Robertson-Walker models do in general tend to isotropy, but this class is of measure zero in the space of all homogeneous models. It therefore seems that one cannot explain the isotropy of the universe without postulating special initial conditions...

The most attractive answer would seem to come from the Dicke-Carter idea that there is a very large number of universes, with all possible combinations of initial data and values of the fundamental constants. In those universes with less than the escape velocity, small density perturbations will not have time to develop into galaxies and stars before the universes recollapse... It is only in those universes which have very nearly the escape velocity that one could expect galaxies to develop, and we have found that such universes will in general approach isotropy. Since it would seem that the existence of galaxies is a necessary condition for the development of intelligent life, the answer to the question 'why is the universe isotropic?' is 'because we are here'.²⁷

The idea here is clear: those values for the cosmological constants and the rate of expansion in our universe are indeed puzzling and in need of explanation. The explanation is just that there are infinitely many different universes, displaying all possible combinations of initial conditions and values for the fundamental constants; and of course it is not surprising that we should occupy one of the universes in which these values permit the development of intelligent life.²⁸ Shades of David Lewis and his aleph₂ concrete possible worlds!²⁹ I suppose there would have to be at least uncountably many such universes, on the Hawking hypothesis, since presumably there is a real interval about 1 such that for any real number r in that interval, the ratio between the effect of explosive expansion and gravitational contraction could have been r .

To make my point, I could stop here; but in the interests of being *au courant*, I mention a couple of further developments to this ongoing and fascinating story.³⁰ Beginning in 1980, Alan Guth suggested a solution to this alleged problem that is interestingly related to the Hawking-Collins many-universe suggestion.³¹ According to Guth, we needn't suppose there is more than one universe; that one universe, however, is enormously larger than the *observable* universe of some 10 billion light years in diameter. The observable universe shrinks to a tiny, nearly minuscule corner of the whole universe. Guth's model, however, was subject to certain problems; a successor has been proposed by A. D. Linde.³² In this model, the universe consists of a vast number of mini-universes; these mini-universes are enormously larger than our observable universe, and different mini-universes display different initial conditions. Indeed, "the laws of low-energy physics and even the dimensionality of space-time may be different in each of these mini-universes: dimensions, values for those constants, and for the rate of expansion, and so on."³³

The point I'd like to make can be put as follows. Consider the 1973 Hawking-Collins suggestion, or the more recent Linde suggestion. Suppose, furthermore, that the principal motivation for putting forth such suggestions is that they avoid the cosmic coincidences. On these theories there is nothing noteworthy about those constants displaying (in our universe) the values they do; all values get realized in one universe or another, and of course we human observers would be found only where the values are such as to permit life. In other words, suppose the motivation for putting forward these theories is what McMullin calls the "Principle of Indifference."

This Principle of Indifference isn't easy to state exactly; an essential part of it, however, is the idea that physical theory should avoid anything like those cosmic coincidences, these apparent fine-tunings, with their implicit suggestions of design.

Now a theist, so it seems to me, needn't be at all impressed by this principle. If God created the world, why shouldn't it display singularities or 'coincidences' of that sort? Why think we don't have a proper physical theory until we get rid of such things? If there were two theories that were empirically equivalent (or nearly so), one of them involving violations of the Principle of Indifference and the other involving the postulation of uncountably many other universes or an enormous number of mini-universes, the theist might well prefer the first on grounds of economy. Of course there may be or may soon be independent evidence for these other hypotheses, evidence that is independent of the Principle of Indifference. Even if there is, however, there may well be a difference between the epistemic probability of a Hawking-like many-universe theory on theism and the evidence on the one hand, and the epistemic probability of such a theory on naturalism and that evidence on the other.

So here we have three examples; each is an example to show that scientific theories are often not, in the specified ways, religiously or metaphysically neutral. We have also noted, so far, three ways in which a scientific theory can be relevantly related to the theological or religious claims characteristic of the theistic religions. First, a scientific theory may be incompatible with those claims; secondly, it might be such that its probability with respect to those claims is quite different from what it is with respect to a naturalistic world view; thirdly, religious or theological views can help determine what needs explanation. Of course there will be many more examples of scientific theories that are related in these ways to the theological or religious claims in question (and such examples will be much more obvious and abundant in the human sciences than in physics or chemistry). Here I must emphasize two things. I am concerned with science and scientific hypotheses taken as attempts to provide us with truth; true explanations, true descriptions, true accounts of various phenomena. I am concerned with Simon's explanation of altruism taken as the proposal of a hypothesis as true (or nearly true); and the same for evolutionary theory and the various proposals of many-universe or inflationary universe theories. Of course these theories need not be taken in that way. If instead we think of science and its aims in the way in which, say, Bas van Fraassen thinks of them,³⁴ then the whole picture looks very different. Then we might think, for example, that the whole grand evolutionary story is improbable, unlikely to be true, but

nevertheless properly saves the phenomena and properly performs the other duties to be expected of a theory of its type. And even from a realistic point of view the Grand Evolutionary Myth doesn't have to be probable to be accepted as a guide to further research, a source of hypotheses, a means of coming to a better understanding of the subject matter with which it deals. Newtonian mechanics, we think, is, strictly speaking, false; it is nonetheless useful in excelsis.

Alternatively, we could perhaps think of parts of science--sociobiology, for example--not as attempts to provide a true or correct explanation of human behavior, but as efforts to see how far we can go in explaining human beings and behavior while appealing to nothing beyond what the naturalist is prepared to appeal to.³⁵ In this case our efforts would be hypothetical rather than categorical. Suppose naturalism were true: what sort of explanation could we come up with for, say, altruistic human behavior? (Just as a naturalist might try to answer this question: suppose Christian theism were true--what would be the correct explanations of, say, aggressive or bellicose human behavior?) I don't know of any reason to think theism would be relevant to this project, except that a Christian might think there are better ways to spend one's time--for example, in trying to find true scientific accounts of human behavior and activity.

Weak Arguments for Methodological Naturalism

Now in view of these examples and many others like them (together with broader Augustinian considerations), the natural thing to think is that (in principle, at any rate) the Christian scholarly community should do science, or parts of science, in its own way and from its own perspective. What the Christian community really needs is a science that takes into account what we know as Christians. Indeed, this seems the rational thing in any event; surely the rational thing is to use all that you know in trying to understand a given phenomenon. But then in coming to a scientific understanding of hostility, or aggression, for example, shouldn't Christian psychologists make use of the notion of sin? In trying to achieve scientific understanding of love in its many and protean manifestations, for example, or play, or music, or humor, or our sense of adventure, shouldn't we also use what we know about human beings being created in the image of God, who is himself the very source of love, beauty and the like? And the same for morality? Consider that enormous, impressive, and disastrous Bolshevik experiment of the twentieth century, perhaps the outstanding feature of the twentieth century political landscape: in coming to a scientific understanding of it, shouldn't Christians use all that they know about human beings, including what they know by faith?

True: there could be practical obstacles standing in the way of doing this; but in principle, and abstracting from these practical difficulties (which in any event may be more bark than bite), the right way for the Christian community to attain scientific understanding of, say, the way human beings are and behave, would be to start from what we know about human beings, including what we know by way of faith. Hence the sorts of hypotheses we investigate might very well involve such facts (as the Christian thinks) as that we human beings have been created by God in his image, and have fallen into sin. These 'religious' ideas might take a place in our science by way of explicitly entering various

hypotheses. They might also play other roles: for example, they might be part of the background information with respect to which we evaluate the various scientific hypotheses and myths that come our way.

I say this is the natural thing to think; oddly enough, however, the denial of this claim is widely taken for granted. As a matter of fact, it has achieved the status of philosophical orthodoxy. Among those who object to this claim are Christian thinkers with impressive credentials. Thus Ernan McMullin:

But, of course, methodological naturalism does not restrict our study of nature; it just lays down which sort of study qualifies as scientific. If someone wants to pursue another approach to nature--and there are many others--the methodological naturalist has no reason to object. Scientists have to proceed in this way; the methodology of natural science gives no purchase on the claim that a particular event or type of event is to be explained by invoking God's creative action directly.

Part of the problem, of course, is to see more clearly what this methodological naturalism is. Precisely what does it come to? Does it involve an embargo only on such claims as that a particular event is to be explained by invoking God's creative action directly, without the employment of 'secondary causes'? Does it also proscribe invoking God's indirect creative action in explaining something scientifically? Does it pertain only to scientific explanations, but not to other scientific assertions and claims? Does it also preclude using claims about God's creative action, or other religious claims as part of the background information with respect to which one tries to assess the probability of a proposed scientific explanation or account? We shall have to look into these matters later. At the moment however, I want to look into a different question: what reason is there for accepting the claim that science does indeed involve such a methodological naturalism, however exactly we construe the latter? I shall examine some proposed reasons for this claim and find them wanting. In Part III, I shall then argue that, nevertheless, a couple of very sensible reasons lie behind at least part of this claim. These reasons, however, do not support the suggestion that science is religiously neutral.

Well then, what underlies the idea that science in some way necessarily involves this principle of methodological naturalism? First, and perhaps most important: this conception of science is an integral and venerable part of the whole conception of faith and reason we have inherited from the Enlightenment. I don't have the space to treat this topic with anything like the fullness it deserves; but the central idea, here, is that science is objective, public, sharable, publicly verifiable, and equally available to anyone, whatever their religious or metaphysical proclivities. We may be Buddhist, Hindu, Protestant, Catholic, Muslim, Jew, Bahai, none of the above--the findings of science hold equally for all of us. This is because proper science, as seen by the Enlightenment, is restricted to the deliverances of reason and sense (perception) which are the same for all people. Religion, on the other hand, is private, subjective, and obviously subject to considerable individual differences. But then if science is indeed public and sharable by

all, then of course one can't properly pursue it by starting from some bit of religious belief or dogma.

One root of this way of thinking about science is a consequence of the modern foundationalism stemming from Descartes and perhaps even more importantly, Locke. Modern classical foundationalism has come in for a lot of criticism lately, and I do not propose to add my voice to the howling mob.³⁶ And since the classical foundationalism upon which methodological naturalism is based has run aground, I shall instead consider some more local, less grand and cosmic reasons for accepting methodological naturalism.

Notes

1. The idea is not, of course, that a scientist won't be passionate about science generally, or his favorite theories, or his reputation; it is rather that none of these properly enters into the evaluation of a scientific theory or explanation.
2. "Science must be provisionally atheistic or cease to be itself." "Darwin's Place in the History of Thought" in M. Banton, ed., *Darwinism and the Study of Society* (Chicago: Quadrangle Books, 1961). Willey does not mean, of course, that one who proceeds in this way is properly accused of atheism. In the same way, to call this procedure or proscription 'methodological naturalism' is not to imply that one who proceeds in this way is really a naturalist. (See Ernan McMullin's "Plantinga's Defense of Special Creation," *Christian Scholar's Review* [Sept. 1991], p. 57).
3. For an initial attempt to explore some of these considerations, see my "When Faith and Reason Clash: Evolution and the Bible" and "Evolution, Neutrality, and Antecedent Probability: A Reply to Pun, Van Till and McMullin," both in *Christian Scholar's Review*, September, 1991, and my "The Twin Pillars of Christian Scholarship": The Henry Stob Lectures (Grand Rapids, MI: Calvin College, 1989) (pamphlet).
4. *Science* 250 (December, 1990) pp. 1665ff. Simon won a Nobel Prize in economics, but is currently professor of computer studies and psychology at Carnegie-Mellon.
5. More simply, says Simon, "Fitness simply means expected number of progeny" (p. 1665). That this is the rational way to conduct one's life is somehow seen as a consequence of evolutionary theory. But even if evolutionary theory is in fact true, does this alleged consequence really follow? Perhaps my having lots of progeny is in some way best for my genes; but why should I be especially interested in that? Couldn't I sensibly be concerned with my welfare, not theirs?
6. "How to Build a Person", in *Philosophical Perspectives, 1, Metaphysics*, 1988, ed. James Tomberlin (Atascadero, California: Ridgeview Publishing Co., 1988), p. 148.
7. Here I leave to one side the teachings of early Genesis, since I am not sure just how those teachings bear on the issue at hand. See my "Evolution, Neutrality, and Antecedent Probability," p. 94.
8. In 1952 Stanley Miller, a graduate student in the laboratory of Harold Urey, showed that certain amino acids could arise under what may have been the conditions of Earth before life; this generated a fervent but temporary burst of dithyrambic optimism. The optimism dissipated when the enormous distance between amino acids and the simplest forms of life sank in, and when there was little or no progress in showing how that distance could have been traversed. See in particular Robert Shapiro, *Origins* (New York: Summit Books, 1986) and Thaxton, Charles, Walter Bradley, and Roger Olsen, *The Mystery of Life's Origin* (New York: Philosophical Library, 1984).
9. "It is mere rubbish, thinking at present of the origin of life; one might as well think of the origin of matter." "Letter from Darwin to Hooker", *The Life and Letters of Charles Darwin*, vol. 2, ed. Francis Darwin (New York: Appleton, 1967), p. 202.
10. See *The Mystery of Life's Origin*, by Charles Thaxton, Walter Bradley and Roger Olsen (New York: Philosophical Library, 1984); *Origins*, by Robert Shapiro (New York: Summit Books, 1986); *Evolution, Thermodynamics, and Information: Extending the Darwinian Program*, by Jeffrey S. Wicken (New York: Oxford University Press, 1987); *Seven Clues to the Origin of Life* (Cambridge: Cambridge University Press, 1985) and *Genetic Takeover and the Mineral Origins of Life* (Cambridge: Cambridge University

Press, 1985) by A. G. Cairns-Smith; and *Origins of Life* by Freeman Dyson (Cambridge: Cambridge University Press, 1985); see also the relevant chapters of Michael Denton, *Evolution: A Theory in Crisis* (London: Burnet Books, 1985).

11. Evolution, says Francisco J. Ayala, is as certain as "the roundness of the earth, the motions of the planets, and the molecular constitution of matter." "The Theory of Evolution: Recent Successes and Challenges", in *Evolution and Creation*, ed. Ernan McMullin (Notre Dame: University of Notre Dame Press, 1985), p. 60. According to Stephen Jay Gould, evolution is an established fact, not a mere theory; and no sensible person who was acquainted with the evidence could demur. "Evolution as Fact and Theory," in *Hen's Teeth and Horse's Toes* (New York: W.W. Norton & Company, 1980), pp. 254-55. According to Richard Dawkins, the theory of evolution is as certainly true as that the Earth goes around the sun. This astronomical comparison apparently suggests itself to many; in "Evolutionary Biology and the Study of Human Nature" (presented at a consultation on Cosmology and Theology Sponsored by the Presbyterian (USA) Church in December, 1987), Philip Spieth claims that "A century and a quarter after the publication of *The Origin of Species*, biologists can say with confidence that universal genealogical relatedness is a conclusion of science that is as firmly established as the revolution of the Earth about the sun." And Michael Ruse adds his nuanced and modulated view that "evolution is a fact, fact, FACT!" (*Darwinism Defended* [London: Addison-Wesley, 1982], p. 58).

12. See the essays referred to in footnote 3.

13. According to Jesus, God remembers each and every sparrow (Luke 12:6); might he not have been minded to create the first of them specially?

14. And of course part of the evidence, for a Christian, will be the Biblical evidence. I myself think that the Biblical evidence for a special creation of human beings is fairly strong.

15. Of course it is possible both that God did something special in creating human beings and that they are genealogically related to the rest of the living world.

16. Douglas Futuyma, *Evolutionary Biology*, (2nd ed., 1986), p. 3.

17. George Gaylord Simpson, *The Meaning of Evolution* (rev. ed., 1967), pp. 344-45.

18. *The Blind Watchmaker* (London and New York: W.W. Norton & Co., 1986) p. 5.

19. "The Anthropic Principle and the Structure of the Physical World," *Nature*, 1979, p. 605.

20. Brandon Carter, "Large Number Coincidences and the Anthropic Principle in Cosmology," in M. S. Longair, ed., *Confrontation of Cosmological Theories with Observational Data*, 1979, p. 72. Carter concludes that if the strength of gravity were even slightly different, habitable planets would not exist.

21. "The Anisotropy of the Universe at Large Times," in Longair, p. 285.

22. John Polkinghorne, *Science and Creation: The Search for Understanding* (Boston: New Science Library; New York: Random House, 1989), p. 22.

23. Davies, P. C. W., *The Accidental Universe* (Cambridge: Cambridge University Press, 1982). Davies adds that "All this prompts the question of why, from the infinite range of possible values that nature could have selected for the fundamental constants, and from the infinite variety of initial conditions that could have characterized the primeval universe, the actual values and conditions conspire to produce the particular range of very special features that we observe. For clearly the universe is a very special place: exceedingly uniform on a large scale, yet not so precisely uniform that galaxies could not form; ...an expansion rate tuned to the energy content to unbelievable accuracy; values for the strengths of its forces that permit nuclei to exist, yet do not burn up all the cosmic hydrogen, and many more apparent accidents of fortune." (p. 111)

24. E.g., see Polkinghorne, p. 23.

25. It is easy to see why this distribution is likely to end in gunfire: the probability of that distribution is much greater on the hypothesis that I am cheating than on the hypothesis that the card's have been dealt fairly. By Bayes's theorem, it therefore follows that the probability of my cheating given this distribution is much greater than on other distributions. The same thing goes for the fine tuning arguments; the probability of fine tuning on the proposition that God has created the universe is much greater than on the proposition that the universe has not been created; consequently the probability of God's having created the universe is greater on fine-tuning than on other distributions of values over those constants.

26. Martin Gardner distinguishes the Weak Anthropic Principle (WAP), the Strong Anthropic Principle (SAP), the Future Anthropic Principle (FAP), the Participatory Anthropic Principle (PAP), and the Completely Ridiculous Anthropic Principle; see his "WAP, SAP, FAP and PAP," *New York Review of Books*, May 8, 1987.

27. C. B. Collins and S. W. Hawking, "Why is the Universe Isotropic?" *The Astrophysical Journal*, March 1, 1973, p. 334.
28. There is a hint of some of the confusion surrounding the anthropic principle in the last sentence: "Because we are here" isn't an answer to the question "Why is the universe isotropic?" although "Only because the universe is isotropic" may be an answer to the question "Why are we here?" There are other problems with this suggestion as an explanation: see John Earman, "The Sap Also Rises: A Critical Examination of the Anthropic Principle," *American Philosophical Quarterly*, October 1987, pp. 314-315.
29. See his *On the Plurality of Worlds* (Oxford: Basil Blackwell Ltd., 1986).
30. A story that is well-told in Ernan McMullin's "Fine-tuning the Universe?" not yet published. In this and the next paragraph I am following McMullin's version of this story.
31. Alan Guth, "Inflationary Universes: A Possible Solution to the Horizon and Flatness Problems," *Physical Review D*, 23, 1981, pp. 347-356.
32. "The inflationary universe," *Reports on Progress in Physics*, vol. 47, pp. 925-86; and "Particle physics and inflationary cosmology," *Physics Today*, September 1987, pp. 61-68.
33. "Particle physics and inflationary cosmology," p. 68.
34. See, e.g., his *Quantum Mechanics* (Oxford: Clarendon Press, 1991), pp. 1-4. This way certainly has its attractions when it comes to claims about the wondrous world of quark and gluon and the history of the universe for the first 10-32 seconds.
35. See William Hasker, "Evolution and Alvin Plantinga," *Perspectives on Science and Christian Faith*, Vol. 44, no. 3, September, 1992, pp. 158-159 and footnote 11.
36. I've argued elsewhere that one condition of rationality laid down by modern classical foundationalism is in fact self-referentially incoherent. See, e.g., "Reason and Belief in God," in *Faith and Rationality*, ed. A. Plantinga and N. Wolterstorff (Notre Dame: University of Notre Dame Press, 1983), pp. 60ff.