

Thinkpiece

DEMARCATIION AND THE SCIENTISTIC FALLACY

by Gregory R. Peterson

Abstract. For many theologians and philosophers, scientism is among the greatest of intellectual sins. In its most commonly cited form, scientism consists in claiming that science is the only source of real knowledge and, therefore, that what science does not discover does not exist. Because the charge of scientism is frequently levied, it is important to be clear about what exactly is being claimed in its name. I argue that scientism can best be understood as a fallacy, specifically as a kind of category mistake. Being clear about this requires an examination of the relationship of scientism to the question of demarcation between science and nonscience, a question that has potential implications for theology.

Keywords: demarcation; reductionism; scientism; scientific fallacy; Mikael Stenmark.

For many theologians and philosophers, scientism is among the greatest of intellectual sins. In its most commonly cited form, scientism consists in claiming that science is the only source of real knowledge and, therefore, that what science does not discover does not exist. The problem with scientism is not merely its antipathy to theology and realities that might exist beyond the natural but that it involves a kind of logical fallacy or category mistake, usually understood to be an unreflective move from scientific to philosophical and (more specifically) metaphysical claims. Clearly, this is a bad thing.

Because the charge of scientism is frequently levied, it is important to be clear about what exactly is being claimed in its name. A number of authors

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have done this to varying degrees, most notably Mikael Stenmark (2001). My concern here is to build on and analyze this prior work and in particular to note the ways that charges of scientism hinge on a prior understanding of demarcation. While demarcation claims may be said to be necessary, beneficial, and even unavoidable, they are not without their problems. Clarifying the relationship between scientism and demarcation, particularly in the ways that it may affect theology in the religion-and-science dialogue, is important so as to avoid pitfalls in identifying cases of scientism accurately as well as understanding the relationship between theology and the sciences more generally.

WHAT IS SCIENTISM?

Scientism is generally understood to be the claim that science is the sole source of knowledge and reality. In a fairly standard definition, Huston Smith writes, “Scientism adds to science two corollaries: first, that the scientific method is, if not the *only* reliable method of getting at the truth, then at least the *most* reliable method; and second, that the things science deals with—material entities—are the most fundamental things that exist” (Smith 2001, 59).

Similarly, Arthur Peacocke states, “The tendency of science to imperiousness in our intellectual and cultural life has been dubbed ‘scientism’—the attitude that the only kind of reliable knowledge is that provided by science, coupled with a conviction that all our personal and social problems are ‘soluble’ by enough science” (Peacocke 1993, 7–8).

For Smith, in particular, scientism is the source of many of the ills that plague contemporary society and can be understood as the floor of a metaphorical tunnel that has constricted our vision of the true nature of things, consequently warping higher education, the media, and the law. As even these two quotations imply, however, the definition of scientism can vary somewhat. Ian Barbour, for instance, specifically links scientism to the claim that the sciences are the sole source of knowledge (Barbour 1997, 81). Mary Midgley understands scientism in terms of the claim of salvation through science alone (Midgley 1992, 37). More recently, even Harvard philosopher Hilary Putnam has lamented the continuing presence of scientism in philosophy, implying in this case the preferential status granted to science in a number of domains (Putnam 1997).

Stenmark has provided a useful typology of the various ways that charges of scientism are made, listing at least seven forms of scientism found in the current literature. In particular Stenmark notes that many scholars criticize (as Smith and Peacocke do) the ontological and epistemological claims that science is the sole arbiter of knowledge and (consequently) what is understood to be real. Here scientism usually takes the form of some kind of “all” or “only” statement. Scientism occurs when someone makes the

claim that *all* knowledge or reality is described (or describable) by the sciences or when someone states that *only* science provides knowledge of reality and the nature of things. Scientism in this sense is a totalizing scientism that claims to engulf all of reality and presumably do away with all nonscientific knowledge and reality claims.

Several of Stenmark's other examples, however, reveal a slightly different kind of understanding of scientism. Among these Stenmark notes specific forms of axiological and existential scientism, the former occurring when it is improperly claimed that science can and should be the source of value and ethics and the latter occurring when science is improperly claimed to be the source of meaning and purpose. In these cases scientism consists in a "border-crossing" violation, in which findings or methods of a scientific discipline are applied, beyond their appropriate bounds, to another discipline and its domain. Indeed, most of Stenmark's book is concerned with these more specific forms of border violations as they pertain to ethics and religion. Although it is not clear whether scholars refer more to totalizing scientism or to border-crossing scientism, both uses of the term seem to be widespread in the literature and, more informally, in oral discourse and debate.

Given both of these broad senses, it seems that the best way to understand the charge of scientism is as a kind of logical fallacy involving improper usage of science or scientific claims. Thus, it might be better to speak of the *scientistic fallacy* rather than simply scientism and to note it as a kind of category mistake or class of such mistakes. Indeed, it would seem that the scientistic fallacy has much in common with Alfred North Whitehead's fallacy of misplaced concreteness, which is used in much the same way and which also seems to have had the sciences specifically in mind when it was formulated (Whitehead [1925] 1967, 50–51). Recognizing this may be useful in clarifying how the term is and should be used within the realm of public debate.

As a final observation, it is important to note that the scientistic fallacy is generally taken to imply some form of reductionism. Indeed, there seems to be an almost canonical list of those who regularly commit the scientistic fallacy, most notably science popularizers such as Richard Dawkins, Francis Crick, E. O. Wilson, and the late Carl Sagan. Perhaps the most famous claim is Sagan's: "The cosmos is all that is or ever was or ever will be" (Sagan 1980, 1). A generalized or border-crossing violation is typically understood to take an improperly reductionist form. Our minds are said to be *nothing more than* neurons firing, or emotions are said to be *nothing but* chemicals in the brain, or morality is *nothing but* our genes manipulating us to survive. It is the reductionism of scientistic claims that are seen to be particularly offensive, improperly pointing to a mechanistic, valueless universe with no hope or soul.

SCIENTISM AND DEMARCATION: ONE LINE OR MANY?

To discern when the scientific fallacy occurs requires a clear conception of what is and is not science. This seems to be true whether we are speaking of the scientific fallacy in its general or border-crossing forms. Thus, scientism would not be said to occur in the proper discourse of metaphysics and theology, not because these disciplines do not make claims about the ultimate nature of knowledge and reality (they do) but because making such claims is part of the proper function of these disciplines, which are not commonly understood to be among the sciences. Similarly, scientism would not be said to occur if one nonscientific discipline made improper claims concerning another nonscientific discipline. One could imagine philosophers, for instance, attempting to do away with literary theory. Such philosophers might be guilty of other mistakes, but they would not be guilty of scientism according to conventional usage.

Scientism occurs when improper claims are made on behalf of a scientific discipline or of science itself. But what is science? In order to understand when the scientific fallacy is committed, we need to be clear about what disciplines and what sort of claims are involved. In common usage this seems straightforward enough. Physics is science, but art history is not. Accepting such common wisdom may be sufficient for most cases but may become problematic in a variety of border cases. Thus, the scientific fallacy seems to imply some notion of demarcation between science and non-science.

This leads to a decidedly significant problem, as the issue of demarcation has been widely debated in the philosophy of science with little clear resolution. While the details of the debate are important, they are widely known among philosophers and many religion scholars, so I will forgo them here and limit myself to a few relevant observations. Karl Popper was perhaps the most vocal and influential proponent of a clear and strict demarcation between science and non-science, advocating the principle of falsification as the dividing line between the two (Popper 1959). For Popper, statements that are clearly falsifiable should be considered scientific in character. Statements that are not falsifiable Popper considered to be not scientific, with the possible implication that they should not be taken seriously at all. Popper declared both psychoanalysis and Marxist theory unscientific precisely on this basis (Popper 1971).

Later philosophers, most notably Thomas Kuhn (1962), have observed that Popper's falsification criteria were too simplistic and inadequately characterized the sciences' actual engagement in discovery. Furthermore, the methodological diversity of scientific disciplines is now more greatly appreciated than it has been in the past. Although the quantitative and experimental features of physics and chemistry have been and are still widely seen (arguably wrongly) as the gold standard for other disciplines, it also is

recognized that each discipline must in various ways develop its own specific methods. Biology, for example, has its quantitative and experimental opportunities but remains widely qualitative in character. Indeed, when quantitative data are produced, they often are taken from field research rather than from strictly controlled experimental conditions and then take on statistical rather than exact or nearly exact form. Disciplines related to natural history (e.g., cosmology, paleontology, and geology) of necessity include historical events that are unique in character.

The picture becomes more complex when the status of the social sciences is examined. Anthropology, sociology, psychology, and economics are typically considered knowledge-producing disciplines, but their status as sciences is frequently called into question, often by those outside these disciplines but even sometimes from within. The social sciences to varying degrees employ quantitative methods and experimental approaches, but the social sciences have endured long internal debate about the extent to which such methods should be employed or seen as sufficient. Indeed, those who employ such methods are sometimes accused of the same sort of scientism within these disciplines as is employed elsewhere (see, for example, Aronowitz and Ausch 2000).

Given this complexity, when should we employ the word *science*? One option would be to abandon the use of the term altogether, with the implication that no one area of knowledge is more privileged than another. Instead of using science as a generic label, one would simply speak of the specific disciplines in question. Alternatively, one could extend the term to include all knowledge-producing disciplines. On this view, it would apply not only to the social sciences but also to disciplines within the humanities such as history and philosophy. Distinctions might still be made between the kinds of sciences (e.g., natural versus social), but extending the term *science* to all knowledge-producing disciplines would acknowledge equally their legitimacy.

Each strategy has its strengths and weaknesses. If either strategy were deployed, the implication would be that the scientific fallacy would no longer apply, as either nothing would be a science or everything would. To some this might lead to the conclusion that the scientific fallacy really is not a fallacy at all but an exercise in how we use the word *science*. It would seem, however, that a different conclusion is warranted. At heart, the scientific fallacy can be understood as a kind of category mistake that occurs when claims from one academic discipline are extended beyond their proper bounds. This kind of mistake could still exist whether we used the term or not. Thus, the scientific fallacy might be regarded as synonymous with an improper disciplinary imperialism.

As noted, such disciplinary imperialism seems typically to be reductionistic in character. That is, it is much more likely that lower-level disciplines will be misunderstood to explain exhaustively the character of

higher-level disciplines than the reverse. All of the classic examples of scientism from the writings of Sagan, Crick, and Dawkins proceed in precisely this fashion. However, there may be at least one example of a higher level's discipline committing a form of the scientific fallacy against lower-level disciplines. Advocates of the strong program in the sociology of science have typically claimed that the sciences (meaning primarily the natural sciences) have no epistemic priority and even, some would claim, no particular access to the truth at all (e.g., Fuller 2002). Rather, strong program proponents argue, natural scientists are essentially deluded about the true nature of their enterprise, which can be understood genuinely only from the vantage point of sociology. Such strong program claims parallel the reductionist approach of the other forms of scientism typically considered, the only difference being that the move is from above to below rather than from below to above.

Recognizing these points, one can acknowledge that the scientific fallacy is indeed a useful concept, although it is best understood in broader terms, as denoting a kind of category mistake and disciplinary imperialism with regard to epistemic and ontological claims across disciplines. Even so, some important caveats need to be kept in mind.

FUZZY BORDERS

First, disciplinary imperialism is typically regarded as a bad thing and reductionism across disciplines as something that should be avoided. This need not be the case. Rather than being considered imperialism, disciplinary *reduction*, or (to use a term with more positive connotations) *integration*, may in some cases be perceived as a positive thing. Modern genetics, for instance, is commonly cited as one of the few cases of a positive and successful disciplinary reduction, an entire area of biology integrated with a branch of molecular biochemistry. Furthermore, it might be argued that disciplinary rivalry, especially along neighboring disciplinary borders, can be a good thing, spurring creativity among scientists from different fields. On this analysis, it may be argued that although individual sociobiologists have frequently committed the scientific fallacy, their attempts to integrate aspects of biology with the social sciences have been fruitful for both biology and the social sciences. In this vein, Philip Hefner (1996) has used the polarity of discipline and antidiscipline to express this relationship between neighboring academic fields. Given these observations, it is important to understand scientism as an *improper* border-crossing or generalizing statement, as there appear to be cases where border crossing, at least, is legitimate.

A second caveat concerns the issue of how academic disciplines are said to interrelate. I have spoken of neighboring disciplines and of "higher" and "lower" disciplines as if such terminology were not problematic. Application of the scientific fallacy implies a basic disunity or at least strong

differentiation of scientific disciplines and the realities that they describe. Behind the scientific fallacy seem to be hidden metaphysical premises about unity of knowledge and how the sciences are said to represent the world. A philosopher who is already a metaphysical materialist and reductionist and who has a strong commitment to the unity of knowledge will likely understand the scientific fallacy as being much narrower in scope than someone who does not already share these commitments. This is not to say that such philosophers would be correct in their evaluations, but it is important to recognize that employment of the scientific fallacy is not metaphysically innocent and that in accusing others of scientism one is also revealing, at least in part, one's own metaphysical baggage.

Given this, it may not always be clear what constitutes a given case of scientism. Certainly, clear examples abound. Take, for instance, Crick's much-cited statement: ". . . you, your joys and your sorrows, your memories and your ambitions, your sense of identity and free will are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules" (1994, 3). Crick implies that we know this because of what neuroscience tells us. But how could such a statement be arrived at through neuroscience alone? Strictly speaking, neuroscience does not talk about "you" but about the properties of the brain. If we follow Crick's line of reasoning, you don't exist, because when neuroscientists look at the brain they don't find you in it. Crick has clearly made the sort of improper border crossing that characterizes the scientific fallacy. Scientism occurs.

In other situations, however, what counts as scientism is not so clear. If, for instance, someone claimed that cognitive science (collectively comprising aspects of neuroscience, psychology, and related disciplines) can exhaustively explain everything that can be known about the human mind, would this be a case of scientism? It seems a possible candidate, for such a claim would infringe on other disciplines' claims to provide insight into the human person. Most notably, philosophical and theological understandings of the human person would be threatened by such a claim. Is this a case of the scientific fallacy or not? The answer hinges partly on what cognitive science is conceived to include. A cognitive science that is limited to Crick's approach would seem clearly to violate the criteria of the scientific fallacy, but whether we conceive of the claim as an occurrence of the scientific fallacy hinges in no small part on prior philosophical and theological commitments concerning the nature of science and the nature of the human person. The claim that cognitive science can exhaustively explain everything that can be known about the human mind may well be false, but it is not obvious from the outset that the claim is scientific. Such a conclusion could only be arrived at after further close examination and then only with some considerable controversy.

In fact, human-nature claims seem to be replete with such fuzzy borders. Whereas we may now consider such topics as visual perception and

attention to fall clearly within the realm of the biological and psychological sciences (and one might say these sciences alone), the topics of the nature of emotion and consciousness raise complex boundary issues, as does the relationship of biology to moral virtues such as altruism. In these cases, what counts as scientism seems to depend profoundly on the character and the quality of the specific scientific research as well as on one's preconceptions about what the boundaries of science are. One can conceive of not only fuzzy borders, therefore, but shifting borders between scientific disciplines and between science and nonscience as particular scientific projects wax or wane.

These observations reveal that the employment of the scientific fallacy may be more complex than it first appears and that there is potential danger in its application. Used inappropriately, accusations of scientism may not clarify debate but muddle it by serving a more general antiscientific agenda. Scientism thus becomes a way of "crying wolf," of creating alarm about a given scientific claim without adequately considering the merits of the methods and evidence in question. It would seem that at least some of the controversy over sociobiology and its related fields stems partly from this kind of alarmism, in which the claims of sociobiology are discounted not because of flaws within the research program but because it has already been determined by some that biological claims about human nature are simply not permissible. Thus, any biological account of human nature is scientific by definition, without any actual consideration of particular theories and evidence. Certainly, this is a purely ideological and inappropriate use of the scientific fallacy. Many advocates of sociobiology have indeed fallen prey to scientific claims, but this does not mean that biology has no relevance to understanding human nature. Indeed, it may well be that as our knowledge of biology grows, the extent to which biological understandings of human nature impinge on the understandings of other disciplines will also grow. Thus, sociobiology may be characterized both by improper scientific imperialism and proper scientific integration at the same time. Only careful examination will reveal the difference between the two.

SCIENTISM AND THE STATUS OF THEOLOGY

Properly understood, the scientific fallacy is a kind of category mistake that occurs when one usually lower-level discipline makes improper and reductionistic claims with regard to the entities or theories belonging to another. The lower-level disciplines typically are those that constitute the physical sciences: physics, chemistry, biology, and their allied fields. Scientific claims are usually ontological or epistemological in character. The latter, epistemic scientism, can take at least two forms. Most commonly, epistemic scientism is understood to occur when the claim is made that

science is the primary or even sole source of reliable knowledge, in which the term *science* is understood to refer primarily or even exclusively to the natural sciences. Some argue, however, that there is a further kind of epistemic mistake, which occurs when it is stated that the scientific method is the sole source of knowledge. This seems, for example, to be part of Smith's concern about scientism; he is very clear in stating that science by itself provides only a narrow, tunnel-like understanding of reality that pales beside the "great outdoors" of reality that is accessible to a broader, religious way of knowing (Smith 2001). In his typology, Stenmark records this as a separate, methodological scientism, of concern primarily to the academy but not necessarily to the broader public.

The concept of a methodological scientism, however, may turn out to be more problematic in its application than either the general ontological or epistemological versions. Methodological scientism, even more than its ontological or epistemological counterparts, seems to hinge on a clear demarcation between science and nonscience—but this time in purely methodological terms. Yet, as we have seen, methods differ somewhat from discipline to discipline. It then becomes fairly easy to make the intellectual move of either denying the usefulness of the term *science* altogether or moving in the opposite direction and granting the label to all knowledge-producing disciplines.

Smith gets around this problem by simply stipulating the scientific method to be explicitly experimental, exact, and quantitative in character. He thus follows the traditional view that physics and chemistry most clearly exemplify what science is. By definition it follows that much of biology, astronomy, geology, and nearly all of the practices of the social sciences are not scientific in character. Smith does not spell out what we should call such disciplines, but apparently they are to be called something other than science. Given such a definition, the methodological form of the scientific fallacy becomes clear: it occurs whenever very specific methods of physics and chemistry are improperly forced upon other disciplines, the implication being that any disciplines that do not follow this method cannot be said to be producing knowledge. Certainly, this kind of methodological scientism is false. It would be absurd to eliminate the contributions of biology, psychology, and anthropology (not to mention history) simply because they do not follow exactly the procedures of physicists. In fact, this seems an almost trivial observation, and it is not clear that it merits much attention.

I would argue that the greater concern is whether and to what extent the scientific method, however defined, produces the best and most reliable sources of public knowledge. It seems to me that this is the more important issue and not one limited to academia. The natural sciences enjoy enormous prestige in our society precisely because they are understood to produce reliable knowledge in a way that other disciplines do not. This is

what makes the question of demarcation between science and nonscience loom important in the public sphere. To be a scientist is to be a producer of truth; the rest of us who are not scientists must have our claims to producing knowledge greeted with suspicion.

Is it scientism to grant greater epistemic weight to those disciplines that employ some form of the scientific method? It is not clear to me that it is, as long as what counts as the scientific method is appropriately defined and recognition is given to the different ways that it may be employed. But it is important to note with what great care such claims must be made. Most of us would justifiably trust the astrophysicist's predictions about the location of Mars in the solar system in three years more than we would trust an economist's forecast of the value of the U.S. dollar over the same time period. But we are likely to trust the historian's fixing the assassination of John F. Kennedy in 1963 more than either the astrophysicist's or the economist's prediction, even though history is not usually designated a science. In the end, science is important, but it does not trump all.

This last point looms large for theology, whose claims to knowledge remain suspect in the public sphere. If the scientific method, properly understood, does confer greater epistemic weight, theologians must weigh the extent to which theology must also become scientific or at least sciencelike. Some theologians, of course, have suggested precisely that (Pannenberg 1976; Murphy 1990). If there are significant avenues to truth beyond the scientific method, theology may remain nonscientific and yet be considered a knowledge-producing discipline. In the end, I would suggest that there is more than one way to do theology; and just as there are more sciencelike and less sciencelike forms of the social sciences, we may also speak of more sciencelike and less sciencelike forms of theology. Methodological scientism with respect to theology could only be said to occur when the methods of other sciences are improperly imposed on theology.

CONCLUSION

The knowledge claims of science remain tremendously important, both for the academy and for society as a whole. As such, the temptation to commit the scientistic fallacy will continue into the foreseeable future, so vigilance is required by those who care for the integrity of science as well as by those who care for the integrity of knowledge and the larger concerns of life. At the same time, it is important to be clear and careful in using the label of scientism or the scientistic fallacy to denote a particular position or argument. The label of scientism can easily become simply a defense mechanism, a means of propping up unjustified antiscientific biases. It can also be employed to defend kinds of demarcation that ultimately prove to be unhelpful, even misleading. The scientistic fallacy should not be employed in such a way as to grant greater authority to scientific disciplines or scien-

tific methods than they deserve, nor in such a way as to detract from the integrity of those disciplines that are considered to be nonscientific or (even) metascientific in character. This last point is of particular concern for theology. To grant that theology is unlike physics is to grant little, but to uncritically grant that theology is unscientific is potentially to grant a great deal. Although the issue of demarcation is often declared to be either solved or done away with, its questions manage to persist, and understanding the relationship between scientism and demarcation suggests that it is time to more clearly examine the latter once again.

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