

Naturalism, Science and the Supernatural

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Abstract There is overwhelming agreement amongst naturalists that a naturalistic ontology should not allow for the possibility of supernatural entities. I argue, against this prevailing consensus, that naturalists have no proper basis to oppose the existence of supernatural entities. Naturalism is characterized, following Leiter and Rea, as a position which involves a primary commitment to scientific methodology and it is argued that any naturalistic ontological commitments must be compatible with this primary commitment. It is further argued that properly applied scientific method has warranted the acceptance of the existence of supernatural entities in the past and that it is plausible to think that it will do so again in the future. So naturalists should allow for the possibility of supernatural entities.

Keywords Methodological naturalism · Ontological naturalism · Scientific method · Supernatural · Supernatural entities · Inference to the best explanation

Introduction

Naturalism is the dominant philosophical movement of the contemporary English-speaking world. According to De Caro and Macarthur, “An overwhelming majority of contemporary Anglo-American philosophers claim to be ‘naturalists’ or to be offering a ‘naturalistic’ theory of a key philosophical concept” (De Caro and Macarthur 2004: 2). Naturalism is also a broad philosophical movement. Naturalists disagree amongst themselves about seemingly divisive issues such as whether, for example, there is room or not for mental and moral properties in a naturalist

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ontology, properly understood. Perhaps the only ontological issue on which there is overwhelming agreement amongst naturalists is that there is no room for supernatural entities within a naturalistic ontology. According to Barry Stroud, “naturalism says that there is nothing, or that nothing is so, except what holds in nature... naturalism on any reading is opposed to supernaturalism” (2004: 23). Philip Pettit tells us that, “Naturalism imposes a constraint on what there can be, stipulating that there are no nonnatural or unnatural, preternatural or supernatural entities” (1992: 245).

In naturalistic epistemology there is somewhat more agreement to be found than in naturalistic ontology. Naturalistic epistemology is widely agreed to involve significant methodological deference to science. In Sellars’s much-quoted words, “Science is the measure of all things, of what is that it is and what is not that it is not” (1963: 173). What is in dispute, in disputes between naturalists, is whether epistemology should be wholly abandoned to science, or whether naturalistic epistemology remains a distinctly philosophical enterprise that should be guided by the methods and findings of the sciences (Kornblith 1985: 3–8). All naturalists seem to concur about the importance of scientific methodology for a genuinely naturalistic inquiry. Indeed, many see this as the core commitment of naturalism. According to Brian Leiter, “Naturalism in philosophy is always first a *methodological* view to the effect that philosophical theorizing should be continuous with empirical enquiry in the sciences” (1998: 81). Michael Rea, an opponent of naturalism, concurs. In his view, philosophical naturalism is to be understood as a research program that makes a primary commitment to scientific methodology (Rea 2002: 50–72).

Now because the naturalist defers to science on methodological matters, it seems that she must also defer to science on ontological matters. If it is possible that the naturalist’s substantive ontological claims may conflict with the results of current or future scientific investigations, then it seems that the naturalist must withdraw those ontological claims. According to Rea, “naturalism, whatever it is, must be compatible with *anything* science might tell us about nature or supernature” (Rea 2002: 55). He continues: “Thus, no version of naturalism can include any substantive thesis about the nature of nature or supernature” (Rea 2002: 55). If Rea is right, then it seems that even the widely accepted naturalist stricture against positing the existence of supernatural entities is without foundation.¹

While most naturalists will find Rea’s premise uncontentious, they will be unlikely to accept the conclusion that he draws from it. They will agree that philosophical naturalism must be compatible with whatever science tells us about nature or supernature, but will also be inclined to the view that science can only say certain things about nature and supernature. In particular they will be inclined to the view that science, properly understood, can never warrant belief in supernatural entities, and if there are good reasons to think that science can never warrant belief

¹ Rea (2002) does not develop these comments. They function as stage-setting for an ambitious argument against naturalism that turns on the alleged inability of naturalists to discover the modal properties of the world using the methods of natural science. Assessment of this argument is well beyond the scope of this paper.

in supernatural entities, then naturalists can be justified in making ontological strictures against the supernatural.

In this paper I will argue, against the above line of reasoning, that the naturalist cannot rule out the possibility of warrant for belief in supernatural entities (where ‘supernatural’ is understood in Rea’s and Stroud’s broad, colloquial sense to refer to anything other than the natural) on the basis of any reasonable inferences about future scientific evidence, and because the naturalist cannot rule out the possibility of such warrant, the naturalist is not entitled to draw up ontological strictures against the supernatural. Rea’s premise may not be sufficient to support his conclusion, but his conclusion is warranted nevertheless, or so I aim to show. My argument will be directed against an opponent, the ‘anti-supernaturalist naturalist’ (hereafter ASN), whom I take to be an exponent of a mainstream naturalist viewpoint. The ASN concedes that it is logically possible for there to be warrant for the conclusion that supernatural entities exist. However, the ASN asserts that we have good reason to hold that the supernatural is an explanatory category that will not be utilized by science, and because of this naturalists—whose beliefs are guided by scientific method—are warranted in dispensing with the possibility of warrant for the existence of supernatural entities.

Preliminaries

Before we go on, it will help to clear up some preliminary issues. First, it may be noted that, if the problem under discussion for ontological naturalists results from acceptance of methodological naturalism, then one option that is open to the ontological naturalist is to give up on methodological naturalism. This is, of course, an option. My argument is directed against naturalism understood as a programmatic approach to philosophy, not against ontological naturalism *per se*. I note, along with Rea (2002) and Leiter (1998), that methodological considerations are usually understood to be at the heart of the naturalistic program in philosophy and I argue that these methodological considerations preclude ontological strictures against the supernatural. The ontological naturalist is free to respond to this argument by abandoning methodological naturalism. If she were to do this, then the ontological naturalist would be casting herself adrift of the naturalistic program in philosophy entirely, which seems to be a very drastic response to the problem posed, but it is a possible response.

Second, it might also be thought that along with Leiter and Rea, I am being too strict in insisting that programmatic naturalism is a view driven primarily by methodological considerations. Many actual naturalists probably do not explicitly consider their views to be driven by methodological considerations. Rather, they intuit that methodological and ontological naturalisms are a ‘good fit’ and they endorse both, without explicitly considering the relationship between them. Although this may be an accurate description of the reasoning of many actual naturalists, it is beside the point, when the point is the understanding of programmatic philosophical naturalism. Were such unreflective naturalists to consider the relationship between ontological and methodological naturalism then it seems that they would be driven to the view espoused by Rea and Leiter, because

it appears to be the only view which makes sense of the close association between methodological and ontological naturalism.

Third, it is often noted that the distinction between the natural and the supernatural is ill-defined, and it might be thought that the vagueness of the distinction between the natural and the supernatural means that discussion of the ontological commitments of naturalism must be hopelessly speculative. A reasonably sharp distinction between the natural and the supernatural can usually be inferred from a clear definition of the natural. David Armstrong defines naturalism in a way that incorporates a clear definition of the natural. According to him, naturalism is “the doctrine that reality consists of nothing but a single all-embracing spatio-temporal system” (1981: 149).² If we understand the natural this way then we can have a reasonably clear sense of the supernatural; namely, anything that might exist that is outside the single all-embracing spatio-temporal system. Other definitions of the natural will lead to somewhat different understandings of the natural-supernatural distinction.

Of course not everyone will accept Armstrong’s definition of the natural or any other particular definition of the natural. In the absence of agreement regarding the definition of the natural, the charge that the boundary between the natural and the supernatural is ill-defined is hard to argue against. However, for the purposes of my argument it will not be necessary to find an exact distinction between the natural and the supernatural. We still have a working distinction between the natural and the supernatural, even if we are unsure whether certain possible entities belong in the category ‘natural’ or the category ‘supernatural’, provided that there are also possible entities that clearly belong in the category ‘natural’ and possible entities that clearly belong in the category ‘supernatural’. We may be unsure whether ghosts and goblins are best understood as supernatural entities or as unusual natural entities. However, on any understanding of the natural-supernatural distinction that shows at least some respect for ordinary usage, God—an all-powerful agent whose existence is unconstrained by either space or time—will be understood as a supernatural agent and ordinary worldly entities—tables, chairs, and the like—will be understood as natural entities.

The Supernatural in Science

Contemporary scientists hardly ever invoke the supernatural when formulating scientific explanations. However, appeals to the supernatural were not uncommon in scientific explanations of the past. For example, Newton argued that the stability of the planets in the solar system is best explained by appeal to the law of gravity, together with God’s careful initial placement of the planets relative to the sun (Meyer 2000: 133–34).

A second example of supernatural explanation in science is provided by vitalist chemistry and biology. Vitalists argued that living matter is imbued with a non-material *élan vital*, which causes it to be living matter. The presence of the *élan vital*

² Armstrong (1989: 3) also describes naturalism as “the doctrine that nothing at all exists except the single world of space and time.”

is a crucial component of the vitalist explanation for the distinction between life and non-life. While some vitalists believed that the *élan vital* was an emergent natural property, many vitalists, such as Van Helmont and Stahl, appeared to believe that it was a non-natural substance (Macdonald and Tro forthcoming), a supernatural substance in the colloquial sense of the term ‘supernatural’ that is in play here.

A third example of the supernatural figuring in scientific explanation is provided by the design hypothesis, as promulgated by Paley and others. Most biologists, prior to Darwin, believed that the best explanation for the functional organization of biological organisms was that this was intended by a supernatural designer (Ruse 2001: 112–13). Not only was the activity of a supernatural designer the best scientific explanation for the functional organization of living organisms, prior to Darwin (Dawkins 1986: 5), at that stage the design hypothesis provided a far superior explanation to available alternatives. According to Michael Ruse, “Before Darwin, one had no choice but to accept a designer” (2001: 113).³

The above examples involving appeals to the supernatural in science are very plausibly understood as instances of the use of inference to the best explanation (IBE), and it is widely agreed that IBE is a legitimate mode of inference which plays a crucial role in scientific theory choice and in the formulation of particular theories in science (Lipton 2004: 154–60; Psillos 1999: 211–12). It is also widely agreed that IBE is ontologically committing (Psillos 1999: 211–12). So, it seems that mainstream scientists of the past have been committed to the existence of supernatural entities.

In IBE, as it is commonly understood, we survey available explanations and accept the best of these. In Lipton’s terminology we infer to the “best potential explanation” (Lipton 2004: 58). It might be supposed that we should refrain from inferring to the truth or truth-aptness of an explanation until we have identified the ‘best actual explanation’. But this sets the bar too high to account for our actual inferential practices, because it seems always possible that we have failed to consider some or other explanation that is actually better than any available explanation. Most, if not all, of our currently accepted scientific explanations are the result of inference to the best potential explanation. It is possible that these will be shown to not be the best actual explanation of the phenomena that they are intended to explain in the future, but this does not stop scientists from inferring to their truth-aptness and inferring that the entities they invoke exist.

None of the exemplar supernatural explanations remain the best explanation of the phenomena that they were intended to explain. Indeed, there are no clear contemporary examples of an explanation that appeals to the supernatural and which constitutes the best scientific explanation of some natural phenomenon. These days, supernatural scientific explanations are associated with minority movements at the fringe of science, such as the Intelligent Design movement.⁴ However, we should not let the current fringe nature of supernatural explanation in science prevent us

³ See also Sober (1993: ch. 3). In a recent paper McLaughlin (2007) takes issue with Sober’s (1993) view that Paley’s argument from design, which was most forcefully advocated in 1802, was representative of then prevailing scientific opinion. McLaughlin’s views need not detain us, however, as he concedes that “the argument from design was a part of science up to about 1730” (McLaughlin 2007: 27). This dispute is about when the argument from design was a part of science, not whether it was a part of science.

⁴ For extensive discussion of the Intelligent Design movement, see Pennock (2001).

from acknowledging the role that the supernatural has played in scientific explanations, as recently as the mid-nineteenth century.

Because the supernatural has been repeatedly invoked in scientific explanations in the past, we are entitled to make a 'supernatural induction' as follows: we have seen a number of instances where explanations that invoked the supernatural were considered the best explanations of a variety of natural phenomena in the history of science. Therefore, it is reasonable to expect that explanations that invoke the supernatural will be considered to be the best explanations of at least some natural phenomena in science in the future.

My argument for the conclusion that naturalists cannot dispense with the supernatural can now be spelled out. [1] Philosophical naturalists are committed to accepting scientific methodology. [2] When it comes to formulating scientific explanations, scientific methodology crucially involves the use of IBE, which is ontologically committing. [3] IBE in science has led us to the conclusion that supernatural entities exist and it is reasonable to believe that it may do so again. Therefore, [4] philosophical naturalists must allow for the possibility of the supernatural when formulating a naturalist ontology.

This is a striking conclusion, and given the determined opposition to the supernatural expressed by leading naturalists such as Pettit and Stroud, I expect it to be a conclusion that will be contested by many. In what follows I attempt to head off a number of possible objections. The objections can be divided into three categories, which will be addressed in the next three sections of the paper, one category per section. First, it may be argued that my examples are not genuine instances of IBE. Second, it may be conceded that they are genuine instances of IBE, but argued that, despite appearances, the supernatural does not and will not figure in genuine scientific explanations. Third, it may be disputed that IBE really is an acceptable form of scientific inference. Having seen off the above lines of objection, I will consider two further ways of trying to evade the force of my conclusion.

Are They Really Instances of IBE?

Although it may be conceded that Newton, Paley, and some of the vitalists considered the aforementioned explanations that invoked the supernatural to be the best available explanations for a variety of natural phenomena, it might be argued that these explanations were not, in fact, accepted because of the correct application of IBE. All I have shown, it may be objected, is that a number of authorities considered explanations of a variety of natural phenomena that invoked the supernatural to be the best available explanations of these phenomena. But these authorities may have been mistaken. Are there good reasons to think that our exemplar scientific explanations that invoked the supernatural were not in fact the best explanations that were available in their respective times? The following have been suggested to me.

First, it may be suspected that the assessments of scientists of the past regarding the quality of available explanations that invoked the supernatural were distorted by the longstanding influence of Christian thinking upon Western science. Christianity systematically distorted the judgments of Western scientists so that explanations that

invoked the supernatural appeared to be better explanations than their purely naturalistic rivals, when in fact they were not better explanations, or so this line of objection has it.

I concede that the longstanding influence of Christian thought may have caused Western science to favor some supernatural explanations over purely natural ones in the past.⁵ However, this line of reasoning cannot account for all of the instances where the supernatural has been invoked in scientific explanation. When Ruse tells us that “before Darwin, one had no choice but to accept a designer” (2001: 113), I take it that he is arguing that an unbiased scientist would have found supernatural design to be the best explanation of the functional organization of living organisms, before Darwin, because this was by far the best available explanation of the functional organization of living organisms. The design hypothesis was the best explanation of the functional organization of living organisms available before Darwin, not just the best explanation available from a Christian point of view.

Second, it may be doubted that the individual scientists who provided our exemplar scientific explanations that invoke the supernatural canvassed all available explanations, before deciding which of these was the best. If they did not canvas all available explanations, then they cannot be said to have conducted IBE in a proper manner.⁶ One way of responding to this line of objection would be to examine the historical record in detail and see if there were significant available explanations of the relevant phenomena that were not considered by Newton, Van Helmont, Stahl, and Paley. However, such historical examination is probably unnecessary. Science, along with other domains of human enquiry, is a community-wide enterprise (Goldman 1999) and it is reasonable to assume that if significant available explanations were left unconsidered then these omissions would be noted by other scientists working in their areas of enquiry. Furthermore, it is reasonable to assume that the exemplar explanations attained the prominence that they did precisely because they were considered better explanations than available alternatives by communities of scientists who were collectively aware of all significant available explanations. An individual scientist working in isolation might well overlook significant available explanations, but a well-functioning community of enquiry will not.

A third possible reason for suspecting that our exemplar explanations were not, in fact, the best explanations of the phenomena that they were intended to explain can be developed by considering the process of selecting between competing explanations. In order to decide which of a number of competing explanations is the best, we consider how well these competing explanations exemplify a range of explanatory virtues. One feature of explanations that is widely considered to be an important virtue is simplicity, and it seems that any explanation of a natural phenomenon that invokes the supernatural commits us to a natural-supernatural distinction, making that explanation less simple than its purely natural rivals. Perhaps scientists of the past lost sight of the importance of simplicity in explanations.

⁵ On the influence of Christianity on the development of Western science, see Brooke (1991) and Grant (1996).

⁶ Thanks to Peter Forrest for suggesting this line of objection.

While it is true that a commitment to a natural-supernatural distinction results in a loss of simplicity, it may nevertheless be that a supernatural explanation is the simplest available explanation of a natural phenomenon, if efforts to avoid invoking the supernatural result in even greater explanatory complexity in purely naturalistic rival explanations. Furthermore, even if an explanation that invokes the supernatural is not the simplest available explanation of a natural phenomenon, it may be the best explanation all things considered, because it may have other compensating explanatory virtues. So it seems that this line of objection will not be sufficient to sustain the conclusion that all of our exemplar supernatural explanations were not arrived at by the correct application of IBE.

Genuine Scientific Explanation and the Supernatural

Our second form of objection involves accepting that at least some of the exemplar supernatural explanations are indeed genuine instances of IBE, advocated by real scientists of the past, but maintains that it does not follow that future scientific explanations could invoke the supernatural. One way to develop this second form of objection is to argue that although the examples of scientific explanations that invoke the supernatural are genuine instances of IBE formulated by real scientists, they are nevertheless not genuine *scientific explanations*. Instead, they are explanations that go beyond the domain of science, properly understood. For example, it may be admitted that the design hypothesis was a genuine scientific hypothesis, and conceded that a supernatural designer is more likely than a natural designer, but it could nevertheless be argued that the inference that the designer of nature is a *supernatural* agent is not, properly speaking, a scientific inference and so explanations that appeal to a *supernatural* designer are explanations that go beyond the domain of science.

This line of objection will probably not attract much support these days, as the project of trying to demarcate the proper domain of scientific explanation from the domain of non-scientific explanation has been out of favor for some time (Laudan 1983). But even if we could successfully argue that instances of IBE which build on scientific results and which invoke the supernatural are not, properly speaking, ‘scientific inferences’, this would not be sufficient for the purposes of the ASN. The problem is that this line of reasoning does nothing to undermine the legitimacy of instances of IBE that are based on scientific evidence and which invoke the supernatural. All that has been achieved is a hollow rhetorical victory. If we endorse IBE at all it is because we endorse IBE as a general form of inference. So it seems that if we endorse IBE, we must be willing to endorse all explanations that are the result of well-formed instances of IBE based on established scientific evidence, even if we decide that some of these explanations are not worthy of the epithet ‘scientific’. But this may include endorsing explanations that invoke the existence of supernatural entities, and this is not a concession that the ASN can allow.

A second way of arguing for the conclusion that future scientific explanations will not involve the supernatural is to argue that inferences to the existence of the supernatural are not a part of ‘mature science’. Immature sciences may involve all manner of explanations, but the mature sciences only involve a restricted range of

explanations, and this does not include appeals to the supernatural, or so this line of argument has it. A huge problem for a proponent of this line of argument is that she owes us an account of the history of science that explains the transition of science from its immature state to maturity. In order to satisfy the needs of the ASN, it seems that any such account must meet two criteria. First, it must explain why mature science no longer allows inferences to the existence of the supernatural. Second, it must show that the transition of science to maturity occurs at roughly the same time as the time that supernatural explanations fell out of favor in the sciences, during the nineteenth century. But standard accounts of the history of science do not seem to meet either of these criteria. Usually, the methodological maturity of science is located in the seventeenth century and it does not involve any obvious stipulation against the invocation of the supernatural (Koyré 1957; Dijksterhuis 1961). But unless these criteria are met, we are left with absolutely no reason to think that supernatural explanations will not reappear in a future science, and so the appeal to ‘maturity’ as a means to exclude the supernatural from current and future science involves a commitment to defending a revisionary history of science.

Another possible line of argument for the conclusion that science has matured to the state where it can reasonably be expected that scientists will no longer make appeals to the supernatural, begins with the observation that although genuine scientific explanations of the past have involved appeals to the supernatural, these have become increasingly rare over the course of time. A corollary of the development of science has been the successive replacement of explanations that invoke the supernatural with purely naturalistic explanations. It may be argued that because we have seen the successive rejection of supernatural explanations, as these have been replaced by purely naturalistic explanations, we can induce that future mainstream scientists will not invoke supernatural explanations. This argument might be termed the ‘naturalistic induction’ and it may seem that the ASN can appeal to the naturalistic induction to try to convince us that the supernatural has no place in future science. If science has matured gradually, then there need be no distinct transition-phase in which the passage of science from immaturity to maturity takes place.

My response to this ‘naturalistic induction’ is threefold. First, it may be countered by the ‘supernatural induction’, introduced earlier. These two inductive arguments lead to opposing conclusions, but both appear to be well-formed inductive arguments. Second, the naturalistic induction is only an inductive argument, and while it may provide us with some reason to be confident that supernatural explanations will no longer figure in science, it gives us no guarantee that future scientists will not find themselves faced with evidence for which a supernatural explanation is the best available explanation, all things considered, and because it gives us no such guarantee it cannot be a sufficient basis for the ASN to reject the supernatural in science. Third, it appears that we can conceive of clear examples of possible circumstances for which, if the right sort of evidence were to come along, then the best explanation of that evidence would involve appeal to the supernatural. To see this, consider the following example, due to Bill Dembski. Suppose that we find the words ‘Made by Yahweh’ inscribed in tiny letters on each and every living cell that we examine (Dembski 2000: 256). If we did discover reliable evidence of this highly unlikely state of affairs, then it seems clear enough that the best

explanation for the presence of the inscription on cells is that a supernatural being, ‘Yahweh’, wishes it to be known that he is the creator of all living organisms.⁷

Objections to IBE in Science

In arguing that explanations that invoke the supernatural can be scientific explanations I have assumed that IBE is a legitimate form of scientific inference. It is widely accepted, particularly by scientific realists, that IBE is a legitimate form of scientific inference. However, IBE is not without its critics. Some criticisms of IBE are best understood as components of larger, more general criticisms of science. For example, Richard Rorty argues that the choice of an explanation as ‘the best’ only indicates that it is in the interests of particular scientists to promulgate that explanation. He writes:

From a Wittgensteinian or Davidsonian or Deweyan angle, there is no such thing as ‘the best explanation’; of anything; there is just the explanation which best suits the purpose of some given explainer (1988: 69).

Rorty’s overall attitude to science is that it has no privileged access to the way the world is. This is because he holds that the project of trying to represent the way the world is, is deeply misguided (Rorty 1980). Although Rorty is a self-described naturalist (2000: 189), he is completely out of step with mainstream contemporary naturalists who hold that science does have privileged access to the way the world is. Rorty’s criticisms of IBE are of no assistance to the ASN because, if they were successful, they would accomplish too much. They might undermine the warrant for believing in the supernatural that may be derived by use of IBE, but if they do so then they do so by undermining the case for the privileging of scientific method, and they thereby undermine the case for mainstream naturalism.

If there are lines of criticism of IBE that are of use to the ASN, then these must be ones that undermine warrant for belief in the supernatural, but do not also undermine the naturalist case for privileging scientific method. We will examine two lines of criticism of IBE that appear to fill this role. These are due to Nancy Cartwright (1999) and Bas van Fraassen (1980). Both are critics of IBE, but they are not critics of all ampliative inferences in science and they are not opponents of the privileging of scientific method. My argumentative strategy will be to show that the case for there being warrant for belief in the supernatural can survive the criticisms of IBE due to Cartwright and van Fraassen, even if these are accepted. This is because, I will argue, we can be warranted in believing in supernatural entities even if we are only allowed to employ the restricted ranges of ampliative inferences that are endorsed by Cartwright and van Fraassen.

Most of the philosophers who oppose IBE, including Cartwright and van Fraassen, do so for the purposes of opposing scientific realism. This is because IBE plays a crucial role in contemporary arguments for scientific realism. Indeed, acceptance of the legitimacy of IBE is sometimes considered to be the defining

⁷ A second example of a possible scenario that would be best explained by appeal to the existence of the supernatural can be found in Clarke (1997).

feature of scientific realists, separating them from their opponents, who only consider more restrictive forms of inference to be legitimate (McMullin 1984). In recent times, debates about the acceptability or otherwise of scientific realism have focused increasingly on the status of IBE, mostly because of the influential ‘no-miracles argument’, which was first articulated by Hilary Putnam (1975: 73).

The no-miracles argument has it that scientific realism is the metaphysical stance that best explains the success of science, because it is the only metaphysical stance that explains the success of science without making that success appear to be miraculous. The no-miracles argument appeals to IBE and appears itself to be an instance of IBE. Because most contemporary naturalists accept the authority of science and because scientific realism is the metaphysical stance that makes most immediate sense of the authority of science, most naturalists are, implicitly or explicitly, committed to scientific realism (Koons 2000: 49). For the purposes of this paper, I will avoid the temptation to enter debates about scientific realism and will focus on criticisms of IBE, due to opponents of scientific realism, which might advance the cause of the ASN.

Cartwright (1983) is an opponent of scientific realism and an opponent of IBE, but not an opponent of all forms of ampliative inference. She argues that our assessment of which of a class of competing explanations is the best often involves appeal to ‘pragmatic virtues’, such as simplicity and elegance in explanation, and she argues that these are reflections of our explanatory preferences, having no obvious relationship to the truth (Clarke 2001: 705–10). Because appeals to pragmatic virtues have no obvious connection to the truth, we are not entitled to infer that, if an explanation is judged by us to be the best available, then it is likely to be true, or so she argues. However, Cartwright is willing to endorse causal ampliative inferences on the grounds that these feature in causal explanations, which we identify as the best available causal explanation without consideration of pragmatic explanatory virtues. An explanation is the best causal explanation just because the cause it identifies is the most likely to exist, according to Cartwright. Although IBE is not a generally legitimate form of inference, ‘inference to the most probable cause’ (IPC) is a legitimate form of inference, according to her.

It might be thought that ASNs could find reasons to rule explanations that invoke the supernatural to be illegitimate by accepting Cartwright’s criticisms of IBE. Indeed, this would be a way of ruling purely theoretical explanations that invoke the supernatural to be illegitimate. However, it seems that we can justify belief in supernatural entities using IPC, which Cartwright does accept. If the most probable cause of the parting of the Red Sea is the activity of a supernatural agent, then IPC allows us to infer to the existence of that supernatural agent. Because Cartwright’s criticisms do not extend to causal explanations and because some explanations that invoke the supernatural are causal explanations, arrived at by utilizing IPC, Cartwright’s criticisms of IBE are insufficient to satisfy the purposes of the ASN.

Our second opponent of scientific realism, Bas van Fraassen, is perhaps best known for his advocacy of ‘constructive empiricism’. According to van Fraassen (1980), the use of IBE to infer to the existence of unobservables involves taking an epistemic risk that we can and should avoid. Constructive empiricists adopt an agnostic stance regarding the existence of unobservables. We can allow that the existence of theoretical entities such as electrons and positrons may best explain a

variety of phenomena that require explaining, without also committing ourselves to the existence (or non-existence) of actual electrons and positrons. It may seem that we could argue similarly in the case of supernatural entities, allowing that the existence of the *élan vital*, for example, would best explain this or that phenomenon, but resisting the inference that we are, therefore, warranted in inferring that instantiations of the *élan vital* actually exist. Adopting constructive empiricism would allow the ASN to find reasons to render some explanations that invoke the supernatural to be illegitimate. However, it would not do enough to render all explanations that invoke the supernatural illegitimate, because supernatural entities need not be unobservable entities. For example, the Old Testament God was regularly observed, if we are to believe what we are told in the Bible, and therefore counts as an observable.

Because the focus of van Fraassen's constructive empiricist objections to IBE were restricted to the realm of unobservables, and because van Fraassen (1980) appeared to endorse instances of IBE in the case of some observables, his scientific realist opponents have often taken him to accept the legitimacy of IBE in the case of observables.⁸ More recently, however, van Fraassen has insisted that he does not accept IBE in any context (Ladyman et al. 1997). Rather, he accepts what Psillos refers to as "as-if IBE" (Psillos 1997: 371), a form of ampliative reasoning that is empirically indistinguishable from IBE, but only licenses conclusions about the empirical adequacy of claims about unobservables and unobserved observables, rather than conclusions of truth-aptness. Nevertheless, it seems that van Fraassen does at least accept the legitimacy of claims about the truth-aptness of well-formed ampliative inferences about observed observables, and it seems that this is enough to license inferences about the supernatural, as supernatural entities may be observed observables.

Two More Attempts to Blunt the Force of the Conclusion

Before concluding, I will consider two more potential lines of defense of naturalistic opposition to the supernatural. The first of these is the 'But science studies the natural' defense, and the second I call the 'It's only a bet' defense.

But Science Studies the Natural

A possible way to try to evade the conclusion that naturalists should abandon opposition to the supernatural is to insist that 'the natural' just is whatever it is that science studies. If future science invokes God or some other apparently supernatural entity in a well-formed scientific explanation, then this acceptance just shows that God must actually be a natural rather than a supernatural entity, or so the line of objection has it. If a narrow sense of the term 'study' is intended then this line of objection seems misconceived, because scientists who have invoked God in scientific explanations did not experiment on or take measurements of God; instead, they sought to explain observed effects by inferring to the existence of God. But presumably most of those who push this line of objection have in mind a broad sense

⁸ Psillos (1999: 212–13) explains why van Fraassen has often been read this way.

of the term ‘study’, which encompasses entities that we come to believe to exist, as a result of inferences from empirical evidence.

One way of heading off this line of objection would be to accuse its proponents of rendering the term ‘natural’ completely vacuous. If, as seems reasonable to believe, science can study anything and everything, then the ‘natural’, on this understanding of the term, encompasses anything and everything, and there is no possibility of the supernatural existing because there is no conceptual space left for the supernatural. However, it may be possible to pursue a form of the line of objection under discussion, while still allowing for the bare possibility of the supernatural and without concomitantly rendering the term ‘natural’ vacuous. To do this we might stipulate that the natural is to be equated with everything that has causal efficacy in the world. If God has had an effect on any part of the world, then God is causally connected to the world and is therefore natural, or so this line of reasoning goes.⁹ This way of understanding the natural allows for the bare possibility of the supernatural existing, but disallows the possibility of the supernatural causally interacting with the natural. If we accept the not obviously unreasonable hypothesis that only factors that have some causal connection to a subject can have explanatory relevance for that subject, then we will have ruled the supernatural out of the proper domain of scientific explanation without ruling out the bare possibility of the supernatural and without rendering the term ‘natural’ entirely vacuous.

My response to this now considerably nuanced line of objection is that it offends against the primacy of scientific method, and so it is not a line of objection that is of use to naturalists. Because naturalists are philosophically guided by scientific method, it seems that they must follow scientific practice in the use of explanatory categories in science, at least to a substantial degree. Scientists might have considered everything that is causally efficacious in the world to be natural, in which case the line of objection suggested would be of use to the naturalist. But as it happens scientists have not considered everything that is causally efficacious in the world to be natural. Overwhelmingly, they have followed ordinary usage and considered God to be a supernatural entity, on occasions when God has been invoked in scientific explanations. So it seems that naturalists, by their own lights, should follow actual scientific explanatory practice and construe God as a supernatural entity.

It’s Only a Bet

I’ve argued that naturalists lack a firm basis for opposition to the supernatural. But it might be considered that I have misconstrued the nature of the naturalist’s opposition to the supernatural. Naturalists who are opposed to the supernatural are not seeking to make grand claims about naturalistic ontology; they are simply betting that science will not invoke the supernatural in the future. They are entitled to do this because current science does not invoke the supernatural. Future science might revive the supernatural, of course, but all this shows is that naturalistic opposition to the supernatural is fallible, or so it may be argued. I have three responses to this line of objection.

⁹ Kim (2003: 92) considers an argument along these lines.

The first response to this objection is that it doesn't seem to explain why naturalists persistently single out the supernatural as an object of opposition. If naturalists are entitled to bet against any and every concept and category that current science does not endorse then they are entitled to bet against phlogiston, cold fusion, the ether, and a vast array of other concepts that are not accepted in contemporary science, and so it is mysterious that naturalists single out the supernatural for special attention. Given that naturalists do single out the supernatural for special attention, it seems more plausible to interpret naturalists as doing more than merely betting against the supernatural. It seems more plausible to suppose that naturalists are trying to identify an ontological stance that is distinctive of naturalism.

The second response to the 'bet objection' is that, as bets go, it seems to be a riskier one to make than many other bets that might be made on the basis of current science. Current science gives us very strong reason to believe that particular entities exist, namely those which we can experiment on and which figure in our best explanatory theories. It also gives us strong reason to believe that particular theories approximate to the truth. If naturalists were to seek to identify their position with the bet that hydrogen exists or the bet that the theory of evolution is approximately true, then they would be making a bet that is strongly grounded in the findings of current science. By comparison, a bet against the supernatural is much less strongly grounded in the findings of current science. It is true that current science does not invoke the supernatural, but currently acceptable scientific theories are not incompatible with the existence of the supernatural. If the naturalist's opposition to the supernatural is only a bet, then it is particularly mysterious why naturalists such as Pettit and Stroud single out the supernatural to bet against, when there are many safer bets that they might seek to be identified with.

My third response to this line of objection is to point out that the naturalist's commitment is not to current science as such but to *scientific method*. The naturalist is only indirectly committed to the findings of current science, in that she (presumably) takes these to be based on the proper application of scientific method. It is true that current science does not invoke the supernatural, but more important for the naturalist is the question of whether or not scientific method issues forth any substantial reason to warrant opposition to the supernatural, and this is the nub of the disagreement between the ASN and myself. The ASN supposes that scientific method does provides substantial reasons for the naturalist to oppose the supernatural, but I argue that scientific method does not provide substantial reasons to oppose the supernatural. How could it? Scientific method has often provided substantial reasons to endorse the existence of specific types of supernatural entities. Because scientific method does not provide substantial reason to oppose the supernatural, the naturalist should not be opposed to the supernatural.

Concluding Remarks

We have seen that there is a strong argument for the conclusion that the supernatural cannot be excluded from science. Because the supernatural cannot be excluded from science, and because the naturalist must defer to science about ontological as well as methodological matters, the naturalist has no grounds for stipulating against the

supernatural in her ontology. Ten different possible lines of objection to this conclusion have been considered and all have been shown to fall short of their mark. Naturalists should respond to this state of affairs by abandoning opposition to the supernatural.

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