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Is theism a simple hypothesis? The simplicity of omni-properties

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Abstract: One reason for thinking that theism is a relatively simple theory – and that it is thereby more likely to be true than other theories, *ceteris paribus* – is to insist that infinite degrees of properties are simpler than extremely large, finite degrees of properties. This defence of theism has been championed by Richard Swinburne in recent years. I outline the objections to this line of argument present in the literature, and suggest some novel resources open to Swinburne in defence. I then argue that scientists' preference for universal nomological propositions constitutes a very strong reason for supposing that theism is simpler than parodical alternatives in virtue of its positing omni-properties rather than parallel 'mega-properties'.

Introduction

One way of appraising the rationality of theistic belief is to appeal to theism as a theory purporting to explain certain features of the world. Various kinds of reasoning – deductive, inductive, abductive, and probabilistic – have been employed to characterize theism as a theory and identify its theoretical virtues. Whether this approach to theism is a kind of scientific reasoning or is merely similar to scientific reasoning is not a question I will answer here, but the similarities are nevertheless instructive.

While there is no overwhelming consensus regarding theoretical virtues – and especially regarding their measurement – there is substantial agreement at some junctures. For example, it is generally agreed that simpler or more parsimonious theories are better than less simple theories, *ceteris paribus*. Whether or not a theory does a good job of explaining our available body of evidence – and, in particular, a diverse and otherwise surprising body of evidence – is also relevant to our overall appraisal of a theory.

Probability theory provides us with a useful technical apparatus for understanding the relationship between these virtues, while also explaining why certain theoretical virtues are, indeed, virtuous. Consider Bayes's Theorem:

$$P(h|e) = \frac{P(e|h)}{P(e)} \times P(h)$$

Let h represent a hypothesis, and let e represent the available evidence. P(h) is known as the prior probability of h, while P(h|e) is known as the posterior probability of h. It can be seen that when $P(e|h) > P(e)$, then $P(h|e) > P(h)$. Thus, when the probability of our obtaining a particular piece of evidence given a hypothesis is higher than the probability of obtaining that evidence in general, the probability of h increases from whatever it was before considering the evidence.

This allows a convenient way of categorizing theoretical virtues and assessing the extent to which a theory possesses them. The virtues of explanatory power and scope can be seen to affect the ratio P(e|h)/P(e) – also known as the Bayes factor. The more surprising a piece of evidence is, the lower P(e) is. The better h predicts e, the higher P(e|h) is. So explanatory power can be measured by the ratio P(e|h)/P(e), and it can easily be seen how greater explanatory power is a theoretical virtue. Explanatory scope can also be given a neat Bayesian rendering. Since total evidence can be individuated into various $e_1 \ldots e_n$, it can be shown that:

$$\frac{P(e|h)}{P(e)} = \frac{P(e_1|h)}{P(e_1)} \times \ldots \times \frac{P(e_n|h\&e_1\&\ldots\&e_{n-1})}{P(e_n|e_1\&\ldots\&e_{n-1})}$$

The more data h 'explains' (i.e. confers a high probability on relative to the probability of e *simpliciter*), the greater the product on the right hand side – indeed, this multiplication of smaller numbers can accumulate to a substantial product even when the individual pieces of evidence are not very powerful.[1] And the wider the range of evidence, the greater the product will be, since the pieces of evidence are more likely to be independent, and so the force of one piece of evidence will not be reduced by evidence already conditionalized upon.

While P(e|h)/P(e) has been explored in detail by way of evidential arguments for God's existence, very little has been said about the value of P(h). Yet it can easily be seen that the value of P(h) is crucially important in appraising the plausibility of theism, both by considering its role in Bayes's Theorem and by considering the importance of its determinants in scientific theories more generally. Clearly, any theoretical virtue intrinsic to a theory (rather than a theory's relation to evidence) will affect P(h). And there is very good reason to think that there are such virtues which affect P(h) significantly.

Why think that there are such virtues? It is generally accepted that the underdetermination of theories by data and the problem of induction (in its old and new guises) require *some* kind of solution: it is easily recognizable that one can contrive many empirically equivalent theories with respect to a given set of data, and these theories will often conflict. Classic examples of these problems include the curve-fitting problem and the grue paradox. In the former, a set of data relating two variables is to be explained by a general rule governing those variables – but for any set of data, there will be an infinite number of curves which fit the data. More concerning is that there will be an infinite number of curves which fit the data *better* than the generally accepted solution. This is because mathematically complex curves can always be made to pass exactly through the data points on a graph, while a simpler curve often bypasses data points, with the disparity being put down to experimental or human error.

The grue paradox invites us to consider the predicate 'grue', where an object is grue if it is observed to be green before time *t*, or if it is observed to be blue after time *t*. Let time *t* be the present. In that case, all emeralds ever observed have been grue, since they have been observed to be green before time *t*. But extrapolating our experience then requires us to hold that emeralds in the future will be grue – and this entails that emeralds observed from now will appear blue. So we have two conflicting hypotheses: that all emeralds are green, and that all emeralds are grue. These hypotheses are empirically equivalent with respect to our current observations, but give drastically different predictions about the future observed colour of emeralds.

If it is reasonable to believe, *ceteris paribus*, that mathematically simpler relationships hold between variables, and that emeralds will be observed to be green rather than blue in the future, we must show a preference for simpler curves and orthodox predicates independently of the data. In probabilistic terms, since the likelihoods of the orthodox and heterodox hypotheses are the same (or sometimes greater in the heterodox hypotheses, as in the curve-fitting problem), any posterior probability distribution which assigns the orthodox hypothesis a higher probability must reflect a prior distribution which, even before considering any evidence, assigns our orthodox hypotheses a higher probability.[2]

There is no widely accepted method of characterizing this preference, and there are no widely accepted criteria for determining which hypotheses should be given preference. Simplicity is therefore an umbrella term for those (perhaps unknown) criteria which determine prior probabilities: defined this way, it is therefore a trivial truth that simpler hypotheses are more likely to be true. But this, of course, raises the question of whether any given property is, in fact, simple. Rather than lay out a comprehensive, general account of what simplicity consists in, I aim to show by a variety of analogies with well-established scientific practices that the theistic omni-properties – omnipotence, omniscience, omnibenevolence – are plausibly very simple properties. The argument then depends on the acceptance of a kind of scientific realism, and on the success of the analogies.

While the simplicity of theism as a hypothesis is of crucial importance, and while it is frequently alluded to, there has been very little by way of detailed discussion on the topic. The only major attempt to appraise theism's simplicity as a hypothesis is that of Richard Swinburne, who lists a variety of criteria constituting simplicity, including introducing few entities, few kinds of entities, few properties, and few kinds of properties.

It is often held that God's having infinite degrees of certain properties renders theism a very complex hypothesis. Hence, many writers have offered parodies of theism, arguing that perfectly evil gods, morally indifferent gods, and megatheistic gods have just as much (or more) epistemic warrant as traditional theism.[3] And, of course, if theism is a particularly complex hypothesis, then the prior probability of theism will be less than the prior probabilities not only of these parodies, but also of many other theories concerning the origin and other features of the universe.

In contrast, Richard Swinburne has argued that infinite degrees of properties are simpler than large finite degrees of properties. In the context of the wider debate, this is taken to imply that the hypothesis of an omnipotent, omniscient personal agent is a simpler explanatory hypothesis than the hypothesis of an extremely-but-not-all-powerful and knowledgeable personal agent (I will henceforth call this latter alternative hypothesis 'megatheism'[4]):

> [Theism] is a simpler hypothesis than the hypothesis that there is a God who has such-and-such limited power (for example, the power to rearrange matter, but not the power to create it). It is simpler in just the same way that the hypothesis that some particle has zero mass, or infinite velocity is simpler than the hypothesis that it has a mass of 0.34127 of some unit, or a velocity of 301,000 km/sec. (Swinburne (2004), 54–55)

Swinburne's justification for the thesis that theism is simpler than megatheism (which, following Gwiazda (2009a), I will call 'principle P') comes from his claim that 'hypotheses attributing infinite values of properties to objects are simpler than ones attributing large finite values' (Swinburne (2004), 55). Since simplicity is the primary determinant of prior probabilities, it follows that the ratio P(h)/P(h*) is quite large, where h represents theism and h* represents megatheism. And since the ratio P(e|h)/P(e|h*) is not sufficiently low to overcome h's prior advantage, we are thereby licensed in accepting h over h*.

Determining whether God's omni-properties are simple properties is only one task in appraising the simplicity of theism as a scientific or quasi-scientific theory. I do not aim here to address the other relevant determinants of simplicity. I do, however, aim to show that omni-properties are not necessarily complex properties and that there is very good reason to think that omni-properties are, in fact, very simple properties. The resources I offer for demonstrating this are, to my knowledge, novel ones, and they go a considerable way towards showing that theism is a relatively simple theory. In what follows, I offer a comprehensive review of the literature pertaining to the simplicity of omni-properties, including all the writers who have objected directly to Swinburne's thesis and its application to theism.[5]

Objections

Gwiazda helpfully divides Swinburne's case for principle P into four arguments. The first is from mathematical simplicity. This suggests that, since we can understand infinity without understanding, for example, a googolplex ($10^\wedge(10^{100})$), infinity is simpler. Gwiazda and Philipse respond by noting that we can also understand a googolplex without understanding the notion of infinity, so there is no obvious advantage for either degree.

The second argument is from scientific practice. Swinburne suggests that the hypotheses postulating infinite velocities of light and gravity are simpler than their large finite counterparts, appealing to their acceptance by the mediaevals and Newton (respectively) when the hypotheses were roughly empirically equivalent. Gwiazda points out, however, that many did not hold to the infinite velocity of light even despite this empirical equivalence, and that many even rejected infinite values entirely. Gwiazda also offers alternative explanations of scientists' preference for the theory that light travels at an infinite velocity: unwillingness to admit imprecision in measurement, unwillingness to contradict Aristotle, and a non-truth-tracking cognitive bias for 'endpoints' (as in the primacy-recency effect, where the first and last items of a list are more frequently memorized by experimental participants) might all serve as non-epistemic reasons for preferring infinite degrees in scientific theories. Bradley (2002) also challenges the idea that this preference was based on simplicity, offering plain experience as an alternative motivation for it. Philipse responds similarly, noting that Descartes's motivation was related to his view of light as a kind of pressure.

Swinburne's final two hints of arguments are that a large finite degree of a property 'cries out for an explanation' and that there is a neatness about infinity which is dissimilar to the awkwardness of large finite numbers. Gwiazda's verdict is that 'these ideas are not developed in detail; if they are meant to be arguments to the simplicity of the infinite then they must be developed further' (Gwiazda (2009a), 397). Bradley offers some further commentary on this point: he argues, first, that the fact that some theory raises a question is of no obvious epistemic consequence in itself; second, that even if raising questions is an epistemic defect, it is not a defect of complexity; and third, that an infinite degree of power similarly raises the question of why there is not a finite degree of power.

Further arguments against Swinburne's application of P have been given. Gwiazda's first is that infinity is often indicative of something malign. He cites Swinburne's claim that an infinite density state is physically impossible in support of this, concluding that 'in many contexts the appearance of the infinite, far from being a sign of simplicity and truth, is rather a sign of complexity and error' (Gwiazda (2009a), 397).

Gwiazda then appeals to Swinburne's *Epistemic Justification*, where Swinburne seems to claim that 0 and 1 are equally simple.[6] Since zero and infinity are implied to be equally simple in *The Existence of God*, it seems to follow that theism is equal in simplicity to unitheism, a hypothesis proposing a personal agent with a value of 1 unit for their power and knowledge.[7] Theism thus has extra competitors in simplicity, and this is especially problematic when it comes to the problem of evil. A unitheist with respect to God's freedom or omniscience is not committed, on Swinburne's schema, to God's goodness, and so the problem of evil seems to evaporate. Gwiazda summarizes:

> For Swinburne's argument to succeed, he needs the infinite to be simpler than all (not just large) finite values, including 1. But it follows from Swinburne's positions in *The Existence of God* and *Epistemic Justification* that the infinite is as simple as 1. (Gwiazda (2009a), 398)

Mark Wynn gives an interesting objection based on the seemingly enormous number of ways a finite designer can exist. He writes:

> Let us distinguish between two hypotheses: h_1, the hypothesis that the world's designer is infinite, and h_2, the hypothesis that its designer is finite. Now given that simplicity is a measure of prior probability, it follows that any one infinite designer is more likely than any one finite designer. However, it would appear that there are many more ways in which there may be a finite designer than ways in which there may be an infinite designer. After all, there is only one way to possess every power, or to know every true proposition, whereas there is no limit to the number of ways in which an agent may fall short of these states. It follows that (other things being equal) there is more likely to be one or another finite designer than one or another infinite designer; that is, the prior probability of h_2 is greater than that of h_1. (Wynn (1993), 332)

Applying a kind of principle of indifference over these various possibilities, it seems reasonable to conclude that the disjunction of all finite designer hypotheses is vastly more probable than the infinite designer hypothesis.

Other criticisms have been made. Philipse suggests that simplicity in this case might not be truth-conducive, while Fawkes and Smythe find Swinburne's advocacy of P 'puzzling and take it as dubious in light of the foregoing discussion' (Fawkes & Smythe (1996), 263), though the foregoing discussion in this case consists of little more than a few spurious assertions that infinite degrees are the most complex possible degrees of properties.

Smith accuses Swinburne of equivocation on 'infinity', and draws attention to four different uses of the term in Swinburne's case: χ_0, the first transfinite cardinal; instantaneity in the cases of 'infinite' velocity; maximal degree of a property as in the case of God's power; and absolutely infinite, the number of all transfinite cardinals. These distinctions will become important in the following analyses.

Critical analysis of P

Mathematical simplicity

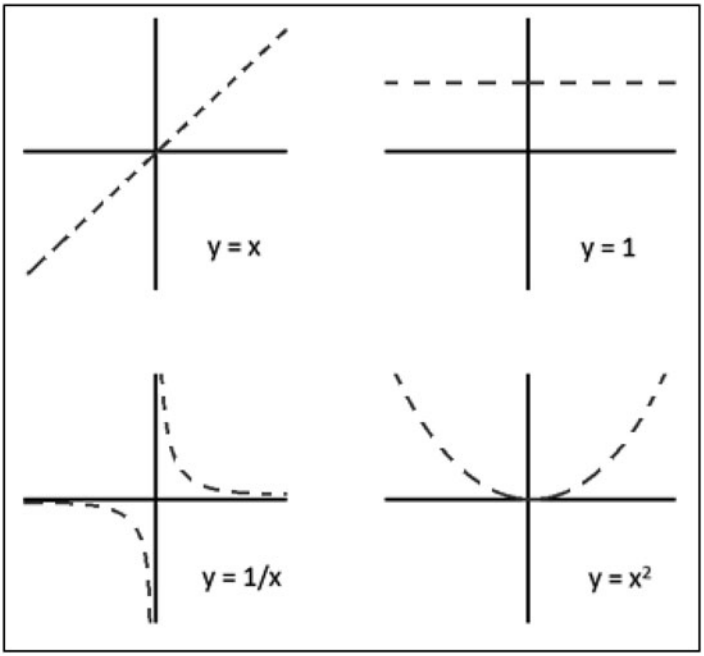
On Swinburne's argument from mathematical simplicity, Gwiazda's response seems to have considerable force. It is surely correct that one can understand a googolplex without understanding infinity, so there is no obvious simplicity to infinity on those grounds. What, then, of Swinburne's response, that God's infinite power means that there is zero limit to his power? Swinburne insists that, since positive integers imply an understanding of zero,[8] to say that God has zero limit to his power is simpler than to say that he has some finite limit.

This response is not *entirely* satisfactory: such a reparametrization leads to Bertrand paradoxes on Swinburne's preferred prior distributions for parameters spanning infinite ranges. Bertrand paradoxes arise when equiprobability assumptions are applied across different partitions of outcomes or propositions, leading to paradoxical results. For example, if a factory 'randomly' produces cubes with lengths between 1 and 2 cm, applying a uniform probability distribution over the length of cubes gives the result that the probability of a random cube having a length between 1 and 1.5 cm is 0.5. But if a uniform probability distribution is applied over the area of the cubes, then the probability of the cubes having an area between 1 and 2.5 cm^2 will be 0.5, which corresponds to a length between 1 and 1.58 cm. This result conflicts with the previous result, and the difficulty is exacerbated by applying a uniform probability distribution over volume. The standard response to Bertrand paradoxes is to say that there are 'natural' ways of partitioning the outcomes or propositions, which should be given preference – other ways of partitioning the outcomes or propositions should simply be ignored when applying principles of indifference.

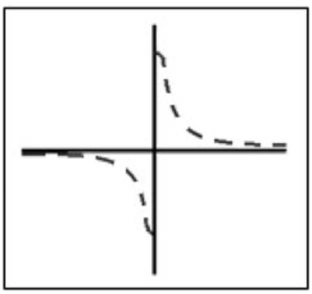
This creates a difficulty for Swinburne: it seems that power is a more natural measure than lack of power, and so appealing to the simplicity of theism according to the latter property seems to complicate theism. At the very least, it is unclear how one should apply a probability distribution over degrees of power on Swinburne's view.

More worrying about this understanding of mathematical simplicity is that it plausibly counts against theism. If Swinburne thinks that arithmetical simplicity is relevantly analogous to the simplicity of theism, then it seems plausible that greater knowledge can be represented by greater numbers. For this to be applicable to theism, we presumably have to move beyond arithmetic into set theory to deal with infinities.[9] The problem here is that there is surely no reason to think that God's attributes should be represented by χ_0, the number of natural numbers. Why should God's knowledge be limited to χ_0, when there is an infinity of greater cardinals? But if we adopt the position that God's attributes should be represented by a higher cardinal, theism seems to be in difficulty. For a googolplex, while not trivially conceivable, requires nowhere near the amount of understanding that the diagonal argument for non-denumerable sets requires. So it seems that an account of numerical simplicity which actually corresponds in some way to God's attributes is not going to be favourable to theism unless reparametrized to talk in terms of God having zero limit to his power, and even then such a reparametrization will have to be defensible.

It is nevertheless possible that there is some mathematical account of a simple infinity which does not run into the problems of a strictly numerical account, and which might correspond to God's omni-properties favourably. One analogy might be found in Cartesian geometry. The curves $y = x$, $y = 1$, $y = 1/x$, and $y = x^2$ all extend to various infinities (some for the x-coordinate, some for the y-coordinate, some negative and some positive):



Any roughly similar curve with this feature removed is likely to be expressed only by a much more complex mathematical formula. For example, suppose that the curve $y = 1/x$ no longer extended to infinity with $x = 0$ as an asymptote, but that it suddenly decreased gradient at some large y-value, hitting the x-axis and stopping:



Such a curve is mathematically much more complex than $y = 1/x$, and this case of an infinite degree being simpler does not run into the same trouble of non-denumerable infinities as the numerical account.

Similarly, it is possible to appeal to converging geometric series and their sums. Where a is the first term in a converging geometric series, r is the common ratio and n is the number of terms in the series, the sum is equal to $a(1-r^n)/(1-r)$. But when the series is infinite, the sum simplifies to $a/(1-r)$. As an example, let $a = 1$ and $r = 0.5$. If n takes some very large but finite value – say, 100 – then the sum of the series is 1.998046875. If n is infinity, then the sum is 2. Of course, it is possible to construct cases where a particular large finite n gives a neat integer and an infinite n doesn't, but there is something to be said for the simplicity of the general formula, in its not requiring parameters to be raised to very large indices and its concision. And, again, this account avoids the problem of uncountable infinities.

Perhaps more has to be said about these examples for them to carry weight. Nevertheless, I hope to have shown that there are at least some further mathematical resources for theists to draw upon even if one rejects an arithmetical account of infinities as an appropriate analogy for God's omni-properties.

Scientific practice

Turning to scientific practice, we might look for more examples of infinite degrees being postulated, or a sense of limitlessness. This ought to be important to all those who take a relatively realist approach towards science. Since academic experimental science is just an extension of our normal approach to the world (for example, my relatively mundane belief that there is food in the refrigerator is a relatively simple hypothesis which is confirmed by my observational evidence that there is food in the refrigerator), the methods of science should be instructive for all but the most radical sceptics about the world.

Smith's distinctions may be useful here. Most theists will want to emphasize the limitlessness and maximality of God's knowledge and power rather than its infinitude *per se*. So examples from science will not fail in supporting principle P merely by not involving strict infinities. The ideas of limitlessness and maximality will be more significant, as we shall see in the final section.

So while Smith is correct in saying that the velocity of light and gravity is not infinite in the sense of being χ_0 km/h, it is not clear that Swinburne's examples thereby fail to support P at all. Swinburne does not need to show that all interpretations of P are correct – only that an interpretation that maps onto theism appropriately is correct. So perhaps we can discard light as an example, given controversy over its velocity at the time and unanimity over its finitude presently. But the 'infinite' velocity of gravity still might have some force in the sense that the force is maximally fast (i.e. instantaneous), or without any limiting factor with regard to temporality. It will not damage the argument to point out that gravity is seen quite differently with the advent of general relativity, since we are arguing from good scientific *practice*, not merely from the current scientific understanding of the world. If positing an infinite velocity of a gravitational force was a reasonable thing to do *given the body of evidence at the time*, then this counts as an instance of the scientific *method* preferring infinite velocities to large, finite velocities, other things being equal.

Another example might be the 'infinite' range of gravitational and electromagnetic forces. Again, whether these are actually infinite depends on whether space is actually infinite, but the concept is clear: there is no spatial limit to the forces (other than space itself), and the range of the forces is maximal.[10]

In the context of infinities of science, two further examples present themselves, concerning the universe as a whole. The first is the age of the universe: until very strong evidence emerged in the early twentieth century that the universe had a beginning, it was almost unanimously accepted that the universe had existed eternally – that is, that it was infinitely old. Indeed, even in the face of this strong evidence, a significant number of physicists continue to believe this in the context of oscillatory models, among others. To appreciate the strength of this conviction before empirical evidence (perhaps) demonstrated otherwise, consider von Weizsäcker's account of Walther Nernst's reaction to cosmological finitism:

> He said, the view that there might be an age of the universe was not science. At first I did not understand him. He explained that the infinite duration of time was a basic element of all scientific thought, and to deny this would mean to betray the very foundations of science. (von Weizsäcker (1964), 151)

Since the empirical evidence seems to confirm a finitely old universe, it seems reasonable to conclude that the majority of scientists hold an infinitely old universe to be more priorly probable. It is not entirely clear why this is: it could be due to a causal principle, or on grounds of simplicity, or for some other reason. But it seems implausible that this is an especially complex or unlikely scenario just because it involves an infinity. Indeed, for many people the infinity would afford it a nice simplicity.

The second example is the infinite spatial extent of the universe. There is considerable debate about whether space is infinite or not. Nevertheless, many scientists and philosophers throughout history have held that space is infinite, Newton being a notable example. This suggests that there may be some kind of simplicity to the view. It is interesting, however, that there seems to be more of an intuitive pull to an infinite age of the universe than to an infinite size. There is very good reason for this on Swinburne's view, however: he insists that simplicity is only satisfied by infinite degrees of properties, not infinite numbers of entities. While this brings up all sorts of other debates – not least the question of substantivalism – it is certainly not implausible that a universe of infinite size would have an infinite number of entities. So Swinburne's own view commits him to thinking that it is most priorly probable that the universe is finite in size, and perhaps the fact that an infinitely big universe is not as intuitively compelling actually serves to support Swinburne's analysis.

A final appeal to scientific practice is available in the form of universal nomological propositions. I leave treatment of this to the final section.

Crying out for explanation

Swinburne does not develop this idea in detail, so it is worth exploring what it might mean.[11] One possibility is that an explanation is simple in so far as it raises fewer questions. If God's power is finite, there are two questions that can be asked: why it is not greater, and why it is not lesser? But if God's power is infinite, we can no longer ask why it is not greater, so we seem to be faced with a simpler explanation.[12]

There is clearly a problem with a naive statement of this view. After all, for power of any degree n, an infinite number of questions can be asked: why isn't it n_i (for any other n_i), and why isn't it infinite? By positing an infinite degree, we raise the questions of why it isn't n_i for *any* finite n_i. Bradley makes a similar point when he notes that omnipotence raises the question of why God's power isn't finite. He does note, however, that the 'Leibnizian version of traditional theism could no doubt make some headway with this problem by claiming the logical necessity of divine existence, thus perhaps conferring a logical necessity and thus self-explanatoriness upon omnipotence' (Bradley (2002), 395).

There is not space here for an in-depth treatment of to what extent necessary propositions still require explanation. But some reflections are in order: the extent to which a Leibnizian solution aids the theist here depends on the extent to which necessary existence coheres probabilistically with omni-properties. It will not do simply to define a sub-hypothesis, N-theism, which stipulates that God is a necessary being. For N-theism will take up only some of the probability space under theism, and so any advantage in explanatory power will be counterbalanced by a reduction in prior probability. Suppose we are trying to discover the author of an anonymous manuscript. My suggestion that Shakespeare is the author might be considered priorly improbable. Yet it will hardly help my case if I posit that Shakespeare is a necessary being, thereby reducing the need for explanation and rendering my thesis more probable. After all, there is a symmetrical stipulative sub-hypothesis for all the alternative hypotheses.

If this move is to work, then, there should be a natural link between theism and necessity which does not invite a symmetrical move for megatheism. Such attempts have been offered by Pruss (2009) and Gellman (2000), among others. If these attempts are successful, then theism might well gain an advantage over megatheism here, though the magnitude of this advantage will depend on the extent to which a necessary being explains other phenomena. Again, however, there is not space to tackle this question here. But it is worth noting the possible merit of a Leibnizian solution. I will later argue that there is another sense in which megatheism asymmetrically cries out for explanation.

Reasons to think that P is false

Gwiazda's first reason for disbelieving P now seems to be implausible in light of the above scientific examples. Scientists found nothing conceptually problematic about an infinitely old universe before evidence disconfirmed it. And many find nothing conceptually problematic about infinite space – it is very much an open question in cosmology whether space is infinite. In any case, once we talk in terms of God's power and knowledge being maximal and limitless instead of infinite, we have some further examples: the maximal ranges of electromagnetism and gravity. In the final section, I will give further reason to suppose that these interpretations of omnipotence and omniscience are simple.

The second reason is not an argument against P, but rather a problem for Swinburne's general argument for theism, based on his claims about mathematical simplicity. Gwiazda claims that 'for Swinburne's argument to succeed, he needs the infinite to be simpler than *all* (not just large) finite values, including 1' (Gwiazda (2009a), 398).

But there are at least two reasons to think that this is false. The first is to note that unitheism is compatible with theism – unitheism might explain the physical universe, while theism might explain unitheism. So any partition treating unitheism and theism as mutually exclusive propositions will not provide a satisfactory probability function. Unitheism might be equally simple as theism or even simpler than theism, but both might still be probably true conditionalized on various propositions because of their compossibility. The equal or greater simplicity of unitheism would be problematic for theism only if the two were mutually inconsistent. Similar considerations apply to the evaluation of megatheism and theism – any argument depending on the incompossibility of finite and infinite gods (such as Wynn's) must address this issue adequately.

The second reason to think that it is false is that, plausibly, unitheism does not fare anywhere near as well with respect to explanatory power. Gwiazda notes that it might perform better in explaining evil. Even if this is true, it is hard to see how a being with such negligible power would be capable of creating the entire universe as we know it. But God is clearly capable of creating a universe, and so can be expected to do so on account of his goodness. There is very little reason for thinking that a personal agent with such negligible power would be capable of such a feat, and so unitheism fails with respect to explanatory power.

Exceptionlessness, maximality, and universal nomological propositions

I suggested earlier that maximality might be a better way to understand God's omni-properties. I also promised a further sense in which appeals to science might support theism via P, along with a discussion of how 'crying out for explanation' might factor into this. I will argue for a novel understanding of infinite degrees as simple, in the sense of exceptionlessness. This concept can be applied much more directly to God's omni-properties than talk of 'infinity', and has compelling parallel cases in scientific practice.

Consider the following two hypotheses: 'all protons have a charge of +1' (or any such universal nomological proposition) and 'all protons except one have a charge of +1'.[13] Let h_0 represent the former and h_1 the latter. Now consider our body of evidence, that each proton whose charge we have observed (or inferred) has a charge of +1. Call this e. Clearly, $P(e|h_o) = 1$. Since the number of protons in the universe is extremely large – and thus it would be enormously improbable that we should happen to observe the single proton with a different charge – $P(e|h_1)$ is very close to 1. This has the consequence that $P(e|h_o)/P(e|h_1)$ is only negligibly greater than 1. Given this, and since:

$$\frac{P(h_0|e)}{P(h_1|e)} = \frac{P(e|h_0)}{P(e|h_1)} \times \frac{P(h_0)}{P(h_1)}$$

It follows that the only way $P(h_o|e)$ could be substantially greater than $P(h_1|e)$ is if $P(h_o|e)$ is substantially greater than $P(h_1|e)$.

Now consider the hypotheses h_2, h_3, etc., where two and three protons have different charges, respectively. Here, again, $P(e|h_i)$ is only very negligibly less than 1, and so anyone who has a significant posterior credence in h_o will therefore have to hold that $P(h_o)$ is significantly greater than $P(h_i)$ for a number of h_i. But since the various h_i are all mutually exclusive, it is possible to create a disjunctive hypothesis, $h_1 \vee h_2 \vee h_3 \ldots h_n$. Even though $P(h_o)$ might be significantly greater than $P(h_i)$, summing the probabilities of many h_i might seem to make the probability of this disjunction much higher than h_o, since $P(h_1 \vee h_2 \vee h_3 \ldots h_n) = \sum P(h_i)$. But yet scientists hold even that $P(h_o) > P(h_1 \vee h_2 \vee h_3 \ldots)$. Since n may be relatively large, and since the various h_i other than h_o can be assumed to have roughly equal prior probabilities, it follows that $P(h_o)$ is an enormous amount greater than $P(h_i)$, for the other h_i.

So for those who accept these kinds of universal nomological propositions, there must be some other kind of epistemically virtuous simplicity to an exceptionless law which is not present in laws with exceptions. The argument for the simplicity of theism appeals to this analogy: God's power and knowledge have no logically contingent exceptions, and thus they are similarly simple. This does not make theism only slightly more priorly probable than megatheism; rather, the exceptionlessness of theism seems, according to this account, to make theism a great deal more priorly probable, in the same way that h_o is a great deal more priorly probable than h_1.[14]

An objection presents itself at this point: surely an application of the principle of indifference should lead us to conclude that megatheism is far more priorly probable than theism? After all, the number of permutations of megatheism vastly outweighs the number of permutations of theism. For megatheism includes not only the hypothesis that God can do everything except scratch his left ear, but also the hypothesis that God can do everything except scratch his nose. These examples can be multiplied endlessly to come up with variants of megatheism where God can do everything except one action. Would applying a principle of indifference not thereby lead us to prefer megatheism over theism in terms of prior probability? This is, essentially, Wynn's argument. Again, however, our appeal to science shows that this is not the case. For there are similarly a huge number of variants of h_1 – any given proton could be the proton with a different charge. And there is only one permutation of h_0, viz. that all the protons have the same charge. Yet we still prefer h_0 despite their almost exact empirical equivalence, and the most plausible reason for this is that h_0's exceptionlessness gives it a kind of simplicity which h_1 lacks. Similarly, theism's exceptionlessness gives it a kind of simplicity which megatheism lacks. So even if Wynn is correct in saying that there is only one way to be omniscient – though he concedes this is dubitable – his criticism fails. Permutational inferiority does not imply improbability in every case.

This analogy also provides a plausible framework for understanding the sense in which megatheism cries out for explanation, and for why this should be considered epistemically detrimental. It is natural to suppose that being improbable simply *is* what it means to 'cry out for an explanation'. Surely explanation is about making certain propositions more probable than otherwise, and so facts 'cry out for explanation' in so far as they are improbable. This seems to comport with our general understanding of which kind of facts require explanation: events of extreme improbability with some sort of potentially meaningful characteristic 'cry out for explanation' – for example, a player achieving royal flushes with every poker hand they play cries out for explanation in virtue of its improbability. Conversely, mundane, priorly probable facts hardly cry out for explanation at all, and so such facts hardly cry out for explanation in the same way.

Suppose we now apply this to h_0 and h_1. Both postulate that every proton except one has a charge of +1. h_0 says the final proton also has this charge, while h_1 negates this claim. But surely if we had observed all except one proton and found that they all had a charge of +1, it would be immensely probable that the final proton would also have this charge. Any explanation for why the final proton would not have this charge would surely be extremely contrived or otherwise priorly improbable, and so h_1 cries out for explanation in its improbability. Analogously, megatheism cries out for explanation in that any explanation for arbitrary exceptions to God's power is likely to be extremely contrived and priorly improbable.

This account of principle P and its application to theism has at least two further advantages. First, it is compatible with various interpretations of God's omni-properties. For example, 'God can do anything that he wills' can be understood as an exceptionless universal nomological proposition, with its concomitant simplicity. 'God can bring about any metaphysically contingent state' has a similar simplicity to it in virtue of its exceptionlessness. 'God has perfect freedom of will and perfect efficacy of will' can be understood this way, postulating exceptionless 'laws' regarding God's freedom and efficacy. So this framework allows for a variety of interpretations of God's omni-properties, giving generic theism significant weight.

Second, this framework may go some way towards responding to another of Gwiazda's objections, viz. that restricted accounts of omnipotence and omniscience lose the ostensible advantage of simplicity which full accounts have.[15]

For example, if God's power is limited by his will, it is no longer infinite in a simple sense, and so theism becomes a complex hypothesis. But on my account, there is no problem with using restricted interpretations of these attributes, since the universal nomological propositions will still be relatively simple. Just as 'all As are Bs' can still be a simple hypothesis even though As might be a restricted subset of some wider class, so 'all of God's intentions can be executed successfully by God' can still be a simple hypothesis despite the realization of God's intentions perhaps being a restricted subset of a wider class, viz. metaphysically possible contingent states. And my account shows that simplicity is only substantially lost when the restriction itself demands explanation, and when the available explanations are all contrived or otherwise improbable. But in the case of theism, these conditions do not hold. For Swinburne's account of omnipotence does not exclude an omnipotent being's possibly performing evil acts for a contrived, priorly improbable reason. It excludes God's possibly performing evil acts on the grounds of his having simple degrees of other properties, freedom and omniscience. The general problem with exceptions is that there is no good reason for them. But here there is abundant reason for exceptions to the wider universal proposition, so the issue is resolved. This constitutes another advantage of the framework I have advocated.[16]

Conclusion

I conclude that there are many resources for theists to draw on in defending theism's simplicity, contra these objections. These include several mathematical analogies, which avoid the problems with numerical accounts of simplicity for theism. Once we have clarified the nature of God's omni-properties and the various senses in which 'infinite' can be used, we can see that Swinburne's examples of infinite velocity plausibly resist criticism, and that there are several other examples of maximality and limitlessness in scientific practice which may be favourable to the theist. Finally, there is an account of God's omni-properties in terms of exceptionlessness, which finds many supportive examples from scientific practice, in all the universal nomological propositions science theorizes. This account has a very natural application to theism and has several distinct advantages over other accounts. The theist is therefore justified in assigning theism a prior probability high enough for natural theology to be a serious enterprise.[17]

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Notes

1. Indeed, there is empirical evidence that humans are prone to underestimating the cumulative force of evidence in this way. My thanks to Timothy McGrew for pointing me to his brief discussion of this point in McGrew (2014), 226.
2. It can now be seen that Grünbaum's (2000) criticisms of Swinburne's project are misconceived. Grünbaum says that conceptual simplicity of an initial hypothesis does not necessarily make for the simplest overall hypothesis explaining the data. But, fairly obviously, Swinburne doesn't hold to this anyway. Swinburne does not believe, for example, that because 'there is nothing' is a conceptually simple hypothesis, it is thereby the simplest overall hypothesis and therefore probably true. The question is whether this is consistent with, or even explained by, Swinburne's framework – and, indeed, it is.

   The same is true of Grünbaum's main argument for this conclusion. He argues that a conceptually simple hypothesis may need complex adjunct hypotheses to explain the data well. Grünbaum thinks that this argument is in contradiction with Swinburne's framework. Actually, however, it is entailed by Swinburne's framework. In Grünbaum's scenario, h is a simple hypothesis, and a is an adjunct hypothesis necessary to render e probable. Thus, $P(h\&a|h)$ and $P(e|h\&{\sim}a)$ are both low. But it can be proved that if $P(h\&a|h)$ and $P(e|h\&{\sim}a)$ are both low, then $P(e|h)$ is also relatively low. This will mean (assuming $P(e|{\sim}h)$ is not much lower) that e does not greatly confirm h, and so h's reasonable prior probability is not sufficient for h to be deemed overall probable. So Swinburne is not committed to supposing that the conceptually simplest hypothesis is the simplest overall hypothesis.

   To keep the topic of this article focused strictly on the issue of whether God's omni-properties are simple in virtue of their being infinite, I cannot devote any more time to responding to further criticisms of Grünbaum and others. But I note this here simply to demonstrate that these sorts of objections can also be met perfectly adequately with a proper understanding of the relevant probability theory.
3. For evil gods, see Madden & Hare (1968); Cahn (1977); Stein (1990); New (1993); Law (2010). On finite gods (including indifferent gods), see Hume (1779); Dilley (2000); Bradley (2007); Philipse (2012). Oppy (2006) considers a broad range of parallel cases to theism, but argues that the theist can be justified in preferring theism.
4. Similarly, we might call these properties megapotence and megascience, respectively.
5. For example, Wynn (1993); Fawkes & Smythe (1996); Smith (1998); Bradley (2002); Gwiazda (2009a); Philipse (2012).

6. Swinburne (2001), 90.
7. Gwiazda does concede that it is not very clear what 1 unit of these properties would look like. I discuss this claim later.
8. If we agree with Swinburne that each integer greater than 1 requires an understanding of the previous integer, and if we agree with him that zero and 1 are equally comprehensible, then it follows that zero is simpler than every positive integer except 1.
9. Swinburne himself rejects this move, arguing that transfinite arithmetic has little application in the real world and that God's omni-properties should not be understood or represented in such terms.
10. Thanks to Richard Swinburne for drawing my attention to the fact that he has already made this point in Swinburne (2010).
11. I note that Swinburne now regrets using this expression, but I will nevertheless consider it as the starting point for a discussion.
12. Thanks to Brian Leftow for this suggestion.
13. The possibility of the latter obviously requires that 'proton' is not defined in a way such that the former is analytically true. If one really struggles with this example, it should not be too difficult to come up with another example that is not analytically true. I am grateful to Richard Swinburne for the example 'all quarks have a charge of +2/3 or −1/3'. Many laws which are not easily formulable as an instance of 'all As are Bs' – for example, the second law of thermodynamics – can also count as examples of the use of this general principle.
14. There are other ways of utilizing this analogy to make a similar point. For example, it is sometimes possible to describe universal nomological propositions in terms of physical necessity. In the case of a law 'all As are Bs', this might be seen as claiming that $\sqcap(B|A) = 1$, where $\sqcap(x)$ is the physical probability of x. This is very plausibly far simpler than the hypothesis $\sqcap(B|A) = 0.999\ldots$ to some given number of decimal places. And so we can see that universal hypotheses fare better once again. I am, again, indebted to Richard Swinburne for this suggestion.
15. Gwiazda (2009b).
16. Of course, it is possible to reject Swinburne's interpretations of God's attributes entirely, which can resolve the problem. I add this, therefore, as an advantage for those who hold to restricted accounts of God's attributes.
17. Thanks to Max Baker-Hytch, C'zar Bernstein, Jeremy Gwiazda, Cameron Domenico Kirk-Giannini, Christopher Kyle, Mahmood Naji, Wes Skolits, and Richard Swinburne for reading and commenting on earlier drafts of this article.