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Probabilities, Deductive Arguments and Theology Don't Add Up

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Introduction

Increasingly, proponents of logical 'proofs' for the existence of the classical monotheistic God are abandoning the requirement that the premises be true or verifiable in favour of the assumption that premises considered to be more plausible than their contradictions are adequate to justify the conclusion. I argue here that this strategy is counterproductive.

In classical logic, for the conclusion of a valid deductive argument to be true all premises must be uncontroversially true. However, deductive arguments for the existence of God are never uncontroversial and they invariably contain premises in which we have varying levels of confidence because they are assertions about an alleged aspect of reality made without complete knowledge or direct observation of that aspect of reality. Even the most sophisticated variants of the ontological, cosmological, and design arguments for God, for example, contain at least one dubious premise (Frances, 2015; 2016, Swinburne, 1991). Thus if a conclusion is in error it cannot be properly verified against reality and we cannot independently verify that an error has been made. It is surprising, then, that deductive arguments are so readily accepted by many theistic believers which arguably informs us, not only about the psychological primacy of *a-priori* faith in the existence of God, but also the magnitude of faith being placed in the classical logical process itself; classical logic being considered a universal, normative paradigm of reason rather than an a useful addendum to natural language (Harman, 1986; Novaes, 2015).

Many natural theologians now recognise that simple true/false judgements are both unrealistic and unachievable for many of their premises and suggest instead that a measure of 'plausibility', achieved via probabilistic reasoning, is a more legitimate approach. As the influential Christian apologist William Lane Craig (2012) writes:

"I presume the classical Principle of Bivalence, according to which there only two truth values, True and False. There are different degrees of plausibility, not of truth, given the varying amounts of evidence in support of one's premises."

However, even if we accept the presumption that two-valued logic is equally applicable to both physical and theological questions (a questionable assumption given its often glaring failures for dealing with inconsistencies, see e.g., Priest, 2001; Beuno & Coyvan, 2004) problems still remain which, although perhaps highly unintuitive at first sight are nevertheless easily demonstrated.

Are Beliefs Justified on the Basis of Probability?

Craig (2016) asserts:

“.....why can't a person believe something based on 51% probability? The claim that he can't seems to me just a matter of personal psychology.”

This is undoubtedly true, but is it a prudent prescription for belief across the board? Is there any correct threshold of probability that justifies and recommends theistic belief? I suggest not, whether we employ relativistic or quantitative approaches to probability.

Sincerely held beliefs are possible based on any level of subjective vs. objective probability, as plenty of psychological studies of the cognitive biases exhibited during gambling demonstrate (Griffiths, 1990). In terms of relative probabilities, a believer might argue that theism (defined here as the claim that a morally perfect, omnipotent, omniscient being who has created the universe necessarily exists; though, in effect, a blanket term for a large number of contradictory concepts and claims) holds inherently more probability of being true than naturalism (the hypothesis that the natural world is a closed system unaffected by the kind of being claimed by theism). But things are not so simple because theism is a highly specified version of supernaturalism (although theism entails supernaturalism, supernaturalism does not entail theism; Draper, 2009. Draper's argument might appear to reflect an *a-priori* ideological bias toward naturalism so it's only fair to note that he views supernaturalism and naturalism as holding equal prior probability) and so the theist further needs to consider why theism is more probably true than either some generic view of supernaturalism or a vague belief such as *ietsism*. Monotheism, of course, is a specific version of theism so even if they are able to successfully dispatch naturalism and generic supernaturalism, the theist has the task of providing evidence as to why other versions of theism, such as pantheism, panentheism or polytheism etc., are less probable than monotheism. If the believer is a mainstream Christian they would further have to debate why specific Christian theology (such as the triune claim) is more probable than other, non-triune monotheistic theology.

To identify which particular religious beliefs are considered as rational by adherents but not so by others, theist or atheist, often one has to look no further than the particular social-epistemic environment in which those beliefs are prevalent. Believers may initially form specific religious beliefs in rational ways. Although nth hand evidence emanating from ancient sources is notoriously unreliable (Schum, 1992) cognitively-immature children placing credence in what trusted adults tell them about the world is not in itself an irrational stance given the circumstances. However, those same children will often proceed to sustain those beliefs in later life in clearly irrational ways such as not accepting that epistemic probability (the subjective degree of belief in an event given at least some evidence) is often at variance with the actual probability of that same event given the entirety of available evidence (Skyrms, 2000).

Here are two mundane quantitative examples of what I'm getting at. In the first example, someone may sincerely yet erroneously believe that the die used in a game of chance has been purposely weighted to land on a '6' at greater than chance levels, in which case their epistemic probability that a '6' will result from the next throw would be somewhat greater than an otherwise rational expectation of approximately .17. Similarly, it is commonplace to find arguments for the existence of the classical monotheistic God that contain fatal flaws (Frances, 2015; 2016, Swinburne, 1991), yet they are widely perceived as being 'good enough' to sustain belief regardless of whether believers understand or are even aware of these flaws, i.e., they are 'weighted' and believers endow them with a higher degree of epistemic probability than they objectively deserve. Indeed, large numbers of theistic believers hold strongly to the opinion that the evidence surrounding some of the issues contained in the premises (concerning e.g., biological evolution) has been and is being systematically tampered with.

In the second example, imagine a sack containing 1000 balls. 510 balls are black and 490 balls are white. If someone were to randomly, blindly, choose a single ball from the sack we can easily estimate the probability of the ball being black ($p = .51$). Would we then be justified in believing that on any single random pick the ball chosen would be black? Surely most people would think not, even though it would be entirely plausible and certainly meet Craig's level of justification for belief. What then of events in which we justifiably have much higher levels of confidence in their probability? Throw a die once. The probability that it will land on '1', '2', '3', or '4' is .67. Would it be justified to stake, say, a month's earnings on the warranted belief that the next throw of the die will plausibly result in your favour, i.e., it is 67% likely to be true? And how many people would not consider it justified but be prepared to change their belief should they receive further information that the previous two throws had been a '5' and/or '6'? Undoubtedly, many would do so but their belief in the outcome of the next throw would definitely not be rational, as any casino owner would aver.

Preferring P-inductive arguments requiring quantitative measures, Swinburne (2011) has calculated the intrinsic, inherent (prior)

probability of a generic monotheistic God's existence, obtained from the hypothetical situation in which there is zero additional information to be factored in, to be as low as .01 (and polytheism even lower at .0005). There are good arguments made, however, that prior probabilities should not be used as criteria for acceptability. It is easy to imagine events with an extremely minuscule prior probability that are nevertheless manifestly true and events with a seemingly large prior probability that are manifestly false. Take the first case, for example; what are the chances of every single one of your thousands and thousands of ancestors having met, procreated and their billions and billions of sperm and many thousands of egg cells being subject to those specific random mutations that have eventually resulted in your personal genome?

Despite such a low prior probability, Swinburne devoutly believes that monotheism obtains because he subsequently factors in carefully selected empirically-derived facts that he considers relevant to his *a-priori* view that God exists. The systematic addition of each fact to the probability equation then has a cumulative effect, increasing the probability that God exists. This process continues until he achieves a probability of >50% at which point, and beyond, he is able to claim that he has calculated a more concrete epistemic probability, i.e., given what we know about the universe, the probability of God's existence becomes more plausible given that knowledge (Swinburne, 1991). (Achinstein, 2001) describes the process:

"An observation A is evidence for a hypothesis H if the probability that H is true given A (along with background information) is larger than the probability that H is true given background information alone."

Here, Swinburne's hypothesis (H) is God's existence and he bolsters the probability of that hypothesis being true by each observation (A) that some particular state obtains. This technique can be inherently flawed, which can be demonstrated in the following way:

P1: H is the hypothesis that I will win the lottery next Saturday

P2: A is the observation that I hold a valid ticket in next Saturday's lottery

C1: Therefore: the probability that I will win the lottery next Saturday (H) is increased by my holding a ticket (A);

$$Pr[HA] > Pr[H]$$

This seems a perfectly reasonable conclusion, except for this fact: holding a lottery ticket in next Saturday's lottery entails the far stronger probability that I will not win the lottery than I will win the lottery. If the probability of any single ticket winning the lottery is w then the probability of that ticket losing must be:

$$Pr = [1-w].$$

Thus the probability that n tickets will lose is:

$$Pr = [1-w]^n$$

This demonstrates something that Christian apologists often wilfully ignore when arguing that some miraculous or otherwise allegedly historical event is more likely to have occurred than not: negative statements tend to hold higher prior probabilities than affirmative statements (Achinstein, 200; Nolt, 1984). If we plug the same reasoning back into Swinburne's methodology, we can see that, for example, he calculates the prior probability that the universe exists to be .5 (Swinburne, 1991; on the grounds that it either exists or it doesn't) and further considers his observation that the universe does exist to increase the probability of his hypothesis that God exists being true (on the grounds that it is more likely that a God created the universe than it has occurred via natural means). But a binary sample space with equal probability can be considered a specious assumption for two reasons; (i) it presupposes that the existence of the universe is a physical fact; and (ii) it further presupposes that, even if the existence of the universe is a physical fact, then the fact of that existence along with carefully selected current states of the universe are best accounted for by underlying affirmative statements, i.e., there is a responsible agent and that agent is the classical monotheistic God. A number of other formulations are, of course, possible and therein lies a further problem with P-inductive approaches. Normally we would contrast a proposition P with its negation, not-P (i.e., a .5/.5 probability) giving us necessary and sufficient reason to either accept or reject P.

In the specific case of starting an analysis with the claim that God either exists or does not exist (P or not-P) theologians again assume a binary sample space with equal probability. But here P is not a singular claim. It is a compound claim. For example, P

(God exists) is necessarily included in the veracity of a prior proposition that monotheism and not polytheism obtains which, in turn, is necessarily included in the veracity of a prior proposition that supernaturalism obtains. Thus when considering many theological and scientific claims side by side a .5/.5 null hypothesis is not always possible. Further, those who use the P-inductive method to rationalise their faith are being forced to accept P, not because it is obviously more plausible than its negation, but on the basis that it also appears to be more plausible than each possible alternative P, as well as any lack of belief in either P or non-P (Schellenberg, 2016). In the case of God exists/does not exist, the theologian is weighting the argument in their favour by presenting: P (God exists) versus not-P (all possible propositions that can counter P; all but one arbitrarily excluded) and then claiming that the probability of P being true is effectively equal to the probability of any single proposition included in not-P being true.

Nevertheless, no matter which P is accepted there are important caveats: First, and most obviously, the degree of belief must obey the laws of probability. Second, it should comport in some demonstrable way with data we currently hold. Third, it must act to confirm the nature of beliefs already held. In other words, it must be internally consistent with other held beliefs. When data is conflicting, Swinburne's approach is not to remain agnostic or further analyse the data but to accept the views of those who have similarly held beliefs or whose views are closest to those beliefs. The first and second caveats are empirically justified, but the third is not because there is no particular requirement that the belief be true. It opens the door to those kinds of soteriological belief which do not depend on either universally agreed plausibility or knowledge as Swinburne (2005) seems to acknowledge:

"To pursue a way in order to achieve the goals of religion, someone needs to believe that it is at least as probable that pursuit of that way will attain those goals as that pursuit of any other way will.....It would not merely be foolish or irrational but logically impossible to pursue a religious way in order to obtain a certain goal, if you believed that pursuing that way would make you less likely to obtain the goal than you would otherwise"

In the case of (i) the simulation hypothesis (Bostrom, 2003; 2005; who calculates the probability of our existing within a simulation to be approximately .33; see also my essay **Is God a Finite Being or a Simulation?**) throws a spanner into the works of P-inductive arguments that assume that God directly created the universe as the prior probability that the universe physically exists must now be viewed as something less than 1. As far as (ii) goes, this claim runs contrary to the views of the majority of cosmologists and their several models, which demonstrate that the universe is better explained by naturalism rather than theism (e.g., Carroll, 2005; 2012). Swinburne's reasoning on this point boils down to P or not-P:

P1: If God does not exist, then the universe does not exist

P2: The universe exists.

C: Therefore, God exists.

This surely begs the question. P1 is simply assumed without proof (note: this differs to claims that P1 is false until proven true or even true until proven false) and it is doubtful that anyone would lend credence to P1 without having already accepted C. Yet it would only take one of the current scientific cosmological models to be made more plausible (due to additional empirical information) to cast doubt on P1. This, in turn, allows a concomitant argument that the epistemic probability of C, that God exists, may actually be decreased by P2, the fact of the existence of the universe. Coming at it from another angle, Schwitzgebel (2015; see also Schwitzgebel & Moore, 2015) calculates the same probability as Swinburne does for the prior probability of God's existence for *"the disjunction of all radically skeptical scenarios"* (including the simulation hypothesis) and so also accepts that a physical universe exists. Yet he denies that the existence of the universe supposes God.

The obvious problem here (as Schwitzgebel readily acknowledges) is that P-inductive arguments can only really work with empirical data resulting from objective observation and experimentation and not with subjective degrees of belief. Or any other observer-dependent assumptions; Swinburne concedes that all sub-arguments he factors into his P-inductive argument are dependent on assumptions about God's motivation and purpose for acting as claimed. There are no naturally existing prior degrees of belief. Just because beliefs can sometimes be expressed in quantitative terms (i.e., accepted on the basis of some probability threshold that makes the belief plausible) does not confer accuracy or reliability. This is not a blanket condemnation of the P-inductive theorem. It appears less at fault than the motives and beliefs behind its application. Nevertheless, even in those cases where we are able to input verifiable quantitative data in the form of a premise, a logically valid P-inductive argument may still furnish a conclusion which would be false if considered true and acted upon. Consider this example (actually based on someone I know, in the county in which I live, though anonymised):

P1: 99% of the residents of Happy County self-identify as being of white European ancestry

P2: Sam Smith has lived in Happy County for 55 years and eight months

C1: Therefore: Sam Smith's ancestry is white European ($Pr = .99$)

Both premises are empirical facts. The P-inductive argument is logically valid; it is indeed far more probable than not that Sam Jones shares ancestry with the bulk of the population of Happy County. However, if we accepted the conclusion as being probably true and plausible and then employed it as a basis for further belief it would nevertheless be a mistaken belief because the conclusion is factually wrong. And therefore by definition not knowledge; no matter how justified one feels a belief to be, it does not constitute knowledge unless it is true. Indeed, believing in something that is false carries you further from knowledge than does a lack of belief. We could, of course, add further premises until a sound argument is obtained, but to reach a true conclusion that is not mere accident we would need to add empirically verified premises only, and not merely 'plausible' claims. Yet despite the availability of such trivial examples some people are seduced into believing that when a theologian plugs subjectively acquired quantitative data (usually masquerading as objective) into a P-inductive argument and then concludes that God exists with a probability somewhere between .51 - .99, then they have provided sufficiently plausible evidence that God exists that they can then claim to be a warranted belief. But they have done no such thing. The original question (does God exist or not?) is really no closer to being answered in anything like an objective fashion. Likewise for other theological claims. Plausibility arguments suffer from this inherent weakness: they can be inverted simply by proffering an equally plausible counter-argument. Ultimately something exists or it doesn't. In which case P or not-P.

Independent Premises each with a Known Probability > .5

Craig (2016) again:

"I claim that in order for a deductive argument to be a good one, it must be logically valid and its premises must be more probable than their opposites.....In a deductive argument the probability of the premises establishes only a minimum probability of the conclusion: even if the premises are only 51% probable, that doesn't imply that the conclusion is only 51% probable. It implies that the conclusion is at least 51% probable."

More explicitly in terms of the goal of his argumentation, Craig (Craig & Sinnott-Armstrong, 2004):

".....both of the premises of the first argument thus seem more plausible than their denials. Hence, it is plausible that a transcendent Creator of the universe exists."

The first point worth making is that Craig seems to consider that the terms 'plausible' and 'probable' are synonymous. They clearly are not. But this is not something with which I take particular issue. More importantly, Craig is invoking what McGrew & DePoe (2013) have coined the 'Plausible Premise Criterion', the overly permissive view that when the premises of a deductive argument are more plausible than their contradictions we can assume that the conclusion is also more plausible than its contradictions. This view is obviously wrong. Even if all the premises of a deductive argument are considered to be more plausible than their contradiction, we still have no basis in which to deduce that a valid conclusion drawn will also be true with > 50% confidence. This observation comes bundled with an important caveat, though: the truth of each of the premises in a logically valid argument is not always a necessary condition for the conclusion to be true. In other words in rare cases a conclusion might conceivably be true, even though the premises are untrue. But assuming Craig's scenario that premises need be only 51% probable for the conclusion to be true, let's put this to the test with premises that we can be certain outweigh this level of probability:

P1: If a single card is picked blindly from a full pack then it will not be a 'heart'

P2: If the previous card picked is replaced to a full pack, a second single card picked blindly will not be a 'heart'

P3: If the previous card picked is replaced to a full pack, a third single card picked blindly will not be a 'heart'

C: Therefore: A 'heart' will not be picked blindly from a full pack on the first try, and a 'heart' will not be the second blindly picked card from a full pack on the second try, and a 'heart' will not be the third blindly picked card from a full pack on the third try.

Because these three events are probabilistically independent (i.e., the result of the first pick will not have any bearing on the second pick, and the result of the second pick will have no bearing on the result of the third pick), the probability of P1 occurring is

.75, and the probability of P2 and P3 occurring is also .75, all of which are beyond Craig's 51% threshold for plausibility. The multiplication rule then applies in order to calculate the probability of C:

$$Pr[C] = Pr[P1] \times Pr[P2] \times Pr[P3] = .42$$

So clearly, Craig is wrong and we can put this result in another way; rather than being at least 51% probable, C will actually not occur, on average, 58% of the time. It is easy to make this point stronger: just increase the number of premises by, for example, using the numbers on a die instead of the suits on playing cards. The probability of any one particular outcome will quickly reduce. There are a few exceptions to use of the multiplication rule, however, e.g. (i) when any premise is redundant; (ii) when the conclusion is a tautology, irrespective of the probability value of the premises; and (iii) when the premises can be either logically or causally connected. Of course these are hallmarks of logical arguments that are not well-thought out anyway.

Dependent Premises one of which has a Known Probability > .5

It might be argued that the statement "*even if the premises are only 51% probable*" refers not to the probability of each individual premise being true but to the probability of the conjunction of all of the premises. In this case not all premises need to meet some individual plausibility threshold because the truth of each premise is dependent on the truth of every other premise leaving the plausibility of the premises considered only in relation to each other. This view is also problematical, however. First, it would appear to deviate from what Craig has argued previously. Here (Craig & Moreland, 2003) he is obviously referring to the importance of the plausibility of each individual premise:

"Some of the premises in a good argument may strike us as only slightly more plausible than their denials; other premises may seem to us highly plausible in contrast to their denials. But so long as a statement is more plausible than its contradictory (that is, its negation), then one should believe it rather than its negation, and so it may serve as a premise in a good argument."

Craig is not alone in this assertion and has acknowledged the influence of two other theologians, Mavrodes (1970) and Davis (1997) in this regard. Second, it seems *prima facie* essential for logical arguments attempting to demonstrate the existence of God that a belief in each specific premise (each of which is, in effect, a substantive theological claim) is warranted. What the conjunction does is flag up confirmatory links between certain beliefs, i.e., illustrating that certain beliefs presented as premises in logical arguments must be coherent alongside other beliefs also presented as premises in logical arguments. It is really feasible to include a premise which many believers would find barely supported or questionable? An argument will only ever be as sound as its strongest premise allows (Schum, 1992). Third, even if there is good reason to assign a high probability to the truth of each premise it does not follow that we should assign a high probability to the conjunction of two premises. If someone asserts that they believe statement A and that they also believe statement B it does not necessarily follow that statements A and B are both true at the same time or for the same event. So, even if the probability of the strongest premise of a valid logical argument meets some plausibility threshold or the mean probability of the premises do so, it can still be the case that the conclusion does not, e.g:

P1: A single roll of a die will not result in a '6'

P2: A single roll of a die will result in a '6'

C: Therefore: A single roll of a die will not result in a '6' and a single roll of a die will result in a '6'

The probability of P1 being true is approx .83; it is plausibly true according to Craig. The probability of P2 being true is much less plausible; approx .17. However, there is a dependency between the premises; if P1 is true, then P2 must be false. Conversely, if P2 is true then P1 must be false. Note that contradictory premises do not, in themselves, render an argument logically invalid. To render the argument invalid either P1 or P2 would need to be logically incoherent by, for example, contravening the Law of Non-Contradiction. In this case, however, both premises are coherent; each could conceivably obtain, though not simultaneously. However, their dependency means we cannot use the multiplication rule to achieve a probability of C being correct. If we do, we get:

$$Pr[C] = Pr[P1] \times Pr[P2] = .14$$

This result is plainly absurd as C asserts a logical contradiction which can have no probability of occurring. The probability of the truth of the conjunction of the two premises is arrived at in this manner (Adams, 1998):

$$Pr[P_1 \& P_2] = [Pr[P_1] \times Pr[P_2|P_1]] = 0$$

This calculation confirms that the probability of C being true is 0.

Dependent Premises each with a Known Probability > .5

P1: If a single card is picked blindly from a full pack then the likelihood of it being a spade is > than the likelihood of being heart, diamond or club.

P2: If a single card is picked blindly from a full pack then the likelihood of it being a heart is > than the likelihood of being spade, diamond or club.

P3: If a single card is picked blindly from a full pack then the likelihood of it being a diamond is > than the likelihood of being spade, heart or club.

P4: If a single card is picked blindly from a full pack then the likelihood of it being a club is > than the likelihood of being spade, heart or diamond.

C: Therefore: the card picked from a full pack will neither be spade, heart, diamond or club.

This is a logically valid argument, P1-P4 are all empirically true statements with a known probability > .51 and so therefore are all plausible in Craig's eyes. This would be the case even if they were considered in isolation (i.e., as independent premises) and not as dependent premises. In all cases, each premise has a probability of .75 and its contradiction of .25. Yet C is demonstrably false, $p = 0$. Here is another logically valid, contrary example:

P1: If a single card is picked blindly from a full pack it will not be a 'heart'

P2: If a single card is picked blindly from a full pack it will not be a 'diamond'.

C: Therefore: If a single card is picked blindly from a full pack it will not be a 'diamond' or a 'heart'

The probability of P1 being true is .75. The probability of P2 being true is also .75. Thus:

$$Pr[P_1 \& P_2] = Pr[P_1] \times Pr[P_2|P_1] = .50$$

And so once again, we have an example of valid logical argument in which the known probabilities of each of the premises are > .51 and yet the conclusion is < .51. All the examples detailed above contradict Craig's assertion that the conclusion of a valid logical argument should be "at least 51% probable" if the premises are "only 51% probable", whether we are dealing with independent or dependent premises.

Conclusion

Arguments for the existence of God serve two primary purposes; either substantiating and sustaining theistic beliefs or convincing non-theists that theistic assertions are truthful or at least plausible. Davis (1997) has expanded on these purposes, identifying five more specific reasons why someone might argue for the existence of a God. They are:

1. To show that theistic belief is inherently rational;
2. To show that theistic belief is more rational than its denial;
3. To show that theistic belief is more rational to believe than agnosticism;
4. To show that theistic belief is equally as rational as widely accepted non-theistic beliefs;
5. To show that atheism and/or agnosticism is inherently irrational

The assertion that premises can be considered plausible if they reach some probability threshold for being true appear to be aimed at reasons 1 and 2 and as we have seen, for this purpose they may often fail. This does not mean, of course, that theistic arguments taken as a whole have failed. Reasons 1 and 2 comprise relatively modest goals that could conceivably be met by other means.

However, it is also fair to point out that, even if probability thresholds for premises proved to be viable and the goals of reasons 1

and 2 had been met, this would in no way imply that the goals of reasons 3, 4 and 5 had also been met. Unfortunately, while professional philosophers rarely claim to be able to demonstrate the irrationality of atheism that spurious claim appears to be increasingly made in certain popular media by amateur apologists. Oppy (2006) has justifiably described what would be required for this to be the case:

“.....successful argument on behalf of [a] claim has to be one that ought to persuade all of those who have hitherto failed to accept that claim to change their minds.”

This is certainly not what is happening. What is achievable, however, is this (DePoe and McGew; 2013):

“Although it is possible to cobble together a deductively valid argument from any evidence for any logically consistent conclusion by adding additional conditional premises, such deductive constructions generally do not represent well the relevance of the individual pieces of evidence to the argument.....The upshot for natural theology is this: for deductive arguments, modest conclusions that set any positive lower bound for the conclusion without also setting an upper bound are an acceptable way to move the discussion forward.....Further arguments, proceeding from other bodies of evidence, may raise that lower bound.”

This seems an even-handed stance. Probabilistic reasoning and logical plausibility in defence of theistic beliefs does certainly identify opportunities for discussion not least by potentially identifying possible lower bounds for prior probability. They are, after all, self-consistent methods of making inferences. However, while having identified a lower bound of probability signifies that we have some degree of surety that this level of probability is true it also signifies that claimed probabilities upward of this lower bound are less likely to be true. Here, we enter the territory of subjectivity. Thus, as things stand, atheism (i.e., neither P or not-P; a lack of belief based on insufficient evidence), remains the more reasonable default stance because, as we have seen, to convince of theism (and so refute atheism) requires more rigorous standards of evidence than those elaborated here. And, of course, an argument is not evidence. Whether God exists or not is ultimately an empirical question, requiring evidence beyond an estimation of probability or belief. *A-priori*, such a claim to truth is based on valid logical argument. However, the truth value of the premises employed is only reliably ascertained via empirical methodology and conclusions drawn from the process of logic provide no more information than is already available in the premises. It remains possible, therefore, to both prove and disprove the existence of God via logic. *A-posteriori*, claims to truth need not be directly observable, they can be posited in the form of hypothesis. However, theism (as opposed to deism) generally includes the claim that God, to varying degree, directly intervenes in the running of the universe. In which case empirical data will tend to falsify those claims that are not factual. Some claims (or definitions of a deity that are carefully constructed to be unfalsifiable) are not amenable to this latter process and so are indeterminate. Thus they will always remain presumptive regardless of the strength of subjective belief they enjoy.

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