



ORIGINAL ARTICLE

Evil is not evidence

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Abstract

The article aims to show that, if S5 is the logic of metaphysical necessity, then no state of affairs in any possible world constitutes any non-trivial evidence for or against the existence of the traditional God. There might well be states of affairs in some worlds describing extraordinary goods and extraordinary evils, but it is false that these states of affairs constitute *any* (non-trivial) evidence for or against the existence of God. The epistemological and metaphysical consequences for philosophical theology of assuming that S4 or K_{op} is the logic of metaphysical necessity are equally untenable. S4 guarantees that God does not exist if there is the slightest evidence against the existence of God. And K_{op} guarantees that God might survive the loss or acquisition of any essential property at all.

Keywords: problem of evil; evidence; metaphysical necessity; traditional God

Introduction

Let $\Box Fx$ be the conjunctive property of essential moral perfection, omnipotence, and omniscience. The traditional God exemplifies the conjunctive property $\Box Fx$. The standard epistemic view on intrinsic evil is that intrinsically evil states of affair constitute at least some evidence against $\Box F_G$. Indeed, it is widely held that an intrinsic evil in some world constitutes at least some evidence against the truth of $\Box F_G$ in any world.

In the section ‘An evidential puzzle’, I offer an evidential puzzle. If S5 is the logic of metaphysical necessity, then a contradiction is derivable from the simple assumption that there are some states of affairs in some worlds that confirm $\Box F_G$ and some states of affairs in some worlds that confirm $\sim\Box F_G$.¹ It is a consequence of the evidential puzzle that it is impossible that there is some evidence in favour of the traditional God and also some evidence against the traditional God.

In the section ‘The triviality solution’ I offer the triviality solution to the evidential puzzle. According to the triviality solution, independent evidence for or against the existence of God is impossible. If it is true that $\Box F_G$, then every state of affairs in every possible world trivially entails $\Box F_G$, and so every state of affairs in every possible world trivially confirms $\Box F_G$. If it is true that $\sim\Box F_G$, then every state of affairs in every possible world trivially entails $\sim\Box F_G$ and so every state of affairs in every possible world trivially confirms $\sim\Box F_G$. There is no independent evidence for or against $\Box F_G$ in any possible world.

If it is true that $\Box F_G$, then every intrinsic evil in every world trivially confirms $\Box F_G$. If it is true that $\sim\Box F_G$, then every intrinsic good in every world trivially confirms $\sim\Box F_G$.

It is a consequence of the triviality solution that even epistemically possible states of affairs trivially confirm $\Box F_G$ or trivially confirm $\sim\Box F_G$. Indeed every epistemically possible state of affairs trivially confirms $\sim\Box F_G$ or every epistemically possible state of affairs trivially confirms $\Box F_G$. So, we could not discover any independent evidence for or against the existence of God.

In the section ‘On abandoning S5’ I discuss the epistemological and metaphysical consequences of assuming a weaker logic – S4 or K_{sp} – is the logic of metaphysical necessity. I offer some concluding remarks in the final section.

An evidential puzzle

We let F_x be a conjunction of properties including omnipotence, omniscience, moral perfection and so on. On traditional theistic views God exemplifies F_x in absolutely every possible world or $\Box F_G$.² Since it is an S5 theorem that $\Box\Box F_G \vee \Box\sim\Box F_G$, it is also true that God exemplifies F_x essentially in every possible world or God fails to exemplify F_x essentially in every possible world. There are, in general, no contingent essential properties in S5. It is impossible, for instance, that anything not essentially human should become essentially human and it is impossible that anything that is not essentially wine should become essentially wine. It is impossible, then, that the traditional God should acquire or lose any essential properties.³

Since it is an S5 theorem that $\Box\Box F_G \vee \Box\sim\Box F_G$, an argument against the existence of the traditional God is fairly easy. There are many actual and possible states of affairs that do not entail the existence of the traditional God. Consider the state of affairs of Jones’s suffering a prolonged illness, for instance, or the state of affairs of Smith’s enduring a debilitating injury. These states of affairs seem to make it a bit less probable that there exists anything exemplifying essential omnipotence, omniscience, and moral perfection. In any event, they certainly do not seem to entail the existence of the traditional God.

We add quantifiers $\exists S$ and $\forall S$ to the language of the logic S5 meant to range over all possible states of affairs.⁴ We also add sentences $P(\Box F_G|S)$ meant to express the epistemic probability of $\Box F_G$ given the evidence in S .⁵ (1) states that there are at least some possible states of affairs that do not entail the existence of the traditional God.

$$(1) \quad \exists S \sim \Box(S \rightarrow \Box F_G)$$

There are also states of affairs that seem to be entirely irrelevant to the existence of a traditional God. The state of affairs of there being 228 billion trees in North America, for instance, and the state of affairs of there being roughly three thousand molecules in one millilitre of water provide no evidence at all for (or against) the existence of a traditional God. These states of affairs seem compatible with the existence of nothing exemplifying essential omnipotence, omniscience, and moral perfection. So there are many states of affairs satisfying the formula in (1).

But it follows immediately from (1) that the traditional God is impossible. It is an S5 theorem that $\exists S \sim \Box(S \rightarrow \Box F_G) \rightarrow \exists S \Box(S \rightarrow \sim\Box F_G)$. If some state of affairs S does not entail that the traditional God exists, then some S entails that the traditional God does not exist. So we derive from (1) that $\exists S \Box(S \rightarrow \sim\Box F_G)$. Indeed, matters are worse, since if *some possible* state of affairs does not entail that the traditional God exists, then *every possible* state of affairs entails that the traditional God does not exist. It is also an S5 theorem that $\exists S \sim \Box(S \rightarrow \Box F_G) \rightarrow \forall S \Box(S \rightarrow \sim\Box F_G)$. So, again, we derive from (1) that $\forall S \Box(S \rightarrow \sim\Box F_G)$.

So, from the fact that there are states of affairs that are evidentially irrelevant to the existence of God, we can prove in S5 that there are at least some worlds in which the traditional God does not exist.

$$(2) \quad \Diamond \sim \Box F_G$$

And from (2) it follows that the traditional God is impossible. Since it is true in S5 that $\Diamond \sim \Box F_G \rightarrow \Box \sim \Box F_G$ we derive (3) from (2).

$$(3) \quad \Box \sim \Box F_G$$

So we can derive the conclusion that the traditional God is impossible from the fact that there are states of affairs that are evidentially irrelevant to the existence of the traditional God.

But notice that we can also derive the conclusion that the traditional God is necessary from the fact that there are some states of affairs that do not entail that the traditional God does not exist. Consider for instance the state of affairs of the actual world's including some great goods or the state of affairs of Jones's enjoying good health his entire life. These states of affairs do not entail that the traditional God does not exist. Indeed these states of affairs seem to make it at least a bit more probable that there exists something exemplifying essential omnipotence, omniscience, and moral perfection. Both of these states of affairs satisfy (4).

$$(4) \quad \exists S \sim \Box (S \rightarrow \sim \Box F_G)$$

But it follows immediately from (4) that the traditional God is necessary. It is an S5 theorem that $\exists S \sim \Box (S \rightarrow \sim \Box F_G) \rightarrow \exists S \Box (S \rightarrow \Box F_G)$. If some state of affairs does not entail that the traditional God does not exist, then some state of affairs entails that the traditional God does exist. So (4) entails $\exists S \Box (S \rightarrow \Box F_G)$. But matters are again worse, since if some possible state of affairs does not entail the non-existence of the traditional God, then every possible state of affairs entails that the traditional God exists. It is also an S5 theorem that $\exists S \sim \Box (S \rightarrow \sim \Box F_G) \rightarrow \forall S \Box (S \rightarrow \Box F_G)$. So, (4) also entails $\forall S \Box (S \rightarrow \Box F_G)$.

From the fact that there are states of affairs that satisfy (4), we can prove that there are at least some worlds in which the traditional God exists.⁶

$$(5) \quad \Diamond \Box F_G$$

And from (5) it follows that the traditional God exists necessarily. Since it is true in S5 that $\Diamond \Box F_G \rightarrow \Box \Box F_G$ we derive (6) from (5).

$$(6) \quad \Box \Box F_G$$

The argument for (6) requires only that there is some state of affairs in some world that does not entail the non-existence of the traditional God. But, indeed, there are many states of affairs in many worlds that increase the probability that there exists a traditional God. And the argument for (3) requires only that there is some state of affairs in some possible world that does not entail the existence of the traditional God. But there certainly are many states of affairs in many worlds that increase the probability that there does not exist a traditional God.

Of course, (6) and (3) cannot both be true, since they are inconsistent. It is an S5 theorem that $\Box \sim \Box F_G \leftrightarrow \sim \Box \Box F_G$. Since the arguments for (6) and (3) are both valid, some

premises in these derivations must be false. It is a common assumption in arguments for and against the traditional God that we can adduce evidence S – say, intrinsically evil states of affairs – against the existence of God and we can adduce evidence S' – say, intrinsically good states of affairs – for the existence of God and reach some conclusion about the existence of the traditional God based on our total evidence S and S' . But this is false. The evidential puzzle shows that it is impossible that there should be evidence S against the existence of God and also evidence S' for the existence of God. S and S' together entail a contradiction. In the next section we consider the triviality solution to the evidential puzzle.

The triviality solution

In the previous section we showed that a contradiction could be generated in S5 from the fact that some states of affairs, in some worlds, (even mildly) confirm $\Box F_G$ and some states of affairs, in some worlds, (even mildly) confirm $\sim\Box F_G$. We could also produce an argument showing that a contradiction is generated in S5 from the fact alone that some states of affairs are evidentially irrelevant to the truth of $\Box F_G$. The evidential puzzle is in part a result of theorem (7).⁷

$$(7) \quad \forall SP(\Box F_G|S) = 1 \vee \forall SP(\sim\Box F_G|S) = 1$$

According to (7) every state of affairs in every possible world constitutes conclusive evidence for $\Box F_G$ or every state of affairs in every possible world constitutes conclusive evidence for $\sim\Box F_G$. (7) rules out the possibility that some states of affairs provide some support for $\Box F_G$ and some states of affairs provide some support for $\sim\Box F_G$. It cannot happen.

It is a consequence of (7) that some extremely evil states of affairs – earthquakes, hurricanes, genocides, etc. – constitute conclusive evidence for $\Box F_G$ or some extremely good states of affairs – vast improvements in well-being, the eradication of suffering, etc. – constitute conclusive evidence for $\sim\Box F_G$. But how could devastating earthquakes and genocide constitute conclusive evidence in favour of God's existence? And how could vast improvements in well-being or the eradication of suffering constitute conclusive evidence against God's existence?

In S5, whether a states of affairs S constitutes evidence in favour of God's existence or against God's existence does not depend on the content of S . There are no states of affairs that constitute any independent evidence for or against the existence of God. Whether S constitutes evidence for or against the existence of God depends entirely and exclusively on whether or not God exists. Consider the state of affairs of Hume's having scratched his finger, S . S does not entail that God does not exist. But it is true in S5 that if a state of affairs S does not provide conclusive evidence against God's existence, then S provides conclusive evidence for God's existence.⁸

$$(8) \quad P(\sim\Box F_G|S) < 1 \rightarrow P(\Box F_G|S) = 1$$

The reasoning to (8) is as described in the evidential puzzle. If $P(\sim\Box F_G|S) < 1$ then we know that $\sim\Box(S \rightarrow \sim\Box F_G)$. But $\sim\Box(S \rightarrow \sim\Box F_G)$ entails $\Box(S \rightarrow \Box F_G)$, and $\Box(S \rightarrow \Box F_G)$ entails $P(\Box F_G|S) = 1$. According to (8), if S does not provide conclusive evidence against God's existence, then S provides conclusive evidence for God's existence. So, Hume's having scratched his finger entails $P(\Box F_G|S) = 1$. That is, Hume's having scratched his finger constitutes conclusive evidence for the existence of God. But there is a much stronger consequence that is also true. (9) states that if some state of affairs S does not make $\sim\Box F_G$

certain, then every state of affairs makes $\Box F_G$ certain.

$$(9) \quad P(\sim\Box F_G|S) < 1 \rightarrow \forall SP(\Box F_G|S) = 1$$

So, Hume’s having scratched his finger entails that every possible state of affairs constitutes conclusive evidence for the existence of God. It follows that all of the extremely evil states of affairs noted above – earthquakes, hurricanes, genocides – all constitute conclusive evidence for the existence of God. But how could *that* be true?

The reason that Hume’s having scratched his finger constitutes conclusive evidence for God’s existence is because every possible state of affairs stands in a trivial evidential relation to the traditional God. And this is true since S5 guarantees that either $\forall S\Box(S \rightarrow \Box F_G)$ or $\forall S\Box(S \rightarrow \sim\Box F_G)$.

Every state of affairs in every possible world trivially entails that God exists or every state of affairs in every world trivially entails that God does not exist. (10) is a theorem.

$$(10) \quad \Box\Box F_G \vee \Box\sim\Box F_G$$

If the left disjunct is true, $\Box\Box F_G$, then trivially $\forall S\Box(S \rightarrow \Box F_G)$, and if the right disjunct is true $\Box\sim\Box F_G$ then trivially $\forall S\Box(S \rightarrow \sim\Box F_G)$. But if $\forall S\Box(S \rightarrow \Box F_G)$, then every possible state of affairs – no matter how bad or good – trivially constitutes conclusive evidence for $\Box F_G$. And if $\forall S\Box(S \rightarrow \sim\Box F_G)$ is true, then every possible state of affairs – no matter how bad or good – trivially constitutes conclusive evidence for $\sim\Box F_G$. We can sum this up in (11) and (12).

$$(11) \quad \forall S\Box(S \rightarrow \Box F_G) \rightarrow \forall SP(\Box F_G|S) = 1$$

$$(12) \quad \forall S\Box(S \rightarrow \sim\Box F_G) \rightarrow \forall SP(\sim\Box F_G|S) = 1$$

It is (10)–(12) that result in (7) above. This explains how earthquakes, hurricanes, and genocides could constitute conclusive evidence for the existence of God. Earthquakes, hurricanes, and genocides constitute only *trivial* conclusive evidence for the existence of God. Indeed, it is a necessary truth that earthquakes, hurricanes, and genocides constitute trivial conclusive evidence for the existence of God or trivial conclusive evidence against the existence of God. These events are not independent evidence for or against the existence of God. Whether they constitute trivial evidence for or against the existence of God depends entirely on whether God exists.

The evidential puzzle states that if there are states of affairs that (even mildly) confirm $\Box F_G$ and states of affairs that (even mildly) confirm $\sim\Box F_G$ then we can derive a contradiction. But the mistake in the evidential puzzle, according to the triviality solution, is the assumption that some states of affairs could *non-trivially* confirm $\Box F_G$ and that some states of affairs could *non-trivially* confirm $\sim\Box F_G$. The triviality solution denies that extremely good states of affairs provide some non-trivial evidence for $\Box F_G$ and that extremely bad states of affairs provide some non-trivial evidence against $\Box F_G$.

The states of affairs cited in the evidential puzzle that appear to provide non-trivial evidence for $\Box F_G$ cannot in fact non-trivially confirm $\Box F_G$. And the states of affairs that appear to provide non-trivial evidence for $\sim\Box F_G$ cannot in fact provide non-trivial confirmation for $\sim\Box F_G$. The assumption that some states of affairs provide independent and non-trivial evidence for or against $\Box F_G$ produces the contradiction in the evidential puzzle.

The mistake in assuming that some state of affairs might non-trivially confirm $\Box F_G$ is perfectly analogous to the mistake in assuming that some state of affairs might

non-trivially confirm $\Box(Fa \vee \sim Fa)$.⁹ (13) is also a theorem.

$$(13) \quad \Box\Box(Fa \vee \sim Fa) \vee \Box\sim\Box(Fa \vee \sim Fa)$$

So, every possible state of affairs S either trivially entails $\Box(Fa \vee \sim Fa)$ or trivially entails $\sim\Box(Fa \vee \sim Fa)$. But then, of course, every possible state of affairs trivially confirms $\Box(Fa \vee \sim Fa)$ or every possible state of affairs trivially confirms $\sim\Box(Fa \vee \sim Fa)$. (14) is also a theorem.

$$(14) \quad \forall SP(\Box(Fa \vee \sim Fa)|S) = 1 \vee \forall SP(\sim\Box(Fa \vee \sim Fa)|S) = 1$$

(14) ensures that there is no state of affairs that could provide non-trivial evidence for or against $\Box(Fa \vee \sim Fa)$, since non-trivial evidence for or against $\Box(Fa \vee \sim Fa)$ is impossible. All possible evidence for or against $\Box(Fa \vee \sim Fa)$ is both trivial and conclusive. There is, further, no way of knowing whether a particular state of affairs constitutes evidence for or against $\Box(Fa \vee \sim Fa)$ apart from knowing whether $\Box(Fa \vee \sim Fa)$ is true. If $\Box(Fa \vee \sim Fa)$ is true, then every possible state of affairs constitutes conclusive evidence for $\Box(Fa \vee \sim Fa)$ and if $\Box(Fa \vee \sim Fa)$ is false then every possible state of affairs constitutes evidence against $\Box(Fa \vee \sim Fa)$. Exactly the same conclusions hold for \Box_{F_G} .

There is a fascinating consequence of the triviality solution to the evidential puzzle. If it is true that \Box_{F_G} then every *epistemically possible* state of affairs provides conclusive evidence for \Box_{F_G} . For any state of affairs S that you might discover, S constitutes conclusive evidence for \Box_{F_G} . The discovery of intensely bad possible worlds, for instance, trivially entails \Box_{F_G} in exactly the same way that intensely bad possible worlds trivially entail $\Box(Fa \vee \sim Fa)$. Both \Box_{F_G} and $\Box(Fa \vee \sim Fa)$ are logically and probabilistically independent of any state of affairs we might discover.

So the discovery alone of intensely bad possible worlds would tell us nothing at all about the existence of the traditional God. Whether the discovery of intensely bad worlds constitutes evidence for or against the existence of God depends entirely on whether God exists. And whether it is true that God exists is logically and probabilistically independent of any possible state of affairs.

Similarly knowing that \Box_{F_G} is true tells us nothing at all about the states of affairs we could discover. Knowing that \Box_{F_G} is true does not, for instance, affect the discovery of extremely evil states of affairs in many possible worlds or the discovery that the actual world is among the worst possible worlds. It does not affect, even, the discovery of pointless evil in vast regions of metaphysical space. If we discover these states of affairs in metaphysical space, then they all trivially entail \Box_{F_G} . Knowing that \Box_{F_G} is true – like knowing that $\Box(Fa \vee \sim Fa)$ is true – does not reduce the kinds of worlds that are epistemically possible or reduce the states of affairs that are epistemically possible.

These consequences are unexpected. In $S5$ there are no states of affairs in any world that constitute independent evidence for \Box_{F_G} or constitute independent evidence for $\sim\Box_{F_G}$. A state of affairs S constitutes evidence for \Box_{F_G} only if \Box_{F_G} is true. In this case S trivially entails \Box_{F_G} and so $P(\Box_{F_G}|S) = 1$. And S constitutes trivial evidence for $\sim\Box_{F_G}$ only if $\sim\Box_{F_G}$ is true. In this case S trivially entails $\sim\Box_{F_G}$ and so $P(\sim\Box_{F_G}|S) = 1$. The discovery that S is true, for any S whatsoever, does not itself constitute any evidence at all for or against the existence of the traditional God.

On abandoning $S5$

The epistemological consequences of $S5$ for traditional theism and traditional atheism are extremely unconventional. In addition to the fact that no state of affairs in any world

constitutes any non-trivial evidence for either $\Box F_G$ or for $\sim\Box F_G$, S5 entails that various agnostic positions are impossible. The proposition $P(\Box F_G|S) = .5$ & $P(\sim\Box F_G|S) = .5$ entails a contradiction, for instance, and so does every proposition of the form $P(\Box F_G|S) = n$, $n(0 < n < 1)$. So agnosticism is impossible.

S4 is a logic of *relative* necessity, so the proposition $\Box F_G$ is true just if F_G is true in every *relatively possible* world. So, the fact that the traditional God necessarily exists does not entail that the traditional God exists in absolutely every possible world. Assuming S4, the fact that $\Box F_G$ is true in some world is perfectly consistent with $\Box F_G$ being false in many others. But the highly unconventional thesis that God might exist in some worlds and not exist in others – $\Diamond\Box F_G$ & $\Diamond\sim\Box F_G$ – is not consistent with standard conceptions of the traditional God.

It is an epistemological consequence of S4 that $P(\sim\Box F_G|S) > 0 \rightarrow \sim\Box F_G$ and also that $\Box F_G \rightarrow \forall SP(\Box F_G|S) = 1$. The latter states that the traditional God exists only if it is certain given any possible state of affairs that the traditional God exists. The former states that if some state of affairs constitutes some evidence against the traditional God, then the traditional God does not exist. Neither of these epistemic propositions is any more plausible than the epistemic consequences of S5.

There are also metaphysical consequences of S4 that are untenable. Since it is not a theorem of S4 that $\forall x(\Diamond\Box Fx \rightarrow \Box Fx)$, it is perfectly possible that an object should acquire an essence that it does not now exemplify. Plantinga might have acquired the essence of an alligator in addition to his human essence. But could God acquire the essence of a beetle? If S4 is the logic of metaphysical possibility, then anything can acquire another essence – so God might indeed become essentially a beetle.¹⁰

It is of course possible to weaken S4 to $K_{\sigma p}$, but the metaphysical consequences of $K_{\sigma p}$ are even more extreme.¹¹ $K_{\sigma p}$ validates neither $\forall x(\Diamond\Box Fx \rightarrow \Box Fx)$ nor $\forall x(\Box Fx \rightarrow \Box\Box Fx)$, so the traditional God could survive the loss of every essential property – essential omnipotence, omniscience, and moral perfection. So the consequences of $K_{\sigma p}$ for traditional theism and traditional atheism are less plausible than the consequences of S5.

Concluding remarks

It does seem that there are states of affairs in the pluriverse that provide at least some independent evidence in favour of $\Box F_G$. Extremely valuable states of affairs and extremely valuable worlds are standardly taken to provide some independent evidence that God exists. There are also states of affairs in the pluriverse that seem to provide at least some independent evidence in favour of $\sim\Box F_G$. Extremely bad states of affairs are standardly taken to provide at least some independent evidence that God does not exist.

But the logic of S5 ensures, on the contrary, that there is evidence for and against the existence of God only if a contradiction is true. So, we are left in the unexpected position of denying that there are various states of affairs in the pluriverse providing various degrees of evidence for and against the traditional God.

It follows from the triviality solution to the evidential puzzle that no states of affairs provide any independent evidence for or against the existence of God. The very worst possible states of affairs might be conclusive evidence for $\Box F_G$ and the very best possible states of affairs might be conclusive evidence for $\sim\Box F_G$. If every possible state of affairs trivially entails $\Box F_G$ then we could discover many extremely evil possible worlds all of which trivially entail $\Box F_G$. If every possible state of affairs trivially entails $\sim\Box F_G$ we could discover many morally and naturally perfect worlds all of which trivially entail $\sim\Box F_G$.

In general, for any state of affairs S – no matter how good or bad S happens to be – S could be, for all we know, conclusive evidence in favour of $\Box F_G$, and S could be, for all we

know, conclusive evidence in favour of $\sim\Box F_G$. We cannot determine whether S is conclusive evidence for or against $\Box F_G$ until we know whether it is true that $\Box F_G$ or true that $\sim\Box F_G$.

S5 is the most widely defended logic of metaphysical possibility, but the metaphysical and epistemological consequences of S5 might warrant abandoning S5 for S4 or $K_{\sigma p}$. But the consequences of S4 and $K_{\sigma p}$ for philosophical theology are equally unconventional. S4 guarantees that God does not exist if there is the slightest evidence against the existence of God. And $K_{\sigma p}$ guarantees that God might survive the loss or acquisition of any essential property at all.

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Notes

1. S5 is the most widely defended logic of metaphysical possibility. See, for instance, Kripke (1972); Plantinga (1974); Forbes (1986); Lewis (1986); Linsky and Zalta (1994), (1996); Williamson (2013); Pruss and Rasmussen (2018; Hale (2020).

S5 is also the most widely accepted logic among philosophers of religion. Its popularity is largely due to the fact that the logic is necessary to a variety of important theistic and atheistic arguments: for example, modal ontological arguments, modal arguments from evil, arguments from the perfections, various forms of cosmological arguments, etc. For a brief discussion of the consequences of adopting S4 or $K_{\sigma p}$ as the logic of metaphysical possibility see section ‘On abandoning S5’ below.

2. On traditional theism, God exemplifies F_x essentially just if God exemplifies F_x in absolutely every possible world. In classical S5, everything exists in every possible world, so an object b is essentially F_x just if necessarily b is F_x . In non-classical S5, objects exemplify properties in worlds in which they do not exist. In either case, and certainly in the case of God, necessarily b is F_x just if b is essentially F_x .

3. This point concerns *surviving* the gain or loss of an essential property and not merely the gain or loss of such properties. In fact, it is impossible that God should do either in S5. If God exemplifies $\Box F_x$ then God loses that essential property if there are worlds in which God is $\sim\Box F_x$. This can be true (depending on the logic involved) even if there are no possible worlds in which God is $\sim F_x$.

4. I assume that states of affairs are abstract and necessarily existing objects. I use ‘S’ as a state of affairs variable in some contexts permitting quantification and a constant in other contexts. The usage should be clear from the context.

5. The epistemic probability in $P(\Box F_G|S)$ is the probability of $\Box F_G$ given evidence S. It measures the extent to which S confirms $\Box F_G$. Similarly, the probabilities of rival ‘big bang’ and steady state theories on the evidence is epistemic. They measure the extent to which the available physical evidence confirms each of the competing theories contexts. Mellor (2005).

6. From (4) $\exists S \sim \Box(S \rightarrow \sim \Box F_G)$ and $\exists S \sim \Box(S \rightarrow \sim \Box F_G) \rightarrow \forall S \Box(S \rightarrow \Box F_G)$ we derive $\forall S \Box(S \rightarrow \Box F_G)$ or that every possible state of affairs entails that God exists. Let S be one of those states of affairs. From S and $\forall S \Box(S \rightarrow \Box F_G)$ it follows that $\Box F_G$. And from $\Box F_G$ and S5 it follows that (5) $\Diamond \Box F_G$.

7. Theorem (7) $\forall SP(\Box F_G|S) = 1 \vee \forall SP(\sim \Box F_G|S) = 1$ follows from the S5 theorem $\Box \sim \Box F_G \vee \Box \Box F_G$. If the left disjunct is true, then (i) $\forall S \Box(S \rightarrow \sim \Box F_G)$ and if the right disjunct is true then (ii) $\forall S \Box(S \rightarrow \Box F_G)$. From (i) it follows that $\forall SP(\sim \Box F_G|S) = 1$ and from (ii) it follows that $\forall SP(\Box F_G|S) = 1$.

8. We assume that S is a possible state of affairs unless otherwise indicated and we assume that $\forall S$ and $\exists S$ range over all possible states of affairs. (8) is derived as follows. Since it is true that $\Box(S \rightarrow \sim \Box F_G) \rightarrow P(\sim \Box F_G|S) = 1$, we know that the contrapositive is true $P(\sim \Box F_G|S) < 1 \rightarrow \sim \Box(S \rightarrow \sim \Box F_G)$. So, if $P(\sim \Box F_G|S) < 1$, then $\sim \Box(S \rightarrow \sim \Box F_G)$. But since $\sim \Box(S \rightarrow \sim \Box F_G) \rightarrow \Box(S \rightarrow \Box F_G)$, we know that if $P(\sim \Box F_G|S) < 1$ then $\Box(S \rightarrow \Box F_G)$. And since $\Box(S \rightarrow \Box F_G)$ only if $P(\Box F_G|S) = 1$, it follows that (8) is true, viz. $P(\sim \Box F_G|S) < 1 \rightarrow P(\Box F_G|S) = 1$.

9. In S5 the logical truth $\Box(Fa \vee \sim Fa)$ faces epistemological problems analogous to than $\Box F_G$. If an agent assigns a purported logical truth L, $P(L|S) = n$, $n(0 < n < 1)$, then $\sim \Box(S \rightarrow \sim L)$ and since $\sim \Box(S \rightarrow \sim L) \rightarrow \Box(S \rightarrow L)$, it follows from that assignment that $P(L|S) = 1$.

10. S4 does include the theorem $\forall x(\Box F_x \rightarrow \Box \Box F_x)$ so nothing could lose an essence or essential property that it does exemplify. God might acquire the essence of a beetle, but God could not thereby cease being divine. Still, it at least strains metaphysical credibility that God should acquire the essence of a beetle.

11. Models for $K_{\sigma p}$ (or B) are symmetric and reflexive.

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