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Pascal's wager revisited

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Abstract. Pascal's wager attempts to provide a prudential reason in support of the rationality of believing that God exists. The wager employs the idea that the utility of theistic belief, if true, is infinite, and in this way, the expected utility of theism swamps that of any of its rivals.

Not surprisingly the wager generates more than a good share of philosophical criticism. In this essay I examine two recent objections levelled against the wager and I argue that each fails. Following this, I argue that a transfinite version of the wager – one using the idea of an infinite utility – is incompatible with standard axiomatic constructions of decision-theory and, as a consequence, the Pascalian would be well-advised to give up the idea of an infinite utility and employ only a finite version of the wager. The consequences of limiting the wager to finite utilities are also explored.

Pascal's wager is a pragmatic argument in support of theistic belief. Pragmatic arguments employ prudential reasons on behalf of their conclusions. A prudential reason for a proposition P is a reason to think that believing P would be beneficial. Other theistic arguments – the Ontological Proof and the Cosmological Argument for example – provide epistemic reasons in support of theism. An epistemic reason for P is a reason to think that P is true or likely.[1] Pascal is famous, in part, for his contention that, if the epistemic evidence is inconclusive, one can properly consult prudence: 'your reason suffers no more violence in choosing one rather than the other … but what about your happiness? Let us weigh the gain and the loss involved by wagering that God exists'.[2] According to Pascal, theistic belief, because of its promised pay-off, dominates its doxastic rivals of disbelief and suspended belief. This conclusion is arrived at, in one version of the wager, via what has come to be known as 'the mathematical theory of expectations'.

The mathematical expectation of an act is determined by multiplying the utility, whether positive or negative, of each possible outcome of that act with its associated probability, and summing the results. Consider a simple example. Suppose one were deciding whether to carry an umbrella or not. Now either it will rain or not. Let the probability of rain be p_1 and that of

[1] For more on the distinction between epistemic reasons and prudential, or pragmatic reasons, see Jeff Jordan, 'Pragmatic Arguments', in Philip Quinn & Charles Taliaferro (eds.), *A Companion to Philosophy of Religion* (Oxford: Basil Blackwell Pubs., 1997), pp. 352–9.

[2] *Pensées*, ed. L. Lafuma and trans. J. Warrington (1670; repr., London: J. M. Dent & Sons, 1960), pp. 93–4.

Table 1.

	Rain (p_1)	No rain (p_2)
Umbrella	$a - c_1$	c_1
No umbrella	$-c_2$	$b - c_2$

no rain be p_2.[3] The benefits from carrying one's umbrella and of leaving it, respectively, are a and b, and the costs of carrying or leaving one's umbrella are respectively c_1 and c_2 (Table 1). According to the mathematical theory of expectations, *if* $(p_1 a - c_1) > (p_2 b - c_2)$, *one is rationally obliged to carry one's umbrella*. The justification for this claim is the Expectation rule: *in a decision situation where both probability and utility values can be assigned, one should choose to do an act which has the greatest expected utility*.

The Expectation rule is employed in a familiar version of the wager, which might be dubbed the *general expectation version*, paraphrased as:

> the expected utility of betting that God exists, via belief, swamps the expected utility of betting that God does not exist, via disbelief or suspending belief, as long as there is some positive probability that God exists and that an infinite gain can be had.[4]

According to the general expectation version of the wager, no matter how small the probability that God exists, as long as it is a positive, nonzero probability, the expected utility of theistic belief will dominate the expected utility of disbelief and of suspending belief.[5] Employing G as *God exists*, and B as *induce belief*, p as the probability of God existing, and m and n as finite values, and ∞ as the infinite gain (Table 2). No matter what values are attached to m and n, as long as p is positive, the expected utility of inducing belief will swamp that of not inducing belief. While there are various magnitudes of infinity, discussions of the wager employ the idealization that the symbol ∞ represents the same magnitude in each use. The allure of the

[3] The probability assignments mentioned in the example are subjective estimations of the relative likelihood that it will rain or not. For more on subjective probability see Richard Jeffrey, *The Logic of Decision* (Chicago: University of Chicago, 1983); and Brian Skyrms, *Choice & Chance: An Introduction to Inductive Logic*, 3rd ed. (Belmont, CA: Wadsworth, 1986), pp. 167–215.

[4] Pascal gives at least three versions of the wager in the *Pensées* passage. The first is a nonprobability version; the second and third are probabilistic versions of the wager. The second holds that the evidence, pro and con, concerning theism is roughly equal; so one should assign a 0·5 probability value to the claim that *God exists*. The third, the general expectation version, exploits the notion of an infinite utility and claims that as long as one assigns some non-zero probability to the claim that *God exists*, one should believe (because of the infinite EU).

Edward McClennen suggests that Pascal in fact formulates four versions of the wager in the *Pensées* passage. See his 'Pascal's Wager and Finite Decision Theory', in *Gambling on God: Essays on Pascal's Wager*, ed. J. Jordan (Lanham, MD: Rowman & Littlefield, 1994), pp. 115–37. The fourth version addresses a person who finds herself in a situation of radical uncertainty. The idea here is that one should assign equiprobable probability values to the alternatives and then calculate expected utility.

[5] I ignore the complication of infinitesimal probability values until the penultimate section.

Table 2.

	$G\ (p)$	$\sim G\ (1-p)$
B	∞	$-n$
$\sim B$	$-m$	m

general expectation version consists in its entailment that theistic belief, no matter how minimal its evidential support, is rational.

The wager presupposes that there is a distinction between (i) a proposition being rational to believe, and (ii) inducing a belief in that proposition being the rational thing to do. Although a particular proposition may lack sufficient evidential warrant, it could be that, given the distinction between (i) and (ii), forming a belief in the proposition may be the rational thing, all things considered, to do. So, if there is an infinite expected utility attached to theistic belief, then inducing a belief that God exists is the rational thing to do, no matter how small the likelihood that God exists.[6]

Not surprisingly, Pascal's wager generates more than a good share of criticism. Two novel objections recently levelled against the wager, each with the aim of showing that it fails as a prudential argument, are the focus of what follows.[7] The first objection is a refurbished version of the 'many-theologies objection', the idea that there are innumerable ways to try to inculcate religious belief. While the second objection is a new 'prudential' criticism of the wager that, even granting the wager's premises, prudence does not dictate the adoption of theistic belief. Despite the ingenuity of the two objections, I argue that neither is fatal to Pascal's wager. After looking at the objections, I turn to the idea of an infinite utility. Because the idea of an infinite utility is incompatible with the standard constructions of decision theory, I argue that the Pascalian would be well-advised to abandon it. Overall, I argue for two claims. First, that neither of the two objections is lethal to the wager. And second, that the wager shorn of the idea of an infinite utility is apologetically useful in support of theistic belief.

THE FRAGILITY PROBLEM

The first objection, which we can call the *fragility problem*, is that the wager fails as a prudential argument because the wager is not robust.[8] A decision D is robust just in case a slight revision of a background assumption of D does

[6] *Believing that p* is best taken as a disposition rather than as an action. *Accepting that p* is an action, as is *inducing the belief that p*. Prudential arguments are arguments concerning the benefits of certain actions and the wager concerns the benefits of accepting or forming the belief that God exists.

[7] See Gregory Mougin and Elliott Sober, 'Betting Against Pascal's Wager', *Nous* **28**/3 (1994), pp. 382–95; and Graham Oppy, 'On Rescher on Pascal's Wager', *International Journal for Philosophy of Religion*, **30** (1990), pp. 159–68.

[8] 'Betting Against Pascal's Wager', pp. 386–7.

not materially affect the outcome of the deliberation. Suppose that B is a background assumption of D. Suppose further in deciding to act on D, we assumed that the probability of B was 0·75. D is a robust decision only if it makes no difference to the status of D if we were to take the probability of B to be 0·74 or to be 0·76 or some such slight revision. The concept of robustness is employed to refurbish an old objection of the wager, namely the many-theologies objection.

The many-theologies objection is similar in structure to the oft-cited many-gods objection. Both objections are partitioning complaints which suggest that, despite appearances, Pascal's decision partition is not exhaustive. The many-gods objection is built upon two components. The first is that there are innumerably many logically possible deities to choose among; and the second is that there is some small chance, a nonzero probability, that any of these possible deities would reward its devotees with an infinite reward. So, given that infinity discounted by any finite amount is still infinite, the many-gods objection concludes that no particular god is recommended by a Pascalian wager. The many-theologies objection, on the other hand, does not focus upon there being various possible deities. The many-theologies objection is a second-order complaint: even if one should, from the rational point of view, try to inculcate belief in deity A (rather than deities B and C and so on), there are various possible incompatible technologies or mechanisms which might be employed in trying to inculcate saving belief. The many-theologies objection is a second-order complaint since it has to do with the various possible technologies, or theologies, which might be used to inculcate belief in the recommended deity. According to the many-theologies objection, as long as there is some positive, nonzero probability that a deviant theology, call it D, is true, where D specifies that theists are damned to perdition and atheists are rewarded with an infinitely impressive postmortem existence, adopting the deviant theology will carry an infinite expected utility ('EU' hereafter). So: $EU(atheism) = \infty = EU(theism)$, where *theism* just is the adoption of a Pascalian theology and *atheism* is the adoption of D.[9] The problem is that as long as a theological alternative has a nonzero, positive probability and a possible infinite utility, an infinite expected utility is generated.

It is here that the concept of decision-robustness comes into play. There are, in any decision problem, three elements: a set of background assumptions, a prudential reason, and a focal proposition.[10] Consider again the mundane problem of whether to carry an umbrella or to leave it at home. One background assumption is the proposition that *one will get wet if outside in the rain without an umbrella*. Although this assumption is less than absolutely certain, revising its probability to unity would not entail a corresponding revision in the outcome of one's deliberation, let's suppose, of leaving the umbrella. One's decision is robust: a slight change in the probability of a

[9] *Ibid.* p. 391. [10] *Ibid.* p. 393.

background assumption entails no change of decision. Moreover, any pragmatic argument which involves a fragile decision, one which is not robust, this objection asserts, thereby fails as a prudential argument.[11]

The problem with this refurbished version of the many-theologies objection is that, along with the Pascalian, it supposes that there is such a thing as an infinite utility.[12] The problem with this supposition is that, if there are infinite utilities, every decision is robust. To see this, consider the umbrella case again. If there is even a remote chance that opening an umbrella incurs an infinite disutility, then the expected utility of that act would be: $EU(\textit{carry umbrella}) = -\infty$. And if there is even a remote chance that being caught without an umbrella in the rain carries an infinite disutility, then $EU(\textit{leave umbrella}) = -\infty$. But then, of course, $EU(\textit{leave umbrella}) = EU(\textit{carry umbrella})$. And this result can be generalized: if there are infinite utilities which possibly attach to actions, then no decision is fragile. The only background revision which could affect the decision outcome is a revision from a positive probability to zero. By supposing that there are infinite utilities, the concepts of robustness and fragility are rendered useless as ways of distinguishing between prudential decisions.

Is there a way of retaining infinite utilities and, yet, circumventing the problem of decision-fragility and, more generally, the many-theologies problem? There is. Although the circumvention entails a significant cost, it involves a principled rejection of the proposition that every possible proposition has a probability greater than zero:

A. *for any proposition B*, $\Diamond B \supset Pr(B) > 0$.[13]

For example, take the proposition that *Jones had parents*. While it is logically possible that Jones had no parents, it would be unreasonable for Jones to assign any value but unity to the proposition that she had parents. If unity is assigned by Jones to the proposition that she had parents, then the denial of that proposition, although logically possible, would receive a zero value. And this assignment seems completely acceptable. The cost of rejecting proposition (A) is that one is thereby placed in a Dutch book situation, such that a clever enough bookie might offer one a series of bets, with odds that seem fair, but are such that one will always incur a net loss. This predicament, however, is a cost justifiably borne since a Dutch book situation is exploitable only if one's bookie is nearly omniscient. Moreover, there seem to be any number of propositions which are both logically possible and

[11] I am only here dealing with one part of fragility objection. Mougin and Sober also argue that finite versions of the wager fall prey to the objection; that a finite version of the wager lacks robustness (see p. 385). I treat that part of their objection in the section, 'A finite wager'.

[12] I do not mean to suggest that, by *supposing* that there are infinite utilities, Mougin and Sober *accept* that there are such things. Nevertheless, the introduction of infinite utilities renders any decision robust.

[13] Although not equivalent, one might understand (A) this way: no contingent proposition can be assigned a probability value of unity or zero.

deserving of a zero assignment. Think of the list of propositions that Moore claims to know, with certainty, in his 'Defence of Common Sense'. It would not be irrational, I think, to assign unity to each of those propositions and, as a consequence, zero probability to their denials, even though doing so incurs a Dutch book situation.

By rejecting proposition (A) one defuses the many-theologies problem without having to relinquish the idea of an infinite utility. If there is nothing beyond mere logical possibility, no credible evidence, in support of what appears to be a cooked-up theology, then one can just set its probability to zero. Without the automatic assignment of infinity to every possible theology, the many-theologies problem cannot arise. There is good reason, then, to conclude that the fragility problem is not lethal to the wager.

THE MIGRATION PROBLEM

This second objection, which we might baptize the *migration problem*, is that if one rejects $(\sim G \,\&\, P)$ on prudential grounds, one can migrate either to $(G \,\&\, P)$, or to $(\sim G \,\&\, D)$, where $G =$ *God exists*, and $P =$ *Pascalian theology*, and $D =$ *deviant theology*, *such that theists are punished and atheists are rewarded posthumously*. While the wager recommends that one migrate from $(\sim G \,\&\, P)$, it does not dictate that $(G \,\&\, P)$ is the terminus of the migration. One might, given certain preferences and beliefs, migrate instead to $(\sim G \,\&\, D)$. Graham Oppy, for instance, classifies the wager as a consistency argument. An argument, that is, which asserts that, on the pain of logical contradiction, if one accepts certain propositions then one must accept also the focal proposition. But, Oppy asserts, 'the most that a consistency argument can do is to show that I need to revise some of my beliefs – but it alone cannot tell me which beliefs need to be adjusted'.[14]

Is the migration problem a decisive objection against the wager? Again, it seems fairly clear that it is not. No argument, sound ones included, can reasonably be expected to be credible to all persons since only those persons who share the presuppositions of an argument will find its premises persuasive. If a person shares or finds plausible the presuppositions of a particular argument, we can say that the argument *is credible* to that person, whether or not the argument is sound, and whether or not the person accepts that the argument is sound. This fact is especially acute with prudential arguments. If a person's beliefs and preferences fit the pragmatic properties of a prudential argument, we can say that that argument is prudentially credible to that person. The wager, like all arguments, has syntactic properties and semantic properties and pragmatic properties and, as a consequence, the wager persuades only those of a certain mind. The migration problem seems

[14] 'On Rescher On Pascal's Wager', pp. 163–6. A version of the migration problem is found also in 'Betting against the wager', p. 387.

entirely unrealistic since it implies that, unless the wager is prudentially credible to all persons, it fails as a prudential argument.

The wager is prudentially credible only to those who consider (G & P) a live hypothesis. A live hypothesis is a proposition whose adoption would not entail widespread and extensive revisions within one's web of beliefs. Whether to become a theist is a live hypothesis for many people, but whether to be, say, a Druid or not isn't. To adopt a Druid theology would entail too many revisions in one's beliefs. The extent of belief-revision is a cost which is properly considered when deciding on prudential grounds which of two alternatives to adopt. If alternative A and alternative B are supported on prudential grounds and are supported to about the same extent, and adopting A requires less by way of belief-revision than adopting B does, then A is the alternative to adopt from a prudential point of view.

As long as (G & P) is a live hypothesis, while D is not, the Pascalian is well supported by prudential considerations to recommend that one migrate from ($\sim G$ & P) to (G & P). Is D a live hypothesis for some? Perhaps, but even if it is that seems no reason to hold that the adoption of theism, motivated by a Pascalian wager, fails as a prudential argument. The adoption of (G & P), given that one rejects ($\sim G$ & P), does assume a certain set of preferences and beliefs and, although this is an empirical matter, it would not be implausible to consider this set standard in the sense of being widely held, especially in contrast to the set of beliefs and preferences which would render D a live hypothesis. And if the set of preferences and beliefs assumed by the wager is standard, then the wager is not afflicted by the migration problem. The migration problem does succeed in reminding us that the wager persuades only those who find persuasive its premises and presuppositions. But this fact is not unique to the wager since it is something true of all arguments about controversial topics. So, the migration objection fails since it imposes an unrealistic demand, and since the set of preferences and beliefs assumed by the wager is, arguably, standard.

THE WAGER AND STANDARD DECISION THEORY

What sense, if any, can be made of the idea of an infinite utility and, further, can the standard axiomatic decision-theoretic constructions accommodate infinite utilities? The key to understanding Pascal's contention that theistic belief provides, if true, an infinite utility is to remember that, according to one widely-accepted version of theistic theology, afterlife is an endless, sublime existence of which each succeeding moment is as saturated in happiness as each preceding one. The idea, then, consists of at least two elements: that there is an endless succession of moments of existence and that, given the special nature of the moments of existence involved here, there is no point of diminishing marginal utility. The value of such an infinitely long and profoundly happy existence is of a magnitude infinitely greater than that of an earthly life. It would be an outcome which is incommensurably greater than any finite good. Is this idea of an infinite utility compatible with standard axiomatic systems of Bayesian decision-theory?

It is not. Standard constructions of decision-theory require that expectation is bounded and, as a consequence, cannot accommodate infinite utilities.[15] As Edward McClennen points out, the Monotonicity axiom of the Luce and Raiffa axiomatization implies that, for two gambles, such that one prefers outcome $O1$ to outcome $O2$ and $Pr(p) > Pr(q)$, where gamble $1 = [O1, 1-p; O2, p]$ and gamble $2 = [O1, 1-q; O2, q]$, one must prefer gamble 1 over gamble 2.[16] Notice, however, the disruption which results from introducing infinite utilities: if the utility of $O1$ is infinite, then $EU(\text{gamble } 1) = \infty = EU(\text{gamble } 2)$. So, the agent must be indifferent between gamble 1 and gamble 2 since, according to the Expectation rule, an agent must be indifferent between gambles which have identical expected utilities. The introduction of infinite utilities results, therefore, in the agent violating either the Monotonicity axiom or the Expectation rule.[17]

The problem can be extended. Any plausibility enjoyed by the Expectation rule is grounded on the axioms of the standard constructions of decision-theory. If one rejects the standard constructions, what reason is there for thinking that the Expectation rule is an appropriate guide when deliberating under conditions of risk? This question is especially acute when the decision involves a single-case bet, as is the case with whether God exists. More generally, is the incompatibility of standard decision-theory and infinite utilities an intractable problem for the Pascalian?

The Pascalian might respond that, for one thing, there is no construction of decision-theory which is without controversy.[18] And, indeed, it is perhaps not surprising that theories constructed for finite utilities, the standard sort, cannot accommodate infinite ones, an unusual sort. Moreover, remembering that the wager is protean, the Pascalian can point out that rational decisions can be framed independently of the standard axiomatic theories, especially since the Pascalian can present the wager in any of its several versions, neither being limited to any one version of the wager nor, apart from the idea of an infinite utility, dependent upon any controversial decision-theoretic principles.

If the Pascalian chooses the strategy of abandoning the bulwark of standard decision theory and opts to strike out on her own, she will need to supply

[15] See, for instance, Richard Jeffrey, *The Logic of Decision* (Chicago: University of Chicago, 1983), pp. 150–63; and see Michael Resnik, *Choices: an Introduction to Decision Theory* (Minneapolis: University of Minnesota Press, 1987), p. 108.

[16] See Edward McClennen, 'Pascal's Wager and Finite Decision Theory', pp. 123–31.

[17] See R. D. Luce and H. Raiffa, *Games and Decisions* (NY: Wiley, 1957), p. 28.

[18] For a powerful critique of the standard axiomatic constructions, quite apart from any Pascalian consideration, see Edward McClennen, *Rationality and Dynamic Choice: Foundational Explorations* (Cambridge: Cambridge UP, 1990).

a reason for thinking that the employment of the Expectation rule, outside of the Bayesian framework of standard decision-theory, is rationally mandated. The prospects of so doing do not appear especially bright since even the law of large numbers will not provide a rational mandate for using the Expectation rule independent of the decision-theoretic framework since the wager is, in a significant sense, a singular bet.

Even if it is true that supporting the rational propriety of employing the Expectation rule outside of the standard constructions is not an insurmountable task, it is such a formidable task that the Pascalian would be well advised to jettison the idea of an infinite utility and all transfinite versions of the wager, and to retain only finite versions of the wager. Would this revision prove a bane to all significant uses of the wager?

Clearly enough, without infinite utilities probability becomes a much more important factor in a decision. Indeed, as Mougin and Sober point out, when employing only finite utilities, it follows that: *If* $Pr(G) < 1$, *then* $EU(theism) > EU(atheism)$ *if and only if* $Pr(G\&P) > Pr(D)$.[19] Where G is *God exists*, and D is some *deviant theology such that atheists are rewarded and theists are punished after death*, and P is *Pascalian theology*. But in the general expectation version of the wager, the probability of G is taken to be extremely low, and, as a consequence, $Pr(G\&P)$ will also be low, even if $Pr(P)$ is quite high. So, it is possible that $Pr(G\&P) < Pr(D)$, even when $Pr(P)$ is quite high and $Pr(D)$ is low. Mougin and Sober conclude from this that the general expectation wager fails as a prudential argument, even if only finite utilities are employed.[20]

Can this conclusion be sustained? It seems to me that it cannot: the general expectation wager, even if finite utilities only are involved, is employable if either of two conditions obtain. If an enormous but finite utility is assigned to the occurrence of theistic afterlife then, while it is true that $EU(atheism) > EU(theism)$ if $Pr(\sim G) >!\ Pr(G)$, it will still be true that $EU(theism) > EU(atheism)$ if $Pr(G) = Pr(\sim G)$, or if $\sim (Pr(\sim G) >!\ Pr(G))$, where the symbol $X >!\ Y$ represents *X is vastly greater than Y*.[21]

What does it mean to say that $Pr(G) = Pr(\sim G)$? The relevant sense here is that G and $\sim G$ are taken to be equiprobable: $1 - Pr(G) = 0{\cdot}5$. Clearly enough in this case, what might be called 'epistemic ambiguity', the EU of believing that God exists will dominate that of disbelief.

A second relevant situation is that of complete uncertainty, a situation in which no determinate probability assignment is made regarding G. The probability of G is taken to be indeterminate. If one takes the probability-

[19] 'Betting Against Pascal's Wager', p. 386. This claim holds, of course, only if $U(theism) = U(atheism)$.
[20] *Ibid.* p. 391.
[21] Assuming that one holds either that $U(theism) >!\ U(nontheism)$; or that $pr(D) = 0$, where D is a deviant theology, such that *theists are punished and atheists rewarded after death*; or that $EU(belief\ in\ EU(theism)) >!\ EU(belief\ in\ EU(D))$. Clearly the first disjunct is standard and the second strikes me as plausible as well. The third disjunct is that the expected utility of holding standard beliefs is much greater than holding nonstandard beliefs.

values to be indeterminate, then, as long as one accepts that $U(\mathit{theism}) >! U(\mathit{atheism})$, a wager-style argument will prevail since a weak dominance principle can be employed to yield the result that one should believe.

Furthermore, the greater the utility assigned to $(G \ \& \ P)$, relative to its decision-theoretic alternatives, the lower the probability of G can be and $EU(G) > !\, EU(\sim G)$ yet obtains. This inverse proportion between the utility of theism and its probability would accommodate those persons who hold that the probability of $\sim G$ is somewhat higher than the probability of G, as long as they hold that the utility of theism swamps that of *atheism*, such that the difference between the expected utility of *theism* and of *atheism* is still in favour of the former.

The finite version of the wager will have, however, a more restricted scope than does the transfinite version. This can be seen by surveying the possible audience of the wager:

(1) *the necessity theist*: one who believes that $Pr(G) = 1$, or would so believe if s/he were to think about it.
(2) *the convinced theist*: one who believes that $1 > Pr(G) > 0.5$, or would so believe if s/he were to think about it.
(3) *the parity agnostic*: one who believes that $Pr(G) = Pr(\sim G)$, or would so believe if s/he were to think about it.
(4) *the indeterminate agnostic*: one who believes that $Pr(G) = ?$ and that $Pr(\sim G) = 1 - Pr(G)$, or would so believe if s/he were to think about it.[22]
(5) *the convinced atheist*: one who believes that $0.5 > Pr(G) > 0$, or would so believe if s/he were to think about it.
(6) *the nonsensical atheist*: one who believes that $Pr(G) = 0$, or would so believe if s/he were to think about it.[23]

Any version of the wager would be redundant to those described by (1) and (2). The transfinite version of the wager would be, presumably, credible to any person described by categories (3), (4) or (5). The finite version of the wager, on the other hand, would be credible to persons described by categories (3) and (4), but only to some persons described by (5). Although drawing a precise line here cannot be done, the wager could well be credible to the upper third of those described by (5) and to at least some in the middle third, but the bottom third of those described by (5) would be, no doubt, beyond the persuasive scope of a finite wager since their probability assessments of theism are significantly less than one-half. So, the number of persons who would find the wager credible, if refurbished in a finite fashion, will be

[22] I assume that the indeterminate agnostic accepts that the focal proposition, *God exists*, is meaningful and has a probability-value. There are those who claim that the focal proposition is nonsense, but I neglect that here.

[23] I ignore the possibility of infinitesimal probability values until the penultimate section, 'Hyperreals to the rescue?', and I ignore entirely the complication of probability intervals.

smaller than the number who would find a transfinite version credible since at least a third of the persons described by (5) are beyond the scope of a finite wager.

Still, any argument which could reasonably sway the agnostic and many of the atheistic, if sound, has an apologetically significant use, even if it is not credible to every person. Neither is it extraordinary that an argument should carry certain presuppositions which limit the class of those who find it credible to those who share those presuppositions. No argument regarding a controversial topic can be credible to all persons. So, although a finite wager may not be credible to all who would find credible a transfinite wager, this in no way implies that the former lacks a legitimate inferential role nor has any apologetic use.[24]

A FINITE WAGER

Although the general expectation version of the wager has a certain allure – one need not pay any heed to the evidence as long as there is some positive probability that God exists – it is an attraction that one should resist since, in addition to its compatibility with standard axiomatic decision theory, a finite wager has assets which render it preferable to its transfinite cousin. For instance, the two problems mentioned earlier, the many-gods objection and the many-theologies objection, cannot rear their most potent guises with a finite version of the wager. The strongest versions of both the many-gods objection and the many-theologies objection depend upon the principle that *infinity multiplied by any finite amount is still infinite*. In order to generate the debilitating embarrassment of Pascalian riches, a proponent of, say, the many-theologies objection contends that for any theology one picks, whether it is genuine or merely cooked-up, there is some small probability that it obtains. And given that infinity multiplied by any finite amount is infinite and that there are an innumerable number of theologies possible, the Pascalian is left with innumerable alternatives recommended by a wager-style calculus.[25] With the finite version of the wager, however, there is no idea of an infinite utility involved and, consequently, there is no troubling infinite expected utility to equalize the alternatives. As a consequence, neither potent version of the objections can arise when the infinite is rejected.[26]

Another asset which adheres to a finite wager is its theological flexibility. Since the notion of an infinite utility, as understood here, entails an endless succession of moments of existence, this is tantamount to saying that the afterlife is everlasting and not timelessly eternal. A transfinite wager, then,

[24] Contra Robert Anderson, 'Recent Criticisms and Defences of Pascal's Wager', *International Journal for the Philosophy of Religion*, **37**/1 (1995), p. 50.

[25] See, for instance, Antony Duff, 'Pascal's Wager and Infinite Utilities', *Analysis* **46** (1986), pp. 107–9.

[26] While there may be some equiprobable alternatives to Pascalian theism which offer the same EU, there would not be an innumerable number of them. Moving to a finite wager pares the list of possible alternatives to Pascalian theism to a more manageable size.

requires that one hold that there is time in heaven, that the afterlife is everlasting and not timelessly eternal. A finite wager carries no such requirement: the afterlife with it can be either timelessly eternal, or everlasting in nature.[27]

Is a finite version of the wager robust? Although the answer to this question depends in part on the beliefs and preferences of the agent involved, it is clear that, given standard beliefs and preferences, a finite version of the wager is as robust as many of our everyday prudential decisions which involve an alternative whose utility, or disutility, swamps the other alternatives.[28] Unless one denies that any such prudential decision is ever prudentially sound, there is no good reason to deny it of a finite wager. For instance, consider a pragmatic argument intended to motivate changes in behaviour and technology regarding the issue of global warming.[29] The idea here is that the prospect of global warming brought on by technological pollution carries such an overwhelming bad EU that it is prudential, even in the absence of conclusive evidence, to take appropriate steps to forestall that prospect. While we may debate the probabilities involved in this decision, there seems to be nothing objectionable in its decision-theoretic structure. If one denies that deviant theologies carry any significant utility, then a finite version of Pascal's wager will be robust.[30]

HYPERREALS TO THE RESCUE?

One response to the foregoing invokes nonstandard decision-theories which employ the concepts of infinitesimals and infinimals found in hyperreal number theory. While the employment of transfinite cardinals with standard decision-theory produces problems, it has been suggested that these problems might be avoided by embedding a Pascalian wager in a nonstandard hyperreal context.[31]

For example, neither subtraction nor division is well-defined for standard Cantorian infinite cardinals, and, as a consequence, all sorts of problems arise when calculating with these cardinals.[32] But, one might substitute the concept of a positive infinimal – a number larger than every positive real number – in place of infinity and employ standard mathematical principles in calculating expected utilities.[33] Or again, one might employ infinitesimals – numbers greater than zero but less than any real number – as measurements

[27] I owe this point to William Lycan. [28] I here redeem the promise of note 11.

[29] See, for instance, David Orr, 'Pascal's Wager and Economics in a Hotter Time', *The Ecologist*, **22** (1992), pp. 42–3.

[30] Can any reason be given for denying that deviant theologies carry a significant utility? One reason that might be considered is that any agent which would punish or reward counter to our standard sense of fairness lacks trustworthiness and is not, thereby, a stable object of utility.

[31] So Jordan Howard Sobel, 'Pascalian Wagers', *Synthese* **108** (1996), pp. 11–61.

[32] See Jeff Jordan, 'Pascal's Wager and Infinite Utilities', *Faith and Philosophy*, **10**/1 (1993), pp. 49–59.

[33] Sobel, *Op. cit.* pp. 47–58.

of probability values. While it is far from clear how one might measure an infinitesimal probability value, their employment would allow a much more fine-grained description of the possible audience of the wager.

Are hyperreals promising for the Pascalian? Perhaps. But there is reason for caution here. For one thing, the employment of hyperreals necessitates a nonstandard construction of decision-theory since standard constructions are compatible with neither infinimals nor infinitesimals. On this score, it seems better for the Pascalian to do away with talk of hyperreals, as well as the infinite, and reside contentedly with a finite wager within the standard constructions of decision-theory. Moreover, it is far from clear how to measure a probability assessment which is less than any real number. In addition, the introduction of hypperreals is also an introduction of an additional layer of complexity. And that does not portend well for the practicality of a hyperreal wager. Remember the wager is not just a theoretical construct, but a pragmatic argument. The wager is an argument intended for widespread use. But if hyperreals are introduced and, as a result, standard number theory and standard decision-theory no longer suffice, the practicality of the wager is compromised. Judith Jarvis Thomson has advised in another context that 'it is a good heuristic in philosophy to be suspicious of views that would shock your grocer'.[34] Something like this is good advice for the Pascalian: one should be suspicious of any version of the wager which one's grocer could not employ.

IN CONCLUSION

There are two primary results which follow from the foregoing. The first is that neither of the problems constitute a fatal objection to Pascal's wager. The second is that a finite version of the wager shorn of any reliance upon the infinite has an apologetically useful employment. By forgoing that reliance the Pascalian will avoid the vexing entanglements of the many-theologies problem and the many-gods objection and, moreover, she can embed the wager within the standard constructions of decision-theory. These assets render the Pascalian well-advised to ignore the transfinite and to focus upon finite versions of the wager.[35]

[34] Gilbert Harman & Judith Jarvis Thomson, *Moral Relativism and Moral Objectivity* (Oxford: Basil Blackwell Press, 1996), p. 211.

[35] Versions of this paper were read at the Society for Philosophy of Religion meeting, Atlanta, GA, February, 1997, Manhattanville College in May 1997, and the University of Delaware in October 1997.