The Possibility of Resurrection and Other Essays in Christian Apologetics

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To my stepchildren
Noël, Eamon, and Claire Lawless

Chapter Five

Probability and Evil

I

In this essay, I will discuss the question whether the evils of the world—the vast amounts of suffering it contains—render the existence of an omnipotent and morally perfect God "improbable." Many philosophers have argued that although the existence of such a God may be logically consistent with these vast amounts of suffering, the existence of this being is nevertheless improbable—very improbable indeed—on the evidence provided by the suffering of human beings and animals. This essay is an attempt to do more clearly and precisely what I did in an essay called "The Problem of Evil, the Problem of Air, and the Problem of Silence."[1] Although the present essay is logically self-contained, it is intended primarily for an audience familiar with the earlier paper.

What sort of probability is it that figures in the thesis that the evils of the world render the existence of God improbable? Most of the philosophers who have argued for this thesis would, I think, say that the relevant notion of probability was "epistemic probability." But how is this notion to be spelled out? Paul Draper has proposed that we understand the notion of the epistemic probability of a proposition in terms of the "degree of belief" that a fully rational person would have in that proposition in a given "epistemic situation,"[2] and this proposal would seem to be fairly standard. At any rate, it represents the line of thinking about epistemic probability that I will pursue. But in attempting to understand Draper's proposal, I face a difficulty right at the outset: I do not understand the notion of "degrees of belief." It seems evident to me that to believe that p is to accept the proposition that p, and that acceptance of a proposition is not a matter of degree: One either accepts a given proposition or one does not accept it (which, of course is not the same thing as accepting its denial).[3] But if I do not understand the notion of degrees of belief, I understand one of the explanations that philosophers have provided for this notion, and I can let the *explanans* serve as a substitute for the *explanandum*. That is, I shall use the *explanans* that certain philosophers have provided for 'degrees of belief' to define 'epistemic probability' without reference to the dubious notion of degrees of belief.

Philosophers of probability have sometimes attempted to explain the concept "degree of belief" in behavioral terms: in terms of the odds that the person to whom degrees of belief are being ascribed would be willing to give on a bet. This idea may be formulated by reference to the bets of an "ideal bookmaker." If I am an ideal bookmaker, then: I accept bets at my discretion; I'm interested only in maximizing my winnings (I have no other interest in money); I need fear no losing streak, however long, for I can borrow any amount at no interest for any period; I am in a situation in which it is possible to settle any bet objectively; my "clients" always pay when they lose, and they never have "inside information"—that is, information not available to *me*—about the matter being betted on; and so on (add such further clauses as you deem necessary). Suppose also that there is only one way for an "ideal bookmaker" to accept a bet: People come to him and say things of the form, "I'll bet you *k* dollars that *p*. Will you give me odds of *m* to *n*?" ("I'll bet you ten dollars that the sun will not rise tomorrow. Will you give me odds of 10 to 1?" This is equivalent to: "Will you agree to pay me 100 dollars if the sun does not rise tomorrow, provided that I agree to pay you ten dollars if it does?") When a bet is offered in this form, an "ideal bookmaker" must either take it or leave it: No negotiation about the odds or anything else is allowed. (An ideal bookmaker never declines a bet because of the amount the bettor puts on the table: No bet is too small, and—because of his enviable credit situation—no bet is too large.)

Now that we have the concept of an ideal bookmaker, we may define the notion of epistemic probability—"directly," as it were, without reference to the idea of degrees of belief. Before stating the definition, I will give an example that illustrates the intuitions that underlie the definition. Suppose a fair die is to be thrown. What is the "epistemic probability" (relative to my present epistemic situation) of its falling 2, 3, 5, or 6? The following thought-experiment suggests a way to approach this question. I imagine that I am an ideal bookie, and I say to myself, "Suppose someone said to me, 'I'll bet you twenty dollars [or whatever; the amount is irrelevant] that the die will fall 2, 3, 5, or 6.' What odds should I be willing to give him (assuming that I am fully rational)?" If there is nothing very unusual about my present epistemic situation, the answer is obvious: I should be willing to give him any odds lower than 1 to 2. (I should, for example, accept the bet if he proposed odds of 9 to 20: I should be willing to pay him nine dollars if the die fell 2, 3, 5, or 6, provided that he agreed to pay me twenty dollars—the amount of his bet—if it fell 1 or 4.) I therefore—it seems evident—manifest in my behavior a belief that "it's 2 to 1 that" the die will fall the way he has bet; that is, I must regard the probability of the die's falling 2, 3, 5, or 6 as equal to 2/3. And this value—it seems evident—should be the "epistemic probability" of the die's so falling for someone in my epistemic situation. The intuitions behind these judgments may be generalized and the generalization treated as a definition:

> The epistemic probability of *p* relative to (the epistemic situation) K $=_{df}$
> (1) 0 if a fully rational ideal bookmaker in K would be willing to give any odds to a client who bet that *p*;
> (2) 1 if a fully rational ideal bookmaker in K would be willing to give any odds to a client who bet that not-*p*;
> (3) $n/(m+n)$ otherwise, where *m* and *n* are determined as follows: *m* to *n* are the highest odds that have the following property: A fully rational ideal bookmaker in K would be willing to give a client who bet that *p* any odds lower than those odds.

This definition immediately suggests a question. What is it that *makes* it rational or irrational (in a given set of circumstances) to be willing to accept a bet that *p* at the odds *m* to *n*? Well, let us look at an example. Consider again the case in which someone wants to bet me that a die will fall 2, 3, 5, or 6. I said that in such a case, at least if I am an ideal bookmaker, it would be rational for me to take the bet at any odds less than 1 to 2 (and at no higher odds). Let us ask a simple, obvious question. *Why*, exactly, would that be the rational determination of the odds I should accept? Only one answer seems plausible: Because I judge that it is rational for me to accept the thesis that the *real, objective* probability of the die's falling 2, 3, 5, or 6 is ⅔. If I did not make that judgment (perhaps because I had reason to believe that the die was biased), I should not take the bet at all or I should figure the odds differently. In my view, this answer may be generalized: Epistemic probabilities exist only in cases in which it is possible to make reasonable judgments about certain real, objective probabilities. (I accept this rather vague principle despite the fact that there are tricky problems about how to apply it in certain cases. A rational ideal bookie would be willing to give you any odds lower than 9 to 1 on a bet that the billionth digit in the decimal part of π—as yet not calculated—would turn out to be '6'. But the real, objective probability of its being '6' is either 0 or 1; whichever it is, it is certainly not 0.1, which is, by our definition, the epistemic probability relative to our present epistemic situation that the billionth digit in the decimal part of is '6'. I believe, however, that the rationality of those odds does depend on the fact that a certain judgment of real, objective probability is rational. Something like this one: The real, objective probability that a randomly selected digit in the decimal part of π will be '6' is 0.1. I concede, however, that providing a decent explanation of why the rationality of accepting this proposition justifies accepting any odds lower than 9 to 1 in a bet that a *specified* digit in the decimal part of π will turn out to be '6' would not be a trivial task.)

Epistemic probability, then, is not a "ground-floor" concept—either in epistemology or in the philosophy of probability. Epistemic probability is to be explained in terms of the concept of real, objective probability and some epistemic concept or concepts, such as the concept of rational belief. Consequently, anyone who refuses to believe in real, objective probability should refuse to believe in epistemic probability as well. In typical cases, the only possible way to arrive at the conclusion that m to n are the highest odds such that a rational ideal bookie would accept a bet that p at any odds lower than m to n is *first* to determine what it is rational to believe that the real, objective probability of p is. (Then one calculates as follows: If this probability is i/j, set $m = j-i$ and $n = i$.) In *all* cases, a rational judgment about the real, objective probability of *some* proposition is required. Since epistemic probability is not a ground-floor concept we need attend to it no further. Since it is to be understood in terms of real, objective probability and various epistemic notions, any argument that is formulated in terms of epistemic probability can be given an equivalent formulation in terms of what judgments about objective probability it is rational for one to make in a given epistemic situation. The arguments of the sequel will be formulated in these terms.

But what is "real, objective probability"—or, as I shall say, what is "alethic probability" (a designation formed on the model of "alethic modality")? What I shall say about objective or alethic probability represents my own understanding of this thorny concept. The account I shall give presupposes some sort of modal realism, and it presupposes that real, objective probabilities attach not only to propositions about cards and dice and balls in urns and nuns over fifty who die in motorcycle accidents (that is, not only to propositions concerning the probability of choosing an object having a certain property when one chooses at random a member of a large set of actual objects), but to a much wider class of propositions. Examples of propositions in this wider class are: the proposition that my wife will quit her job within six months (the probability of this proposition is not to be identified with the probability of, for example, a fifty-two-year-old psychiatric nurse's quitting his or her job within six months, despite the fact that my wife is a fifty-two-year-old psychiatric nurse, and the same point applies to any large, well-defined set of objects to which she belongs); the proposition that God exists; the proposition that there are vast amounts of animal suffering in nature.

Let us suppose that some sets of possible worlds have unique *measures*; these measure the proportion of logical space (of the whole set of worlds) occupied by these sets. (See the Appendix to this chapter for some constraints on the concept of a measure on a set of worlds.) And let us further suppose that all of the sets of worlds in which we shall be interested in this essay are among those that have such measures. The alethic probability of a proposition is the measure of the set of worlds in which it is true. The conditional alethic probability of the proposition p on the proposition q (where the set of worlds in which q is true is not of measure 0) is the proportion of the region of logical space occupied by worlds in which q is true that is occupied by worlds in which p is true.[4] For example, if 13 percent of the region occupied by worlds in which A is true is occupied by worlds in which B is true, then the conditional alethic probability of B on A is 0.13.[5] In the sequel, I shall frequently use phrases of the form, 'the proportion of the p-worlds that are q-worlds'. Such phrases are to be understood as abbreviations of the corresponding phrases of the form 'the proportion of the region of logical space occupied by worlds in which p is true that is occupied by worlds in which q is true'.

An example may help to tie this together. The conditional alethic probability of the proposition that there is intelligent life on other planets in the galaxy on the proposition that Project Ozma has negative results until the year 2010 is the proportion of the (Project Ozma has negative results until the year 2010)-worlds in which there is intelligent life on other planets in the galaxy.

We make judgments of alethic probability, both in everyday life and in the sciences. (Or we do in effect. The concepts I have introduced may not be part of the cognitive repertory of most people, but most people make judgments that entail and judgments that are entailed by propositions that are alethic probability-judgments in the present sense.[6]) And it would seem that very often such judgments are justified. For example, I judge that the conditional alethic probability of the sun's rising tomorrow on the present state of things is nearly unity, that the conditional alethic probability that the number of Douglas firs in Canada is odd is 0.5 on the proposition that I am in my present epistemic situation, that the unconditional alethic probability of α's being actual (where 'α' is a proper name of the actual world) is 0, and that the conditional alethic probability of there being intelligent bacteria on the proposition that there exists a physical universe is 0. Of course I could be wrong about these things; I *could* be wrong about almost anything. Nevertheless, I could give cogent arguments (or so they seem to me) in support of these probability-judgments, and I *believe* that they are fully justified.

If there are cases in which it is rational to assign alethic probabilities to various propositions, there are other cases in which one is simply not in a position to make any judgment about the probabilities of certain propositions. (From now on, I shall usually drop the qualification 'alethic' and speak simply of probabilities.) This is hardly surprising. One reason it should not be regarded as surprising can be easily grasped by reflection on the fact that probability-judgments are judgments of proportion, judgments about the proportion of a region of logical space that is occupied by some subregion of that region. And—leaving aside for the moment the particular case of judgments about proportions of logical space and considering judgments of proportion in the abstract—it is evident that there are cases in which we are not in a position to make certain judgments of proportion.

I have drawn one of the numbers from 0 to 100 in a fair drawing from a hat, but I am not going to tell you what it is. I have put that many black balls into an empty urn and have then added 100-minus-that-many white balls. Now: What proportion of the balls in the urn are black? You have no way of answering this question: No answer you could give is epistemically defensible: "35 percent" is no better than "6 percent," "about half" is no better than "about a quarter," "a large proportion" is no better than "a small proportion," and so on.[7]

Ask me what proportion of the galaxies other than our own contain intelligent life, and I'll have to say that I don't know; no answer I could give is epistemically defensible for me. The answer could be "all" or "none" or "all but a few" or "about half." I see no reason to prefer any possible answer to this question to any of its equally specific competitors. Or such is my judgment. I could be wrong about the implications of what I think I know, but, then, as I say, I could be wrong about almost anything.

I conclude, therefore, that there are cases in which one is not in an epistemic position to give any answer to a question of the form, "What proportion of the Fs are Gs?" There would seem to be no reason to suppose that this general principle about judgments of proportionality is inapplicable in the case of regions of logical space. And it seems evident that it does apply in that case.

What proportion of the possible worlds in which things happen exactly as they have happened in the actual world before 1997 are worlds in which there is a devastating thermonuclear war between 1997 and 2097? In what proportion of them is there discovered a surveyable proof of the four-color theorem during that period? I, at least, do not profess to have any idea about what the right answers to these questions are. That is, I do not profess to have any idea of the probability (conditional on things being as they now are) of the occurrence of a thermonuclear war or the discovery of a surveyable proof of the four-color theorem during the next 100 years. In what proportion of the worlds in which I am now in my present actual epistemic situation does either of these things happen in the next 100 years? Again, I have no idea.

There are, therefore, cases in which someone is not in a position to make any judgment about the proportion of the worlds having the feature F that also have the feature G—just as there are cases in which someone is not in a position to make any judgment about the proportion of the galaxies that have a certain feature. And just as one may offer cogent arguments for the conclusion that no one is in an epistemic position to make any judgment about what proportion of the galaxies have a certain feature, there are cases in which one may offer cogent arguments for the conclusion that no one is in an epistemic position to make any judgment about what proportion of the worlds that have F also have G. In general, such arguments will not be proofs. They will have to be judged by the same standards that we employ in evaluating philosophical or political or historical arguments. The standards that are appropriately applied to such arguments are like the standards that are appropriately applied in the cases of arguments for nominalism or the military value of the Stealth bomber or the importance of the exhaustion of the Spanish silver mines for an understanding of late Roman politics.

We shall now, armed with the above discussion of probability, examine the "probabilistic Argument from Evil," the argument that is supposed to show that it is improbable that there exists an omnipotent and morally perfect being, given what we know about the evils of the world. More exactly, we shall examine one version of it, the version I believe to be the strongest and most compelling.[8]

I will present this version of the argument in terms of the idea that I have used to explain alethic probability: that regions of logical space (or at least all of them that correspond to the propositions that figure in the argument) have measures that satisfy the constraints set out in the Appendix. It will be seen that this allows us to bring to bear on the argument our intuitive capacities for making judgments of relative size and proportion. This will be useful, because we have employed these intuitive capacities all our lives in our reasoning about regions of ordinary, physical space and about sets of discrete items.

Here is the argument. Let S be a proposition that (correctly and in great detail and with some claim to completeness) describes the amounts and the kinds and the distribution of the sufferings of human beings and all other sentient creatures. Let **HI** (for "hypothesis of impersonality") be the proposition that the amounts and the kinds and the distribution of the sufferings of human beings and all other sentient creatures are due entirely to blind, impersonal forces. Let "Theism" be just what the name implies—with the understanding that whatever else this proposition may entail, it entails the falsity of **HI**.

Now consider three regions of logical space, those in which, respectively, S, **HI**, and Theism are true. (I will identify a proposition with the region of logical space in which it is true. This identification is an aid to concision and is not essential to the argument. Given this identification, p & q is simply the region of logical space common to p and q.) And let us assume that **HI** and Theism are of the same size (have the same measure) or at least that neither is significantly larger than the other. Given what it seems reasonable to expect if Theism is true and what it seems reasonable to expect if the hypothesis of indifference is true, there is a good prima facie case for saying that the

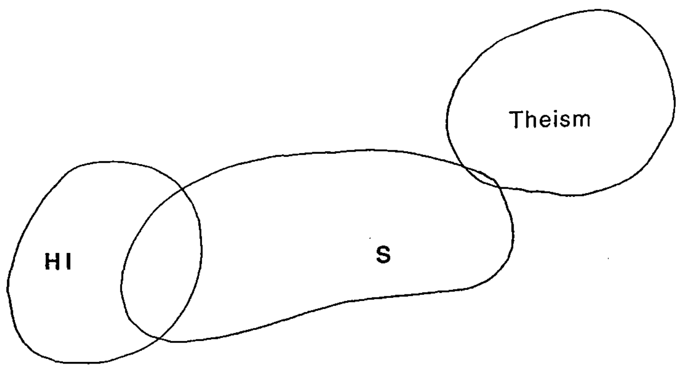

FIGURE 5.1

proportion of HI that overlaps S is much larger than the proportion of Theism that overlaps S. Given that HI and Theism are of the same size, it follows that the part of S that overlaps HI is much larger than the part of S that overlaps Theism. We may represent this diagrammatically (two features of the diagram are without significance: the way the diagram represents the size of S relative to the sizes of HI and Theism and the way it represents the proportion of S that overlaps neither HI nor Theism). The actual world, α, must fall within S. Hence, in the absence of further relevant considerations, the thesis that α falls within HI is epistemically preferable to the thesis that α falls within Theism. (Compare the following judgment about physical space: If a meteor has fallen somewhere within the United States, then in the absence of further relevant considerations, the thesis that it has fallen in Texas is epistemically preferable to the thesis that it has fallen in Rhode Island.) But if *p* and *q* are inconsistent and *p* is epistemically preferable to *q*, then it is not reasonable to accept *q*. Hence, the theist who wishes to be reasonable must find "further relevant considerations." The theist must either refute the strong prima facie case for the thesis that the above diagram correctly represents the relative sizes of the region HI & S and the region Theism & S, or the theist must accept the diagram and present an argument for Theism, an argument for the conclusion that α falls within Theism[9] (and hence within Theism & S, a very small region of logical space). If the diagram is correct, therefore, an argument for Theism would be in effect an argument for the conclusion that α falls within a very small region of logical space (relative to the "competing" regions that surround it). It would, in consequence, have to be a very strong argument to carry much conviction, and even weak arguments for Theism (as opposed to arguments for the existence of a designer of the world or a first cause or a necessary being) are in short supply.

The theist, therefore, has only one option: to refute the prima facie case for the correctness of the probability-judgments displayed in the diagram. There is, in practice, only one way to do this.[10] The theist must provide a *theodicy*[11]—a proposition (region of logical space) *h* that has the following two features:

- *h* overlaps a large proportion of Theism;
- S overlaps a large proportion of Theism & *h*.[12]

This will force us to redraw the diagram (the reader is invited to try it), since it will have the consequence that Theism must overlap a part of S significantly larger than the one shown in the diagram. We should then have to admit that (given that HI and Theism are of equal size) the prima facie case for the conclusion that the proportion of HI that overlaps S is much larger than the proportion of Theism that overlaps S has been overcome.

Here is a spatial analogy. Two nonoverlapping storm systems of equal size, East and West, overlap the United States. There is a prima facie case for the thesis that the proportion of West that overlaps the United States is much larger than the proportion of East that overlaps the United States. Therefore, the part of the United States that overlaps West ("U.S./West") is, prima facie, much larger than the part of the United States that overlaps East ("U.S./East"). Therefore, in the absence of further relevant considerations, the thesis that a particular person, Alice (whom we know to be somewhere in the United States), is in U.S./West is epistemically preferable to the thesis that Alice is in U.S./East. Therefore, anyone who believes that Alice is in U.S./East is unreasonable, unless he can do one of two things: give an argument for the conclusion that Alice is in U.S./East (and it will have to be a fairly strong argument, owing to the fact that U.S./East is known to be considerably less than half the United States) *or* find a geographical region *r* that has the following two features:

- *r* overlaps a large proportion of the total region occupied by East;
- the United States overlaps a large proportion of the region common to *r* and the total region occupied by East.

If we could find such a region, then, because East and West are of equal size, we should have refuted the prima facie case for the thesis that the proportion of West that overlapped the United States was much larger than the proportion of East that overlapped the United States.

To meet the evidential challenge to Theism that we have set out, the theist must discover a theodicy. But no theodicy is known: Nothing that has ever been described as a theodicy is a theodicy in the present sense of the word. Therefore, the strong prima facie case for the conclusion that HI is epistemically preferable to Theism has not been answered. Therefore, it is not reasonable to accept Theism.

This is the evidential Argument from Evil. In the following section, I shall present a reply to this argument. The reply will be a reconstruction of some points made in of "The Problem of Evil, the Problem of Air, and the Problem of Silence."

II

The most important thing I tried to do in "The Problem of Evil, the Problem of Air, and the Problem of Silence" may be described in our present terminology as follows: to argue for the proposition

> We are not in an epistemic position to judge that only a small proportion of Theism overlaps S.

I proposed (in effect) the following principle:

> We are not in a position to judge that only a small proportion of the *p*-worlds are *q*-worlds if there is a proposition *h* that has the following two features:
>
> - a large proportion of the *p*-&-*h*-worlds are *q*-worlds;
> - we are not in a position to make a judgment about the proportion of the *p*-worlds that are *h*-worlds.[13]

(If 'Theism' is substituted for '*p*' and 'S' for '*q*' in this principle, a proposition that satisfies both the conditions contained in the resulting proposition may be called a "defense"—as opposed to a theodicy. A defense is simply a proposition *h* such that S is highly probable on Theism & *h* and such that we are not in a position to make a judgment about how probable *h* is, given Theism. The conclusion of "The Problem of Evil, the Problem of Air, and the Problem of Silence" might be summarized in these words: To answer the probabilistic Argument from Evil, to meet the "evidential challenge" that S presents to Theism, it is not necessary to construct a theodicy; a defense suffices. For if we have a defense and if the principle is correct, then it follows that we are not in a position to make any judgment about how probable S is, given Theism. And, therefore, we are not in a position to judge that the probability of S on Theism is low; but that the probability of S on Theism is low is the central premise of the evidential Argument from Evil.)

This principle is simply an application to the special case of judgments concerning proportions of regions of logical space of a general form of reasoning that we should find it very hard to reject in the case of other sorts of judgment of proportion. Let us consider two examples, one involving proportions of geographical regions and the other involving proportions of finite sets of discrete items.

> We are not in a position to judge that only a small proportion of Spain is arable if, for a certain geographical region R, Spain and R overlap and most of the Spain-R overlap is arable and we are not in a position to make any judgment about the proportion of Spain that overlaps R.

> We are not in a position to judge that only a small proportion of the balls now in the urn are black if some balls have just been added and if most of the balls that were just added are black and we are not in a position to make any judgment about what proportion of the balls now in the urn are ones that were just added.

Both of these judgments seem undeniably correct. (They would be correct even if we knew that no part of Spain outside R was arable and that none of the original balls in the urn was black.)

In "The Problem of Evil, the Problem of Air, and the Problem of Silence," I proposed a certain hypothesis I shall call D (for 'defense').[14] I argued that a very high proportion of the Theism-&-D-worlds are S-worlds (all of them, as far as I can judge) and that no one is in an epistemic position to offer any answer to the question, What proportion of the Theism-worlds are D-worlds?[15]

If I am right about D, it follows (by the above epistemic principle) that no one is in a position to judge that only a small proportion of the Theism-worlds are S-worlds.[16] And, therefore, no one is in a position to judge that the proportion of the HI-worlds that are S-worlds is "much greater" than the proportion of the Theism-worlds that are S-worlds.[17] The probabilistic Argument from Evil therefore fails.

It has been argued[18] that this strategy, if it were generally applied, would make it all but impossible to use probabilistic reasoning to establish epistemic conclusions. Consider, for example, the following argument for the conclusion that it would be unreasonable for us to believe that smoking was safe—that is, did not *cause* serious diseases—if we knew that the following proposition

> MLC Smokers get lung cancer much more frequently than nonsmokers

was true (and knew nothing else that was relevant to the question whether smoking was safe). If we were in that epistemic situation, we could reason as follows:

> Let 'SS' abbreviate 'Smoking is safe', and let 'SLC' abbreviate 'Smoking causes lung cancer'. It is evident that the following probability-judgment is prima facie correct:
>
> P(MLC/SLC) >> P(MLC/SS).

> But this shows that MLC presents an evidential challenge to SS, a challenge that could be met only by discovering either a strong argument for the conclusion that there was a reasonably high antecedent probability that smoking was safe or else some way to overcome the prima facie correctness of the probability-judgment 'P(MLC/SLC) >> P(MLC/SS)'. And neither of these things can be done. SLC is therefore epistemically preferable to SS (with which it is inconsistent). It is therefore unreasonable to accept SS.

This argument is obviously cogent. Anyone in the epistemic situation we have imagined who has considered it should be convinced by it and should accept its conclusion. (If an argument is wanted for the prima facie correctness of the probability judgment 'P(MLC/SLC) >> P(MLC/SS)', here is one that I find convincing. When I think about it, it seems fairly evident to me that the proportion of the smoking-causes-lung-cancer-worlds in which smokers get lung cancer much more frequently than nonsmokers must be—unless there is some relevant factor that I have not thought of—far greater than the proportion of the smoking-is-safe-worlds in which smokers get lung cancer much more frequently than nonsmokers. If I were asked to defend this judgment, I would list possible kinds of explanation of smokers' getting more lung cancer than nonsmokers that did not depend on the causal agency of the habit itself, and I would argue that because these explanations postulated very special sets of circumstances, they were intrinsically improbable. But my argument would, in the last analysis, have to be based on intuitive judgments of probability.)

But—the critic of my response to the probabilistic Argument from Evil contends—if the strategy I employed above for meeting the evidential challenge that S presents to Theism could be applied in the case of any evidential challenge, someone who believed that smoking was safe could meet the evidential challenge that MLC presents to SS simply by contriving the following "defense":

> GENET Lung cancer is due to genetic causes, and people who are genetically predisposed to lung cancer are genetically predisposed to smoke.

If the critic's contention is correct, it is a grave blow to if not a refutation of my reply to the probabilistic Argument from Evil. For the above probability-judgment is not only prima facie correct, but it seems evident that unless a person in the epistemic situation we have imagined could discover either a pretty strong argument for the conclusion that smoking was probably safe or else some way to overcome the prima facie correctness of the probability-judgment 'P(MLC/SLC) >> P(MLC/SS)', then it would not be reasonable for that person to believe that smoking was safe. (It does not follow that it would be reasonable for that person to believe that smoking caused lung cancer. Our real-world knowledge that smoking causes lung cancer is based on the work of epidemiologists who have done far more than establish a positive correlation between smoking and lung cancer. They, have, for example, discovered evidence that conclusively rules out GENET.) And merely calling attention to the hypothesis I have labeled GENET does nothing to undermine the prima facie correctness of the probability-judgment 'P(MLC/SLC) >> P(MLC/SS)'.

But *am* I committed to the thesis that GENET can be used as a "defense" to block the evidential challenge to the thesis that smoking is safe that is provided by MLC? An argument parallel to my counterargument to the probabilistic Argument from Evil (one that employed GENET in the role I gave to D) would go like this:

> We are not in an epistemic position to judge that only a small proportion of the SS-worlds are MLC-worlds, owing to the fact that most SS-&-GENET-worlds are MLC-worlds, and we are not in an epistemic position to make any judgment about the proportion of the SS-worlds that are GENET-worlds.

But we *are* in an epistemic position to make a judgment about the proportion of the SS-worlds that are GENET-worlds. We are in an epistemic position to make the judgment that this proportion is very low. Surely only a very small proportion of the worlds in which smoking is safe are worlds in which there is such a thing as lung cancer and it has a genetic cause and the very same factors that genetically predispose people to get lung cancer also genetically predispose people to smoke? (What proportion of the worlds in which it's safe to wear gold jewelry are worlds in which skin cancer has a genetic cause and the very same genetic factors that predispose people to skin cancer also predispose them to enjoy wearing gold jewelry?) Suppose that you know that you are somehow to be "placed" in a world in which smoking is safe, a world that has been chosen at random from among all the worlds in which smoking is safe. How likely do you think it is that you will find that in this world lung cancer exists, has a genetic cause, and, moreover, has a genetic cause that predisposes people to smoke? *I* wouldn't bet on this complex of factors turning up. I suppose my reasoning is that in general, in the absence of further considerations, worlds in which two things that are logically and causally unrelated (save, possibly, by a common cause) have a common cause must be "rare"; worlds in which a taste for avocados and the enjoyment of medieval Latin lyrics have a common cause (genetic or social or whatever), do not, I would judge, collectively take up much logical space. In any case, if I were not in a position to judge that only a small proportion of SS-worlds were GENET-worlds, I should not have been able to give the argument that convinced me that the probability-judgment 'P(MLC/SLC) >> P(MLC/SS)' was prima facie correct: I should not have been able to say, "The proportion of the smoking-ishazardous-worlds in which smokers get lung cancer much more frequently than nonsmokers is—unless there is some relevant factor that I have not thought of—far greater than the proportion of the smoking-is-safe-worlds in which smokers get lung cancer much more frequently than nonsmokers." I was able to make this judgment only because I was able to judge that the proportion of smoking-is-safe-worlds in which smokers get lung cancer much more frequently than nonsmokers is low. And I should not have been able to make this judgment if I were not in a position to judge that only a small proportion of SS-worlds are GENET-worlds.[19] Indeed, much of the argument of the present paragraph is no more than a spelling out of the reasons I had initially for accepting the prima facie credibility of the judgment 'P(MLC/SLC) >> P(MLC/SS)'.

Appendix: Constraints on the Concept of a Measure on a Set of Worlds

We adopt the following conventions concerning and constraints on the notion of the measure of a set of worlds. All measures are real numbers between (and including) 0 and 1 (there are, therefore, no infinitesimal measures); the measure of the whole of logical space is 1, and the measure of the empty set is 0; if a set (*sc.* of worlds) has a measure, then its union with a set x has a measure iff x has a measure; if a set is exhaustively decomposed into a finite number of nonoverlapping subsets each of which has a measure, the measure of this set (by the previous statement it has a measure) is the sum of the measures of those subsets; if a set of measure P has n members, where n is finite (and not 0), an m-membered subset of that set has the measure $m\ P/n$; if there are infinitely many possible worlds, any set of lower cardinality than the whole set has measure 0. It should be noted that these statements *define* "measure" only if the number of possible worlds is finite. If there are infinitely many worlds—and surely there are?—the notion of the measure of a set of worlds gets most of such content as it has from the intuitive notion of the proportion of logical space that a set of worlds occupies.

In the text of the essay, I sometimes speak of the proportion of logical space that a set of worlds occupies as its "size." "Size" in this sense must be carefully distinguished from cardinality. The cardinality of a set may indeed be said to measure its "size" in one perfectly good sense of the word, but there are other measures of the "sizes" of certain sets, measures that are in general independent of cardinality. In point-set topology, for example, regions of space are identified with sets of points, and some regions are assigned such cardinality-independent measures of size as length, area, and volume. There is obviously a close conceptual connection between such measures and the concept of probability. Suppose, for example, that darts are thrown at a wall "at random" or "without bias" (i.e., by a method that favors no point on or region of the wall). The probability that a given dart that strikes the wall will strike a given region of the wall is the proportion of the whole wall that is occupied by that region: the ratio of the area of that region to the area of the whole wall. It is this conceptual connection between probability and area (and length and volume) that is the reason for the heuristic utility of thinking of the set of all worlds as forming a space such that many of its subsets may be assigned measures of size that (like length, area, and volume in respect of sets of points in space) are not in general functions of their cardinality. Just as two sets of points of the same cardinality may be "spread out" in such a way as to occupy different proportions of some region of the plane, so two sets of worlds of the same cardinality may be "spread out" in such a way as to occupy different proportions of logical space. Do we understand these ideas, the idea of sets of worlds being "spread out in logical space" and the idea of their having measures that depend not only on their cardinalities but also on the way they are spread out? In my view, we understand them as well or as badly as we understand the assignment of (real, objective) numerical probabilities to propositions like "My wife will quit her job within six months" or "God exists" or "There exist vast amounts of animal suffering in the natural world." This, at any rate, is true in my case.

Notes

1. "The Problem of Evil, the Problem of Air, and the Problem of Silence," *Philosophical Perspectives* 5 (1991): 135–165. Reprinted in Daniel Howard-Snyder, ed., *The Evidential Argument from Evil* (Bloomington: Indiana University Press, 1996), pp. 151–174, and in Peter van Inwagen, *God, Knowledge, and Mystery: Essays in Philosophical Theology* (Ithaca, N.Y.: Cornell University Press, 1995), pp. 66–95. The present essay is an adaptation of parts of a long essay called "Reflections on the Essays of Draper, Gale, and Russell," which also appeared in *The Evidential Argument from Evil* (pp. 219–243). That essay was a reply to three essays critical of "The Problem of Evil, the Problem of Air, and the Problem of Silence" that were included in *The Evidential Argument from Evil.* The purpose of the present essay is to present some of the arguments of "Reflections on the Essays of Draper, Gale, and Russell" in a way that is independent of those three critical essays.

2. See Paul Draper, "Pain and Pleasure: An Evidential Problem for Theists," *Noûs* 23 (1989): 331–350. See especially p. 349, n. 2.

3. Matters of vagueness aside. The relation "acceptance" that (in my view) holds between certain persons and certain propositions is vague in the same sense—whatever that sense may be—as the relations "is the same color as" or "is a friend of" or "has seriously injured." If, say, Alice, who until recently has been a convinced Christian, is undergoing a deep crisis of faith, there may be no definite answer to the

question whether, at the present moment, she accepts the proposition that Jesus was raised from the dead. It may be simply *indeterminate* whether she accepts this proposition. But I very much doubt whether what philosophers have meant by "degrees of belief" has anything to do with the fact that acceptance is, like almost all the relations that figure in our everyday discourse, in some sense vague.

4. Or, equivalently, the ratio of the measure of the set of worlds in which both p and q are true to the measure of the set of worlds in which q is true. This definition (in either form) can have counterintuitive consequences if the number of worlds is infinite and q is true in only a finite number of worlds. Consequently, one might want to define conditional probability "separately" for this case. I shall not bother about this very special case.

5. I have defined both the alethic probability of a proposition and the alethic probability of a proposition conditional on another proposition. I have not defined conditional *epistemic* probability, and how to do so is an interesting question. But since I shall be conducting my argument solely in terms of (what it is rational to believe about) alethic probabilities, I shall not need to answer it.

6. I concede that "pure" judgments of unconditional alethic probability are pretty rare, since the unconditional alethic probability of most propositions that interest us is either very, very large or very, very small. The true unconditional alethic probability of the proposition that the sun will rise tomorrow is (I should imagine) very, very small, since the portion of logical space in which the sun so much as exists is (I should imagine) very, very small—perhaps of 0 measure. (Stephen Hawking has said that it is quite plausible to suppose that the set of worlds in which there is organic life is of 0 measure.) And if this is so, then the unconditional alethic probability of the *denial* of this proposition is very, very large; perhaps 1. I take it that when we apparently say that certain propositions have real, objective probabilities like ⅔ or 0.7116, we are actually making this statement about their conditional probability on some "understood" proposition—perhaps in many cases the proposition that records the state of things in the actual world at the time of utterance. And this would also seem to be the case even with many judgments that apparently assign propositions unconditional probabilities close to 0 or 1. For example, the judgment that the (real, objective) probability that the sun will rise tomorrow is very near to unity is best understood as the judgment that in almost the entirety of that region of logical space in which things are as they are at present in the actual world, the sun rises tomorrow.

The judgments of real, objective probability that a rational bookmaker uses to calculate odds are usually judgments conditional on an hypothesis involving his epistemic situation at the time of the calculation. When, for example, he judges that the real, objective probability of *this* die's falling 2, 3, 5, or 6 a moment from *now* is ⅔, he is not judging that this or any die falls that way a moment from now in two-thirds of the whole of logical space (or even in two-thirds of the region of logical space in which things are exactly as they are at present in the actual world, for that might be false given strict, causal determinism—which he may not be in a position to rule out); rather he is judging that in two-thirds of the region of logical space in which he is in *this* epistemic situation and *this* die (or perhaps the die that plays *this* role in relation to someone in this epistemic situation?) is thrown in a moment, it falls 2, 3, 5, or 6.

7. More exactly, no answer is better than any *equally specific* competing answer. Of course there are answers like "between 1 percent and 90 percent" that have a pretty good crack at being right. But this answer is no better than "between 7 percent and 96 percent" or "either between 4 percent and 6 percent or else between 10 percent and 97 percent."

8. This argument is based on Draper's "Pain and Pleasure.".

9. Or, more generally, an argument for some thesis that would undermine the prima facie credibility of the proposition that HI is epistemically preferable to Theism. Arguments for the conclusion that α does not fall within HI or for the conclusion that it is more plausible to suppose that α falls within Theism than within HI are other possibilities. For the sake of simplicity, I will not discuss other possibilities.

10. Of course there is the formal possibility that one might find some reason to reject the assumption that HI and Theism are of about equal unconditional probability, that they are regions of logical space of about the same size. The ontological argument is, in effect, an argument for the conclusion that Theism spans the whole of logical space and thus is much larger than HI (which would presumably be the empty set of worlds if the ontological argument is sound). But every version of the ontological argument is either invalid or depends on a premise that enjoys an epistemic position no better than that of Theism, whatever that position may be. No other known argument or consideration seems even relevant to the task of showing that the unconditional probability of Theism is significantly greater than the unconditional probability of HI.

11. This special, technical use of 'theodicy' is Paul Draper's. (See the essay cited in note 2 above). A "theodicy" is a proposition h such that (i) h is highly probable on Theism and (ii) S is highly probable (or at least not too improbable) on Theism & h.

12. Or a proportion that is not too small. I will ignore this refinement.

13. Suppose that someone were to argue that this principle, even if it were correct, could not be used to block an evidential challenge to Theism, owing to the fact that P(S/HI) could be "much larger than" P(S/Theism) even if P(S/Theism) were fairly high. (The former might be, say, 0.9 and the latter 0.6.) But I should not regard an "evidential challenge" to Theism as very impressive unless "much larger than" implied (at least) "several times larger than." If it could be somehow demonstrated to me that P(S/HI) = 0.9 and P(S/Theism) = 0.6, I should not regard this as a demonstration that it was unreasonable to accept Theism in the absence of a strong argument for Theism. I shall assume that if P(p) is "much larger than" P(q), this implies that P(q) is "small"—even if P(p) = 1.

14. D was the conjunction of the following three propositions:

1. Every possible world that contains higher-level sentient creatures either contains patterns of suffering morally equivalent to those recorded by S or else is massively irregular.
2. Some important intrinsic or extrinsic good depends on the existence of higher-level sentient creatures; this good is of sufficient magnitude that it outweighs the patterns of suffering recorded by S.
3. Being massively irregular is a defect in a world, a defect at least as great as the defect of containing patterns of suffering morally equivalent to those recorded by S.

15. At any rate, my arguments, if they were correct, showed that no one is in a position to rule out the answer "all of them." It may be that one could give a plausible a priori argument for the conclusion that various modal considerations entail that the answer must be "all of them" or "none of them." But a dispute about this point would be of no consequence. If the answer to the question, What proportion of the balls now in the urn were just added? were known to be either "all of them" or "none of them," that would not affect the validity of the conclusion that we are not in a position to judge that only a small proportion of the balls now in the urn are black.

16. It also follows that D has no epistemic probability on Theism (relative to our epistemic situation)—nor does D have an epistemic probability on, say, the totality of what science makes it reasonable for us to believe at the present time. It is easy to see that there are propositions that have no epistemic probability. Remember the case in which I chose a number n ($0 \leq n \leq 100$) at random, and placed n black balls and $100-n$ white balls in an empty urn. What is the epistemic probability (relative to a situation in which one knows just this much) of the proposition that the first ball drawn from the urn will be black? A rational ideal bookie, contemplating this situation, will see that because he has no way to determine what the real, objective probability of the first ball's being black is, he has no way to set odds. (Do not confuse this case with the following case: The number n *has not yet been drawn* and the bookie is told that it will be and then the urn prepared and then a ball drawn. In *this* case, the real, objective probability that the ball will be black is 0.5, and the bookie would take the bet at any odds less than even odds.) Although one way of setting the odds is *objectively* better than any of the others (if, for example, the number of black balls in the urn is in fact thirty-six, the best course is to accept a bet that the first ball will be black at any odds lower than (100–36)/36 or 16/9 and at no higher odds), the bookie has no way of *knowing* which way of setting the odds is objectively the best. An ideal bookie who was forced, in this epistemic situation, to post odds for a bet that the first ball would be black could only *choose at random* the odds at which he would accept the bet. No odds, therefore, are *the* odds that a rational ideal bookie in this situation *would* set, and, as a consequence, the proposition that the first ball drawn will be black has no epistemic probability relative to this epistemic situation.

A more interesting if more problematic example: In my view, the proposition that a surveyable proof of the four-color theorem will be discovered in the next century has no epistemic probability (relative to my present epistemic situation) on any proposition I know or believe to be true.

17. In note 9 to "The Problem of Evil, the Problem of Air, and the Problem of Silence," I wrote

> Well, one might somehow know the probability of S on Theism as a function of the probability of HI on Theism; one might know that the former probability was one-tenth the latter, and yet have no idea what either probability was. But that is not the present case. The [probabilistic argument from evil] essentially involves two independent probability-judgments: that the probability of S on HI is at least not too low, and that the probability of S on Theism is very low.

This concession now seems to me to have been needless (although the point about the independence of the two probability judgments is certainly correct). If I know that probability A is ten times probability B, then I know that B is less than or equal to 0.1, and I *am*, therefore, in a position to make a judgment about the magnitude of B. If one is not in a position to judge that the probability of B is low, then it cannot be true that one knows that some other probability is ten times greater than B. If one is not in a position to judge that the proportion of Spain that is arable is low, then it cannot be that one knows that the proportion of France that is arable is ten times the proportion of Spain that is arable. (Compare note 13.)

18. By Paul Draper, in "The Skeptical Theist," which appeared in *The Evidential Argument from Evil*, pp. 175–192.

19. In my view, this judgment does not depend upon my knowledge of the relation between smoking and cancer. It is simply an application of very general and abstract principles about causal relations (primarily the "low probability of common cause" principle that I appealed to earlier in the paragraph to which this note is appended), principles that I may very well know a priori. Whether or not my knowledge of them is a priori, it is certainly knowledge that I possessed before I first learned of the correlation between smoking and cancer.