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Source: *American Philosophical Quarterly*, Vol. 29, No. 2 (Apr., 1992), pp. 111-124
Published by: University of Illinois Press on behalf of North American Philosophical Publications
Stable URL: http://www.jstor.org/stable/20014406
Accessed: 13/03/2010 15:03

AMERICAN PHILOSOPHICAL QUARTERLY
Volume 29, Number 2, April 1992

THE EPISTEMOLOGY OF BELIEF AND THE EPISTEMOLOGY OF DEGREES OF BELIEF

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INTRODUCTION

CONSIDER two questions. What propositions are epistemically rational for us to believe? And, with what confidence is it epistemically rational for us to believe a proposition?

Answering the first of these questions requires an epistemology of belief, answering the second an epistemology of degrees of belief. The two kinds of accounts would seem to be close cousins, the problems they encounter and the range of options for solving them being essentially the same. An account of rational degrees of belief simply adopts a more fine-grained approach to doxastic attitudes than does an account of rational beliefs. The latter classifies these attitudes with a simple three-fold scheme: either we believe a proposition or we disbelieve it or we withhold judgement on it. By contrast the former introduces as many distinctions as are needed to capture our distinct levels of confidence in various propositions—i.e., our degrees of belief in them. Nevertheless, each account has a similar aim, that of describing what is required if our doxastic attitudes are to conform to our evidence.

Indeed, a natural first impression is that the two kinds of accounts complement one another. Begin with the idea that it is rational for our confidence in the truth of a proposition to be proportionate to the strength of our evidence. Add the idea that belief-talk is a simple way of categorizing our degree of confidence in the truth of a proposition. To say that we believe a proposition is just to say that we are sufficiently confident of its truth for our attitude to be one of belief. Then it is epistemically rational for us to believe a proposition just in case it is epistemically rational for us to have sufficiently high degree of confidence in it, sufficiently high to make our attitude towards it one of belief.

I will call this way of thinking about the relationship between the rationality of beliefs and the rationality of degrees of belief "the Lockean thesis." John Locke hinted at the idea that belief-talk is but a general way of classifying an individual's confidence in a proposition,[1] and he explicitly endorsed the idea that one's degree of belief in a proposition ought to be proportionate to the strength of one's evidence for it:

> The mind, if it will proceed rationally, ought to examine all the grounds of probability, and see how they make more or less, for or against any probable proposition, before it assents to or dissents from it, and upon a due balancing the whole, reject or receive it, with a more or less firm assent, proportionably to the preponderance of the greater grounds of probability on one side or the other.[2]

One immediate benefit of the Lockean thesis is that it allows us to finesse the worry that accounts of rational degrees of belief are apt to be overly demanding. After all, perhaps it is too much to expect us to believe very many propositions with exactly the degree of confidence that our evidence warrants. But even if this is so, the Lockean thesis implies that accounts of rational degrees of belief have an important theoretical function. For according to the thesis, it is epistemically rational for us to believe a proposition *p* just in case it is epistemically rational for us to have a degree of confidence in *p* that is sufficient for belief. So, we can rationally believe *p* even if our specific degree of belief in it is somewhat higher or lower than it should be given our evidence. The thesis thus leaves room for the possibility of our believing precisely those propositions that are rational for us given our evidence even though few of these propositions are believed by us with precisely the appropriate degree of confidence.

This is a tidy result. It makes the theory of rational degrees of belief important even if, strictly speaking, our degrees of belief are only rarely what the theory says they should be.

I. The Lottery and the Preface

According to the Lockean thesis, it is rational to believe a proposition just in case it is rational to have a degree of confidence in it that is sufficient for belief. What degree is sufficient? It is not easy to say. There doesn't seem to be any principled way to identify a precise threshold. But in itself this doesn't constitute a serious objection to the Lockean thesis. It only illustrates what should have been obvious from the start—namely, the vagueness of belief-talk.

Still, we will want to be able to say something, even if vague, about the threshold above which our degrees of confidence in a proposition must rise if we are to believe that proposition. What to say is not obvious, however, since there doesn't seem to be a non-arbitrary way to identify even a vague threshold. But perhaps we don't need a non-arbitrary way. Perhaps we can just stipulate a threshold. We deal with other kinds of vagueness by stipulation. Why not do the same here?

To be sure, stipulating a threshold may do some violence to our everyday way of talking about beliefs, but violence may be what is called for. The benefits of increased precision would seem to warrant our discounting sensitivities about ordinary usage. It warrants our simply stipulating, at least for the purpose of doing epistemology, that belief is an attitude of confidence greater than some degree x. This will still leave us with the problem of measurement. Often enough we will have difficulty determining whether or not you have degree of confidence x in a proposition and as a result we won't be sure whether or not your attitude towards it is one of belief. Moreover, if the difficulty here is not simply one of measurement, if it is sometimes the case that there just isn't any numerically precise degree of confidence that you have in a proposition, then the degree x will itself have to be vague.

In either case, however, the stipulation is likely to be useful when we are discussing issues of rational belief. Indeed, it might not even matter much where we set the threshold, as long as we are forthright about what we are doing. There are some restrictions, of course. We don't want to require subjective certainty for belief. The threshold shouldn't be this high. On the other hand, we will want the threshold to be high enough so that you don't end up believing almost everything whatsoever. At a minimum, we will want to stipulate that for belief you need to have more confidence in a proposition than in its negation. But except for these two restrictions, we might seem to be pretty much on our own. What matters, at least for the theory of rational belief, is that some threshold be chosen. For once such a threshold x is stipulated, we can use the Lockean thesis to say what is required for rational belief: it is rational for you to believe p just in case it is rational for you to have degree of confidence y in p, where $y \geq x$.

Or can we? Although at first glance this seems to be an elegant way to think about the relationship between rational belief and rational degrees of belief, a second glance suggests it leads to paradoxes, the most well-known of which are those of the lottery and preface. More precisely, it leads to paradoxes, if we make two assumptions about rational belief.

The first of these assumptions is that that of non-contradiction: explicitly contradictory propositions cannot be rational. If it is rational for you to believe p , it cannot be rational for you to believe not$p$. *A fortiori* it is impossible for the proposition (p and *notp*) to be rational for you. This follows from non-contradiction via simplification: if it is rational for you believe (p & q), then it is also rational for you to believe each conjunct. Thus, if it is impossible for p and *notp* both to be rational for you at the same time, it is also impossible for (p & $notp$) to be rational for you.

The second is that rational belief is closed under conjunction: if it is rational for you to believe p and rational for you to believe q, then it is also rational for you to believe their conjunction, (p & q).

I will later argue that this second assumption should be rejected. But for now, the relevant point is that if both of these assumptions are granted, the Lockean thesis must be abandoned. The lottery paradox, which was first formulated by Henry Kyburg,[3] illustrates why. Suppose that degrees of belief can be measured on a scale from 0 to 1, with 1 representing subjective certainty. Nothing in the argument requires this assumption, but it does help clarify the argument's force. So, for the moment at least, grant the assumption. Let the threshold x required for belief be any real number less than 1. For example, let $x = 0.99$. Now imagine a lottery with 100 tickets, and suppose it is rational for you to believe with full confidence that the lottery is fair and that as such there will be only one winning ticket. More precisely, assume it is rational for you to believe that (either ticket #1 will win or ticket #2 will win . . . or ticket #100 will win). This proposition is logically equivalent to the proposition that it's not the case that (ticket #1 will not win and ticket #2 will not win . . . and ticket #100 will not win). Assume that you realize this and that as a result it is also rational for you to believe this proposition.

Suppose finally that you have no reason to distinguish among the tickets concerning their chances of winning. So, it is rational for you to have 0.99 confidence that ticket #1 will not win, 0.99 confidence that ticket #2 will not win, and so on for each of the other tickets. According to the Lockean thesis, it is rational for you to believe each of these propositions, since it is rational for you to have a degree of confidence in each that is sufficient for belief. But given that rational belief is closed under conjunction, it is also rational for you to believe that (ticket #1 will not win and ticket #2 will not win . . . and ticket #100 will not win). However, we have already assumed that it is rational for you to believe the denial of this proposition, since it is rational for you to believe that the lottery is fair. But according to the assumption of non-contradiction, it is impossible for contradictory propositions to be rational for you. So, contrary to the initial hypothesis, x cannot be 0.99.

A little reflection indicates that x cannot be anything other than 1, since the same problem can arise with respect to a lottery of any size whatsoever, no matter how large. However, we have already agreed that x need not be 1. Subjective certainty is not required for belief. The conclusion, then, is that despite its initial attractiveness, the Lockean thesis cannot be the correct way to think about the relationship between beliefs and degrees of belief. Or more precisely, this is the conclusion if we continue to grant the above two assumptions.

To make matters worse, there is another argument, similar in form, that seems equally devastating to the Lockean thesis from the opposite direction. This is the preface argument. It seems to show that a degree of confidence greater than 0.5 is not even necessary for belief.

Here is a version of the preface. You write a book, say a history book. In it you make many claims, each of which you can adequately defend. In particular, suppose it is rational for you to have a degree of confidence x in each of these propositions, where x is sufficient for belief but less than 1.0.[4] Even so, you admit in the preface that you are not so naive as to think that your book contains no mistakes. You understand that any book as ambitious as yours is likely to contain at least a few errors. So, it is highly likely that at least one of the propositions you assert in the book, you know not which, is false. Indeed, if you were to add appendices with propositions whose truth is independent of those you have defended previously, the chances of there being an error somewhere in your book becomes greater and greater. Nevertheless, given that rational belief is closed under conjunction, it cannot be rational for you to believe that your book contains any errors. For if, as we have assumed, it is rational for you to believe each of the propositions that make up your book, then, given conjunctivity, it is also rational for you to believe their conjunction. This is so despite the fact that it is rational for you to have a low degree of confidence in this conjunction—a degree of confidence significantly less than 0.5, for example.

These two arguments create a pincer movement on the Lockean thesis. The lottery argument seems to show that no rational degree of confidence less than 1 can be sufficient for rational belief, while the preface argument seems to show that a rational degree of confidence greater than 0.5 is not even necessary for rational belief. Despite being similar in form, the two arguments are able to move against the Lockean thesis from opposite directions, because the controlling intuitions about them are different.

The controlling intuition in the lottery case is that it is rational for you to believe that the lottery is fair and that as such exactly one ticket will win. Unfortunately, the only remotely plausible way to satisfy this intuition without violating either the non-contradiction assumption or the conjunctivity assumption is to insist that 0.99 confidence in a proposition is not sufficient for belief.

On the other hand, the controlling intuition in the preface case is just the opposite. The intuition is that it is rational for you to believe each of the individual propositions that comprise your book. Unfortunately, if we grant this intuition, then given the conjunctivity assumption, we must also admit that it is rational for you to believe the conjunction of the propositions you assert in your book, despite the fact that it is rational for you to have less than 0.5 confidence in it.

Thus, the lottery and the preface might seem to show that the most serious problem for the Lockean thesis has nothing to do with the vagueness of belief. If that were the only problem, it could be dealt with by simply stipulating some degree of belief as the threshold. The problem, rather, is that there doesn't seem to be any threshold, not even a vague one, that we can sensibly stipulate. Anything less than 1.0 is not sufficient for belief and something greater than 0.5 is not even necessary for belief.

Of course, once again this conclusion follows only if we grant the above two assumptions. Thus, a not unnatural reaction to the problems of the lottery and the preface is to wonder whether the problems are caused by one or the other of these assumptions rather than the Lockean thesis. This is precisely what I will be arguing, but before doing so, it will be helpful to look at another kind of reaction to the problems of the lottery and the preface.

II. Side-Stepping the Lottery and the Preface

One way of avoiding the problems of the lottery and the preface is simply to abandon the epistemology of belief for an epistemology of degrees of belief. This is exactly what many epistemologists have done. The problems of the lottery and the preface are then easily avoided. With respect to the lottery, for example, they simply observe that it is rational for you to have a high degree of confidence in the proposition that ticket #1 will lose, an equally high degree of confidence in the proposition that ticket #2 will lose, and so on with respect to each of other tickets. They go on to observe that it is rational for you to have a low degree of confidence in the conjunction of these propositions. They then leave the matter at that. They refuse to take a stand on the issue of whether it is rational for you to believe *simpiciter* these propositions. They don't even try to stipulate a threshold of belief.

Moreover, and this is part of the beauty of their strategy, it is not immediately obvious that anything is lost in refusing to take a stand on this issue. After all, what reasons do we have to be interested in a theory of rational belief if we have an adequate theory of rational degrees of belief? Does the former tell us anything useful above and beyond the latter?[5] Is it really needed for anything? It doesn't seem to be needed for the theory of rational decision making. That theory seems to require something more fine-grained than beliefs *simpliciter*. It seems to require rational degrees of belief. Whether or not it is rational for you to decide in favor of option x is a function of its estimated desirability in comparison with your other alternatives, where this in turn is roughly a matter of the confidence it is rational for you to have that *x* will obtain your ends. So, for the general theory of rationality, we seem to be able to get along without a theory of rational belief but not without a theory of rational degrees of belief. But then, why have two theories when one will do just as well?

There are answers to all these questions, and I will try to give them. But for the time being, I will simply help myself to the assumption that the epistemology of belief is not to be altogether abandoned. This will allow me to pursue an issue that is related to the problems of the lottery and the preface—the issue whether it can be rational to knowingly have inconsistent beliefs. I will argue that this sometimes can be rational, that the cases of the lottery and the preface illustrate this, and that these cases also illustrate what is wrong with the conjunctivity assumption about rational belief. If the conjunctivity assumption is rejected, we have a means of saving the Lockean thesis from paradox. And thus, it is possible for an epistemology of belief to co-exist comfortably with an epistemology of degrees of belief. Still, there will be the nagging question, do we really need the former if we have the latter? I think that we do, and my last job will be to explain why. It will be to show that we would lose something important if we were to abandon the epistemology of belief for an epistemology of degrees of belief.

III. Being Knowingly Inconsistent

Just as we can reasonably makes mistakes about contingent matters, so too we can reasonably make mistakes about non-contingent matters. Mathematical propositions are a case in point. If I have done my calculations carefully and checked my results against those of another competent mathematician, then I can reasonably believe these results even if, unbeknownst to me, they are false—indeed, necessarily false. But from this, it immediately follows that consistency of belief is not an utterly strict requirement of rationality, since if I believe even one proposition that is necessarily false, my beliefs are inconsistent.

Analogously, we can make reasonable mistakes about whether or not one contingent proposition implies another. After all, logical relations are not always transparent. On the contrary, some are so complex that neither you nor I nor perhaps any other human is capable of discerning them. This is so even if in principle all such relations could be broken down into simpler ones that we can grasp. Combinations of these simple relations can still be so complex as to exceed our capacities. But if so, our beliefs about contingent matters can be mutually inconsistent even though we cannot have been reasonably expected to see that they are inconsistent.

The lesson, once again, is that consistency of belief is not an utterly strict requirement of human rationality. Perhaps it would be a strict requirement for someone who was capable of omniscience about necessary truths and logical relations, but of course real human beings are not capable of this.

Even so, isn't it always irrational for us *knowingly* to have inconsistent beliefs? For if we were knowingly to have inconsistent beliefs, we would be knowingly involving ourselves in error.

Epistemologists have shown remarkably little interest in this as a fallback position, perhaps because it leaves us within the circle of epistemic terms from which we are trying to escape. We now need to say what it is to be knowingly inconsistent. Nevertheless, a position of this sort does have at least an initial appeal, and one way to illustrate its appeal is with analogies to rational decision making. Think of betting situations, for example. In particular, think of Dutch books, in which you cannot help but suffer a net loss, no matter how the outcomes you are betting on turn out. If your aim is to win money and you have the option of not betting, it is irrational for you knowingly to allow someone to make book against you. This is irrational because you know in advance that your betting aims will be frustrated. By analogy, if your intellectual aim is to have accurate beliefs, isn't it irrational for you knowingly to have inconsistent beliefs? Here again, you can know in advance that your aim will be frustrated. You know in advance that at least one of your beliefs is false.

But in fact, the analogy between having

book made against you on the one hand and having inconsistent beliefs on the other is a weak one. The distinguishing feature of the first is that no matter how the events you are betting on turn out, you will suffer a net loss. The distinguishing feature of the second is that no matter how the world turns out, you do less well intellectually than what is ideal. If your beliefs are mutually inconsistent, then not all of them can be true. But to say that an option is sure to be less than ideal is not yet to say that it is sure to be irrational. In fact, it often isn't, and there are other kinds of betting situations that provide clear illustrations of this.

The betting situations I have in mind are ones in which you agree to a series of bets despite the fact that you are guaranteed to lose at least one of them. Nonetheless, it can be rational for you to agree to the series. Indeed, the series may be optimal for you—optimal but not ideal. The ideal would be to win each and every bet, but your situation may be such that the necessarily flawed strategy is preferable to any that keeps open the possibility of an ideal outcome.

For example, suppose that you are given the opportunity to play the following game. There are ten cups on a table, numbered 1-10, and you know that nine of the ten cups cover a pea. You are asked to predict of each cup whether or not it covers a pea. For each correct answer you receive $1 and for each incorrect answer you pay $1.

The best strategy for you in this game is to bet "pea" on each cup. The payoff from this strategy will be $8, with your winning nine of the bets and losing one. What are your alternatives? One alternative is to guess which cup doesn't have a pea under it and to bet "non-pea" on it. By doing so, you keep open the possibility of an ideal result, one in which you win every bet, but your estimated payoff is only $6.40.[6] Another alternative is to bet "pea" on nine of the cups while refusing to bet on some arbitrary cup. This strategy precludes the possibility of an ideal outcome, since you do not even try to win every bet. However, it does leave open the possibility of a flawless outcome, one in which you win each of your bets. Nevertheless, the estimated payoff of $7.20 is still below that of betting "pea" on each cup.[7] Finally, if you were to refuse all the bets, the payoff would be $0.

The lesson is that it can be rational to prefer a strategy that precludes an ideal outcome over one that does not. This is as true of doxastic strategies as it is of betting strategies. Precisely what is wrong with consistency requirements on belief is that they fail to recognize this.

It is sometimes rational for you to tolerate inconsistency. This is rational even in a purely epistemic sense—i.e. even if your only concern is the current accuracy and comprehensiveness of your beliefs. If we were to stipulate that your concern is to have accurate and comprehensive beliefs eventually, in the long-run, it would be easier to defend an attitude of tolerance towards inconsistency, since it might be reasonable for you to put up with inconsistency temporarily in hopes that in time you will be able to make the necessary corrections.

Even so, I am not interested in making this kind of defense of inconsistency. I want to defend the idea that it can be rational for you to tolerate inconsistency even if your only concern is that your *current* beliefs be accurate and comprehensive. Of course, if you know that your beliefs are inconsistent, you know that they cannot possibly be ideal. You know that at least one is false. Nevertheless, this doesn't rule out the possibility of their being rational. There are situations in which it is rational for you to have beliefs that you know are neither ideal nor even flawless.

This is the real lesson of the lottery and the preface. It can be rational to believe that the lottery is fair and that as such exactly one ticket will win and also rational to believe of each and every ticket that it will not win. After all, if the lottery is large enough, the evidence that you have in favor of the proposition that ticket #1 will not win is extremely strong, as strong as you have for almost any empirical proposition whatsoever. But of course, you have equally strong evidence for the proposition that ticket #2 will not win, the proposition that ticket #3 will not win, and so on.

Similarly, it can be rational for you to believe each and every proposition that you defend in your book even though it is also rational for you to claim in the preface that at least one of these propositions is false. For once again, you might have enormously strong evidence for each of the propositions in the body of the book, and yet given their huge number, you might also have enormously strong evidence for the proposition that at least one of them is false.[8]

Situations of this sort are not even uncommon. Most of us have very strong but not altogether certain evidence for a huge variety of propositions, evidence that makes these propositions rational for us. And yet, we also have strong evidence for our fallibility about such matters, evidence that might make it rational for us to believe of a set of such propositions that at least one is false. If it were always and everywhere irrational to be knowingly inconsistent, this would be impossible. It would be impossible for us knowingly and rationally to have these kinds of fallibilist beliefs. But this isn't impossible, and any theory that implies otherwise should be rejected for this reason.

There are many such theories, including all coherence theories. According to coherence theories, our beliefs are rational only if they are coherent, where coherence is a matter of mutual support. There are various proposals about how to understand the relation of mutual support, but none of them allow mutually inconsistent propositions to be mutually supportive. So, no coherence theory can allow us to knowingly but rationally believe inconsistent propositions. And hence, no coherence theory is plausible.[9]

IV. Rational Belief and Conjunction

Epistemologists have been reluctant to admit that we can knowingly have inconsistent beliefs, and part of their reluctance stems from a fear that if mutually inconsistent propositions can be rational, then so too can explicitly contradictory ones. In the lottery, for example, the fear is that we will be forced to say that it can be rational to believe the proposition that some ticket will win as well as the proposition that it's not the case that some ticket will win.

These fears would be justified if rational belief were closed under conjunction, but precisely what the lottery, the preface, and other such cases illustrate is that this is not so. They aren't paradoxes at all. They simply illustrate in a particularly dramatic fashion that rational beliefs are not conjunctive.

In the lottery, for instance, we have enormously strong evidence for the proposition that some ticket will win as well as for the proposition that ticket #1 will not win, the proposition that ticket #2 will not win, and so on. However, we do not have strong evidence for the conjunction (ticket #1 will not win & ticket #2 will not win . . . and ticket #n will not win). On the contrary, we have strong evidence for its denial. So, although it can be rational for us to believe of each ticket that it will not win, it will not be rational for us to believe the conjunction of such propositions; it is not rational for us to believe that no ticket will win.[10]

Similarly for the preface case. You have strong evidence for each of the claims you make in your book. Nevertheless, you do not have strong evidence for their conjunction. Indeed, you have strong evidence for its denial.

Contrast this treatment of the lottery and preface with the one described earlier. There the suggestion was that these cases show the inadequacy of the Lockean thesis, and thus by extension they also show that the epistemology of belief ought to be abandoned in favor of an epistemology of degrees of belief. The argument was based on the assumption that theories of rational belief must contain a conjunction rule. The preface and the lottery were then used to argue that any such theory of rational belief faces absurd consequences, from which it was inferred that we ought to abandon the theory of rational belief.

My strategy is to stand this argument on its head. I begin by presuming that the project of formulating an epistemology of belief, at least on the face of it, is a legitimate project. The second premise is the same as above: any theory of rational belief must either reject the conjunction rule or face absurd consequences. I conclude that we ought to reject the conjunction rule, which in any event is not a plausible rule. After all, a conjunction can be no more probable than its individual conjuncts, and it is often considerably less probable.

Why, then, has it so often been unquestioningly presumed that an adequate theory of rational belief must contain a conjunction rule? Have epistemologists simply failed to notice that a conjunction is often less likely to be true than its conjuncts?

No. There is a more fundamental worry at work here, one that goes to the heart of how we think and argue. The worry is that if we are not required on pains of irrationality to believe the conjunction of propositions that we rationally believe, we might seem to lose some of our most powerful argumentative and deliberative tools. Indeed, it might even seem as if deductive reasoning entirely loses its force, since without a conjunction rule, we can believe each of the premises of an argument whose deductive validity we acknowledge and yet insist that this does not commit us to believing its conclusion.[11]

This is a serious worry. Anyone who wants to reject a conjunction rule for beliefs must come to grips with it. Fortunately, there is a way to handle the worry, but one of the points that motivates it needs to be granted immediately—namely, that a conjunction rule of some sort is essential for deductive reasoning. What can be denied, however, is that the relevant conjunction rule is one for beliefs.

A conjunction rule does govern many belief-like attitudes. For example, it governs presuming, positing, assuming, supposing, and hypothesizing. Each of these attitudes is a form of commitment that, unlike belief, is context-relative. You don't believe a proposition relative to certain purposes but not believe it relative to others. You either believe it or you don't. But presuming, positing, assuming, and the like are context-relative. Having such attitudes towards a proposition is a matter your being prepared to regard the proposition as true for a certain range of purposes or in a certain range of situations. Moreover, relative to these purposes or situations, such attitudes are conjunctive. If for the purposes of a discussion you assume (suppose, posit, etc.) *p* and for that same discussion you also assume (suppose, posit, etc) *q*, then you are committed within that context to their conjunction, and you are committed as well to anything that their conjunction implies.

Purely deductive reasoning is typically carried on in terms of such attitudes rather than beliefs. Suppose, for example, that you deduce *r* from *p* and *q*. If you don't believe either *p* or *q*, the reasoning process cannot be characterized as one that directly involves beliefs. It is not a matter, for example, of your moving from one belief state to another. The attitudes involved are weaker than belief. For purposes of your deliberations, you have assumed or posited *p* and you have done the same for *q*.

Suppose, on the other hand, that you do believe both *p* and *q*. This doesn't alter the nature of the deductive reasoning, and one sign of this is that the deduction has no determinant consequences for what you believe. You can just as well abandon *p* or abandon *q* (or both) as believe *r*. The deductive reasoning considered in itself is neutral between these alternatives. Thus once again, it cannot be construed as a matter of moving from belief to belief. You may be engaging in the reasoning in order to test your beliefs *p* and *q*, but the reasoning itself must be regarded as involving attitudes that are distinct from belief. For the purposes of the test you hypothetically suspend your beliefs in *p* and *q* and adopt an attitude towards each that is weaker than belief. You assume or posit both *p* and *q* and from these assumptions deduce *r*. You then are in a position to deliberate about whether to abandon *p* or *q* (or both) or to believe *r*. This latter kind of deliberation does directly concern your beliefs, but on the other hand it is not deductive reasoning.[12]

But if this is so—i.e., if deductive reasoning can go on without a conjunction rule governing beliefs—don't we lose the regulative role that considerations of consistency play in our deliberations about what to believe? Suppose, for example, that someone constructs a *reductio* argument out of a number of propositions that you believe. If rational belief is not conjunctive and if as a result you can knowingly but rationally have inconsistent beliefs, it seems that you are free to acknowledge the validity of this *reductio* without it having any effect whatsoever on your beliefs.

This too is a serious worry, one that must be addressed by anyone who wants to reject a conjunction rale for beliefs. The key to dealing with it is to be clear about the nature of *reductios*. *Reductios* prove that the conjunction of their premises cannot possibly be true. They prove inconsistency. However, they need not show which of the presupposed premises is false. They only sometimes do this and then only in a derivative way by proving that the conjunction is false. If all of the premises but one are uncontroversial for you with the remaining one posited for the purpose of the *reductio*, then a valid *reductio*, in proving the conjunction to be false, gives you a decisive reason to reject this premise. More generally, in proving that the conjunction is false, *reductios* provide a potentially powerful argument against any given premise of the argument, but the strength of this argument is a matter of how closely the truth of this premise is tied to the truth of the conjunction.

Suppose, for example, that the premises are so theoretically intertwined with one another that they tend to stand or fall together. An argument against the truth of their conjunction will then constitute a strong argument against each premise as well. Alternatively, the truth of a premise might be tied to the truth of the conjunction not so much because it is theoretically interdependent with the other premises but rather because the other premises are so strong in comparison with it and so few in number. The weaker the premise and the fewer the number of other premises, the stronger is the argument against that premise. So, if one premise is distinctly weak while the others are strong and if there is a relatively small number of premises, a *reductio* will provide a devastating argument against this weakest premise.

On the other hand, there are examples of *reductios* whose premises are not like this. Their premises aren't so theoretically intimate that they tend to stand or fall together. Moroever, even the weakest premise is relatively strong and the number of premises is large. But if so, the strength of the argument against even this weakest premise may be only negligible.

This is the reverse of the idea, common enough in contemporary epistemology, that although consistency among a very small or theoretically untight set of propositions doesn't have much positive epistemic significance, consistency among a very large and theoretically tight set does.[13] My claim is that although inconsistency among a very large and untight set of propositions doesn't have much negative epistemic significance, inconsistency among a very small or very tight set does. The latter precludes each member of the set being rational for you to believe, but the former need not.

This is not to say that the discovery of inconsistency is ever epistemically irrelevant. It isn't. Inconsistency is always an indication of inaccuracy, and because of this, it would be a mistake to base further inquiry on a set of propositions that you know to be inconsistent. It would be a mistake, in effect, to make all of these propositions part of your evidence, since this would risk spreading the error to yet other propositions. However, it is also a mistake to think that what cannot be part of your evidence cannot be rationally believed either.[14]

So, a convincing *reductio* shows that it is irrational for you to believe the conjunction of its premises, and it puts you on alert about each of the individual premises as well. Moreover, this means that not all of these propositions are part of your evidence. Even so, the case against the individual premises need not be so great as to make it irrational for you to believe them. The lottery, the preface, and the more general case of a fallibilist belief about your other beliefs provide particularly clear examples of this. In each of these cases, it is possible to construct a *reductio* entirely out of propositions that you rationally believe, but a huge number of propositions are needed for these *reductios*. So, despite the fact that a *reductio* can be constructed out of them, these propositions aren't serious competitors of one another.[15] Nor are they so deeply intertwined with one another theoretically that they tend to stand or fall together.

Such cases are by no means rare, but they aren't the rule either. The discovery of inconsistency typically does make for effective *reductios*, ones that constitute powerful arguments against one or more members of the inconsistent set of propositions, and when they do, it is irrational to believe these propositions. But it is precisely the rejection of the conjunction rule that allows us to say when *reductios* can be so used and when they cannot.

Indeed, rejecting the conjunction rule precludes only one common use of *reductios*. It precludes them from being used to prove that knowingly believing inconsistent propositions is always and everywhere irrational. But of course, this is hardly a criticism, since precisely the issue in question is whether this is always and everywhere irrational. I claim is that it is not, that the lottery, the preface, and the case of a fallibilist belief about one's other beliefs plainly illustrate this, and that attempts to deny the obvious in these cases are based in part upon the unfounded worry that if inconsistencies are allowed anywhere they will have to be allowed everywhere and in part upon a failure to distinguish evidence from rational belief.

Besides, what are the alternatives to rejecting the conjunction rule? They are to give up on the epistemology of belief altogether or to find some other way of dealing with the preface and the lottery within the confines of a theory of rational belief that retains the conjunction rule. But on this point, the critics of theories of rational belief are right: if we retain the conjunction rule, there is no natural way to do justice to the controlling intuitions of both the lottery and the preface.

The controlling intuition in the lottery is that it can be rational for you to believe that the lottery is fair and that as such exactly one ticket will win. But then, we are forced to conclude that it cannot be rational for you to believe of any given ticket that it will lose. For if this were rational, it would be rational to believe of each ticket that it will lose, since by hypothesis your evidential position with respect to each is the same. However, it cannot be rational for you to believe of each ticket that it will lose, since given the conjunction rule it would then be rational for you to believe contradictory propositions. But if we were to reason in a parallel way about the preface, we would find ourselves denying the controlling intuition about it—namely, that it is rational for you believe the individual claims that comprise your book. On the other hand, if we grant that each of these claims can be rational for you, we are forced to conclude, given a conjunction rule, that it is also rational for you to believe the conjunction of these claims, despite the fact that this conjunction is highly unlikely to be true.

By contrast, rejecting the conjunction rule allows us to treat the lottery and the preface in the same way and to do so without sacrificing the controlling intuition of either. This is not to say that there aren't important differences between the two cases, but it is to say that the differences are not ones of rational belief. One difference is that while you can know many of the claims that make up your book, you do not know of any given ticket in the lottery that it will lose. However, this difference is to be explained not by citing the conditions of rational belief but rather the conditions of knowledge. The precise form of the explanation will depend on one's account of knowledge.

For example, according to one kind of account, to know a proposition p you must have evidence for it that does not support a falsehood that is relevant to p.[16] For purposes here, we need not be overly concerned with what makes a proposition relevant to p. Simply assume that however the notion is explicated, the propositions that ticket #1 in the lottery will lose, that ticket #2 will lose, that ticket #3 will lose, etc. are relevant to one another. But one of these propositions, you know not which, is false. Moreover, it is the same evidence that supports each. So, your evidence for any one of these propositions, say the proposition that ticket #23 will lose, is evidence that supports a relevant falsehood. On the other hand, the evidence that you have for the propositions in your book need not be like this. Thus, according to this account of knowledge, you cannot know that ticker #23 will lose whereas you can know many of the propositions in your book. Even so, this is irrelevant to the issue at hand, which is one of rational belief—in particular, epistemically rational belief.

There is, then, a straightforward way of dealing with the lottery and the preface without repudiating the epistemology of belief. It is to reject the notion that rational belief is closed under conjunction. This allows us, at least for the purposes of epistemology, to stipulate a threshold for belief, if only a vague one. We can sensibly do so without encountering paradox and without undermining deductive reasoning. The Lockean thesis is thus salvageable, and with it we can also salvage the idea that an epistemology of degrees of belief complements the epistemology of belief.

V. The Epistemology of Belief

A non-paradoxical epistemology of belief is possible but it may not be really necessary if we have an adequate epistemology of degrees of belief. Once we have the latter, why not be content with it and just abandon the former? Doing so makes it easy to deal with the lottery and the preface. We simply say that it is rational for you to have a high degree of confidence in each of the particular claims in those cases and a low degree of confidence in their conjunction, and we leave the matter at that, refusing even to entertain the question of what it is rational for you to believe *simpliciter*. Moreover, abandoning the theory of rational belief would seem to have the advantage of simplifying our theorizing, especially if we assume that the doxastic inputs for rational decision making must be degrees of belief rather than beliefs *simpliciter*. This suggests that we cannot do without a theory of rational degrees of belief but that we might be able to do without a theory of rational belief. But then, why have two theories when one will do just as well?

The answer is that one won't do just as well. There are good reasons for wanting an epistemology of beliefs, reasons that an epistemology of degrees of belief by its very nature cannot accommodate.

Consider again the betting situation in which you know that 9 of the 10 cups on the table cover a pea, and you are offered the opportunity to bet "pea" or "not-pea" on any combination of the 10 cups, with a $1 payoff for each correct guess and a $1 loss for each incorrect guess. In such a situation, a decision to bet "pea" on each of the 10 cups can be rational even though you realize that this series of bets precludes an ideal outcome. Notice that the number of options available to you in this case is sharply limited. Either you must bet "yes" or "no" to there being a pea under a cup, accepting without alteration the stipulated payoffs for successful and unsuccessful bets, or you must refuse to make any bet at these payoffs. Of course, we can imagine situations in which you have a greater range of betting options with respect to the cups. For example, we can imagine that you yourself determine the payoff scheme for the bets and that your opponent then gets to choose the side of the bets. You are able to post whatever you take to be fair odds. In this kind of betting situation you are not limited to three options. Your options are more fine-grained. Accordingly, you have a greater range of betting strategies from which to choose.

The theory of rational belief is concerned with doxastic situations that resemble the more restricted of the above betting situations. The three betting options—betting "pea" at odds X, betting "not-pea" at these odds, and refusing to bet at these odds—correspond to the three doxastic options with which the theory of rational belief is concerned—believing, disbelieving, and withholding. Of course, not every betting situation is one in which our options are limited to just three. So too, there is nothing in principle that limits our doxastic options to just three. We can and do have various degrees of confidence in propositions, and we can and do ask whether or not our degrees of confidence are appropriate ones. Even so, in our deliberations we often to want to limit our doxastic options to just three, and likewise in gleaning information from others we often want to limit them to just three options. We find it useful or even necessary to do so. We exert pressure upon others and upon ourselves to take intellectual stands.

In reading an article of this sort, for example, you expect me to say what I think is true and what I think is false about the issues at hand. You expect me not to qualify my every claim. You do not want me to indicate as accurately as I can my degree of confidence in each claim that I defend. You want my views to be more economically delivered than this. And so it is with a host of other informative, argumentative, and decision-making activities.

In decision-making, for instance, we need the general parameters of at least some decisions to be set out without qualification. We first identify what we believe to be the acts, states and outcomes that are appropriate for specifying the problem. It is only after we make this specification that there is a decision upon which to deliberate. It is only then that our more fine-grained doxastic attitudes—in particular, our degrees of confidence that various acts will generate various outcomes—come into play.[17]

Similarly, in expository books and articles, in department reports, in financial statements, in documentaries, and in most other material that is designed to transfer information, we want, all else being equal, a black-and-white picture.[18] We want a definite "yes" or "no" on the claims in question while at the same time recognizing that this is not always feasible. Often the information available is not sufficiently strong one way or the other to allow the author to take a definite stand on all of the issues, in which case we tolerate a straddling of the fence.

Even so, the overall pattern is clear. If all of the information provided to us by others were finely qualified with respect to the provider's degree of confidence in it, we would soon be overwhelmed. It is no different with our private deliberations. We normally don't have finely qualified degrees of confidence in a wide variety of propositions—propositions concerning the outcomes of games of chance and ones concerning well-established statistical frequencies perhaps being the exceptions—but even if we did, we would soon find ourselves overwhelmed if we tried to deliberate about complicated issues on the basis of them.[19] We would need to force ourselves to take definite stands in order to make deliberation about these isues manageable.

Of course, this is not always the case. Sometimes we want probabilities, and we force ourselves or others to provide them. But even here it needs to be emphasized that we arrive at these probabilities only against a backdrop of black-and-white assumptions—i.e., a backdrop of belief. I calculate what to bet before I draw my final card, and I note to myself that the probability of the drawn card being a heart, given the cards in my hand and the exposed cards of my opponents, is 0.25. Or I note that the probability of the die coming up six is 0.16667, or that the probability of an American male dying of a heart attack prior to age 40 is 0.05. The assignment of each of these probabilities depends on antecedent black-and-white beliefs. I believe that the deck of cards is a standard deck, that the die isn't weighted, and that the statistics on heart attacks were reliably gathered. It might be argued that these background beliefs are so close to certain that we ignore their probabilities. But this is just to confirm the point. There are so many potentially distorting factors that we need to ignore most of them. We couldn't possibly keep track of all of them, much less have them explicitly enter into our deliberations. Thus, we ignore them. We ignore them despite the fact that we recognize there is some probability of their obtaining. We are content with our black-and-white beliefs about these matters.

So on the one hand, even our probabilistic reasonings require a background of belief, and on the other hand, we try to minimize the need for such probabilistic reasonings. To the extent possible, we try to avoid probabilistic qualifications, both in our own case and in the case of others. Indeed, a penchant for making such qualifications is often regarded as a character flaw. It is a mark of an overly cautious and perhaps even slippery personality. We do not want to get our information from the overly opinionated but neither do we want to get it from the overly diffident. We commonly need others to provide us with a sharply differentiated picture of the situation as they see it.[20]

In effect, we expect others, whether they be scientists, teachers, butchers, journalists, plumbers, or simply our friends, to act as jurors for us, delivering their black-and-white judgements about the facts as best they can. Indeed, legal judgements provide a good paradigm for this kind of judgement. In the American legal system, juries have three options in criminal proceedings. Each particular juror has only two options—to vote "innocent" or vote "guilty"—but collectively they have three. If each individual juror votes "innocent" they reach a collective verdict of innocence and thereby acquit the defendant; if each votes "guilty" the reach a collective verdict of guilt and thereby convict the defendant; otherwise the result is a hung jury, in which neither innocence nor guilt is declared.[21]

No room is left for judgements of degree here. Juries are not allowed to qualify their judgements. They cannot choose among "almost certainly guilty" as opposed to "highly likely to be guilty" as opposed to "more likely than not to be guilty." *A fortiori* they are not given option of delivering numerically precise judgements. They cannot, for example, judge that it is likely to degree 0.89 that the defendant is guilty.

There is nothing in principle that precludes a legal system from allowing such calibrations and then adjusting the punishment to reflect the degree of belief that the jury has in the defendant's guilt. But in fact there is no legal system of this sort and for good reasons. Any such system would be horribly unwieldy.

Taking stands is an inescapable part of our intellectual lives, and the epistemology of belief is the study of such stands. It restricts your doxastic options to just three—to say "yes" to a proposition, to say "no" to it, or to remain neutral on it. The project is then to describe what is the best, or at least a satisfactory, combination of such yes, no and neutral elements for you—not for all time but for now.

This conception of the epistemology of belief makes it all the easier to appreciate why it sometimes can be rational for you to have beliefs that you know to be inconsistent. A combination of yes, no, and neutral elements that you know to be somewhat flawed can nonetheless be a satisfactory one for you, given your situation and given the alternatives. The lottery, the preface, and the more general case of having fallibilistic beliefs about your other beliefs all illustrate this. To be sure, in each of these cases there are alternatives that keep open the possibility of a flawless outcome, but only a misplaced fastidiousness would insist that we always and everywhere do so.

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Received May 29, 1991

NOTES

1. John Locke, *An Essay Concerning Human Understanding,* ed. P. H. Nidditch (Oxford: Clarendon Press, 1975), especially Book IV, Chapters xv and xvi.

2. Locke, *op. cit.*, IV, xv, 5.

3. Henry Kyburg, *Probability and the Logic of Rational Belief* (Middletown: Wesleyan University Press, 1961).

4. This forces us to bracket, for the moment, the conclusion of the lottery argument.

5. "Once a subjective or epistemic probability value is assigned to a proposition, there is nothing more to be said about its epistemic status." Robert Stalnaker, *Inquiry* (Cambridge: MIT Press, 1987), p. 91.

6. Your estimated payoff on each of the nine "pea" bets = .9($1) + .1(-$1) = $.80, and your estimated payoff on the "non-pea" bet = .1($1) + .9(-$1) = -$.80.

7. Your estimated payoff on each bet = .9($1) + .1(-$1) = $.80, and you make nine such bets.

8. For other defenses of the idea that one can knowingly but rationally have inconsistent beliefs, see Richard Foley, "Justified Inconsistent Beliefs," *American Philosophical Quarterly,* vol. 16 (1979), pp. 247-58; Richard Fumerton, *Metaphysical and Epistemological Problems of Perception* (Lincoln: University of Nebraska Press, 1985), especially pp. 45-7; Gilbert Harman, *Change in View* (Cambridge: MIT Press, 1989), especially pp. 15-6; and Paul Moser, *Empirical Justification* (Dordrecht: D. Reidel, 1985).

9. A sampling of such theories: Keith Lehrer, *Knowledge* (Oxford: Oxford University Press, 1974), and Keith Lehrer, Theory of Knowledge (Boulder: Westview Press, 1990); Larence Bonjour, T*he Structure of Empirical Knowledge* (Cambridge: Harvard University Press, 1985); Gilbert Harman, *Thought* (Princeton: Princeton University Press, 1973); Marshall Swain, *Reasons and Knowledge* (Ithaca: Cornell University Press, 1981).

10. Compare with Henry Kyburg, "Conjunctivitis," in M. Swain, ed. *Induction, Acceptance, and Rational Belief* (Dordrecht: D. Reidel, 1970), pp. 55-82.

11. Both Robert Stalnaker and Mark Kaplan have expressed worries of this sort. See Stalnaker, I*nquiry,* especially p. 92; and Kaplan, "Rational Acceptance," *Philosophical Studies,* vol. 40 (1981), pp. 129-45.

12. Points of this sort have been especially emphasized by Gilbert Harman. However, he regards reasoning as essentially a matter of moving from one belief-state to another. As a result, he concludes that there is no such thing as deductive reasoning, only deductive argument. This is a needlessly controversial conclusion. If we distinguish believing from assuming, positing, and the like, we can admit what in any event seems obvious—viz., that there is such a thing as deductive reasoning—while retaining what is really essential in Harman's position—viz., that there is no simple way to get principles of rational belief acquisition and revision from the principles of deductive argument. See Harman, *Change in View,* especially Chapters 1 and 2.

13. This is an idea typically emphasized by coherentists. See, e.g., Lehrer, *Knowledge*; Lehrer, *Theory of Knowledge*; and Bonjour, T*he Structure of Empirical Knowledge.*

14. Contrast with Harman who says: "Belief in or full acceptance of P involves . . . [allowing] oneself to use P as part of one's starting point in further theoretical and practical thinking." *Change in View,* p. 47.

15. Contrast with Lehrer, *Theory of Knowledge,* pp. 129-30. His position implies that it is altogether impossible for you to be justified in believing any of these propositions, since for each such proposition there is a competitor (if only a very weak one) that is equally reasonable for you.

16. This is essentially Chisholm's view. See Roderick Chisholm, *Theory of Knowledge,* 3rd. ed. (Englewood Cliffs: Prentice-Hall, 1989), p. 98.

17. ". . . *whever we apply decision theory we must make some choices:* At the very least, we must pick the acts, states, and outcomes to be used in our problem specification. But if we use decision theory to make these choices, we must make yet another set of choices." Michael Resnik, *Choices* (Minneapolis: University of Minnesota Press, 1987), p. 11.

18. Compare with Mark Kaplan, "A Bayesian Theory of Rational Acceptance," *The Journal of Philosophy,* vol. 78 (1981), pp. 305-30.

19. Compare with Gilbert Harman, *Change in View,* especially Chapter 3.

20. Recent work in cognitive science re-inforces this picture by suggesting that the human cognitive system displays a propensity toward full acceptance. See. J. A. Feldman and D. H. Ballard, "Connectionist Models and Their Properties," *Cognitive Science,* vol. 6 (1982), pp. 205-54. See also Alvin Goldman, The Cognitive and Social Sides of Epistemology," P*roceedings of the Philosophy of Science Association,* vol. 2 (1986).

21. Unlike the jury that acquits, a hung jury typically allows the prosecutor the prerogative of retrying the case. So, it is not a declaration of innocence.