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COUNTERFACTUALS AND EPISTEMIC PROBABILITY

ABSTRACT. Philosophers have often attempted to use counterfactual conditionals to analyze probability. This article focuses on counterfactual analyzes of epistemic probability by Alvin Plantinga and Peter van Inwagen. I argue that a certain type of counterfactual situation creates problems for these analyses. I then argue that Plantinga's intuition about the role of warrant in epistemic probability is mistaken. Both van Inwagen's and Plantinga's intuitions about epistemic probability are flawed.

Alvin Plantinga and Peter van Inwagen have recently proposed analyses of epistemic probability. Both of their proposals are counterfactual accounts that analyze epistemic probability in terms of what it would be rational to believe in certain counterfactual situations. Unfortunately these analyses of epistemic probability are based on incorrect intuitions about epistemic probability. In the following I will begin by presenting a counterexample to van Inwagen's account. After seeing that similar counterexamples affect other counterfactual analyses of probability, we will look at Alvin Plantinga's account of epistemic probability, which is also a counterfactual account. A simplified version of Plantinga's account falls prey to the same type of problem, and we will investigate Plantinga's proposal of how to avoid this type of problem. Plantinga's attempt to avoid these problems results in even more problems for his analysis. By the end it will be clear that the fundamental intuitions behind Plantinga's and van Inwagen's accounts of epistemic probability are incorrect. These counterexamples are not based upon any minor feature of Plantinga's and van Inwagen's accounts, but arise from the counterfactual nature of their proposals; as a result no minor modifications will enable their proposals to survive.

1. VAN INWAGEN'S PROPOSAL

van Inwagen presents the following definition of epistemic probability:

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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 there are no odds that a fully rational ideal bookmaker in K would be willing to give to a client who bet that 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.(1996, 221)

Although this appears quite complicated, this proposal analyzes epistemic probability in terms of the odds an ideal bookmaker would set in a counterfactual situation. But consider the following:

(B) there is a fully rational ideal bookmaker.

A fully rational ideal bookmaker in our epistemic situation would certainly believe that he or she existed and was a fully rational ideal bookmaker; thus he or she would not bet against there being a fully rational ideal bookmaker, no matter what the odds. From this it follows that according to van Inwagen's analysis the epistemic probability of (B) relative to our epistemic situation is 1. But surely that is incorrect; it is not reasonable to be certain that there is a fully rational ideal bookmaker in this world. The fact that in some counterfactual situation a fully rational ideal bookmaker in my epistemic situation would be certain that a fully rational ideal bookmaker exists is irrelevant to the epistemic probability relative to my epistemic situation that such a bookmaker exists in our world.[1] What it would be rational for an ideal bookmaker to believe may be very different from what it is rational for us to believe.

van Inwagen has also proposed a counterfactual account of conditional epistemic probability that suffers from the same basic problem. According to van Inwagen:

If K is the epistemic situation of some person at the world w, let K & p be what is common to that person's epistemic situations in all the worlds closest to w in which he rationally believes that p. (Roughly, K & p is the epistemic situation that someone whose actual epistemic situation is K would be in if he rationally believed that p.) Let us then say that the conditional epistemic probability of p on q relative to K is equal to the epistemic probability of p relative to K & q. (1996, 221)

Unfortunately, this analysis commits the agent to believing that he or she is omniscient. To see this, consider any proposition that I do not know whether it is true or false. As an example, consider R:

(R) the first person to cross the Bering Strait into North America was right handed.

The problem arises with the value of P(I believe R | R). First note that for van Inwagen the epistemic probability of *I believe R* relative to K (my epistemic situation) and R is 1. To see this, look at all the worlds closest to ours in which I rationally believe R is true; in those worlds the epistemic probability of R is 1. From this it follows that according to van Inwagen's analysis the conditional epistemic probability of *I believe R* given R relative to my epistemic situation is 1: P(I believe R | R) = 1. This basically means that the agent is sure that if R is true, he or she will be certain of it; in other words, the agent believes he or she is omniscient. This problem arises because of the counterfactual nature of van Inwagen's analysis. What it would be rational for an ideal bookmaker to believe in some counterfactual situation may not be what it is rational for me to believe in my current situation. Although counterfactual situations may provide a good means to determine many epistemic probabilities, the above examples show that it is a mistake to analyze epistemic probability in terms of these counterfactual situations.

This type of error is easily made in giving counterfactual analyses of probability. Subjective probability is often presented as the odds one would consider to be fair, if one were forced to set odds and place bets at those odds. For example, following a suggestion of Jackson and Pargetter (1976), Davidson and Pargetter give the following analysis of degrees of belief (subjective probability):

> ...if betting quotients can be identified with a person's degrees of belief, it will be their FBQ's (forced betting quotients), that can be so identified. So the suggestion is that only a betting quotient which would be acceptable to a person for a reversible bet regarding a proposition, if they were forced to bet, could be identified with the degree of belief that person has regarding that proposition. (1985, 409)

According to this proposal we can identify or analyze a person's degrees of belief or subjective probability in terms of the odds they would set if they were forced to bet in a highly controlled situation.

But consider an agent's degree of belief in the following:

(F) I am being forced to bet in a highly controlled situation.

The agent's partial belief in (F) is analyzed in terms of the odds they would set if forced to bet in a highly controlled situation. However, if they were being forced to bet in a highly controlled situation, they would believe quite strongly that they were being forced to bet in a highly controlled situation. Hence they would set odds that reflected this strong belief. Thus according to this analysis, the agent's degree of belief in proposition (F) is very high, most likely 1.

But contrary to this result, it seems intuitively false that everyone has a high degree of belief in proposition (F). At the present moment most people do not believe strongly that they are being forced to bet in a highly controlled situation. This problem arises because of the counterfactual nature of the analysis; it identifies our actual degrees of belief with the degrees of belief we would have in a certain counterfactual situation. But our degrees of belief in certain propositions will be different in counterfactual situations than they are in the actual world.

2. PLANTINGA'S ACCOUNT OF CONDITIONAL EPISTEMIC PROBABILITY

Plantinga begins his discussion of epistemic probability by distinguishing between an objective component and a normative component in epistemic probability. Both of these accounts are very interesting, but we will limit ourselves to discussing his account of the normative component in this paper. Although he does not present a final analysis of the normative component, he does give the following principle which he claims is a "first approximation" to the basic intuitive idea behind the normative aspect of epistemic probability:

(CEP): P(A|B) = <x,y> iff <x,y> is the smallest interval which contains all of the intervals which represent the degree to which a rational human being S (for whom the conditions necessary for warrant hold) could believe A if she believed B, had no undercutting defeater for A, had no other source of warrant either for A or for −A, was aware that she believed B, and considered the evidential bearing of B on A. (1993, 168)

Although quite complicated, this analysis clearly has a counterfactual structure. Plantinga requires the criteria besides believing B in an attempt to avoid counterexamples of the sort that were discussed above. To see why it is important for Plantinga to add these criteria, consider the following simplified version of Plantinga's proposal:

(austere-CEP): P(A|B) = <x,y> iff <x,y> is the smallest interval which contains all of the intervals which represent the degree to which a rational human being S (for whom the conditions necessary for warrant hold) could believe A if she believed B.

It is easy to see that austere-CEP commits the agent to believing he or she is omniscient. According to austere-CEP, P(I believe

R|R) = 1, just as it was for van Inwagen's theory. [2] Thus austere-CEP has the same problems that van Inwagen's analysis did.

Because of these problems facing austere-CEP, CEP has several restrictions on the counterfactual situation that austere-CEP does not have. Plantinga thinks all of the cases that create these sorts of problems arise because B cannot be the sole source of warrant for A. As a result, Plantinga has two strategies to avoid these problems that face austere-CEP. His primary strategy is to add additional requirements to austere-CEP and say that conditional epistemic probabilities are undefined in the problematic cases because the additional restrictions in CEP are not satisfied. In the problematic cases B cannot be the sole source of warrant for A, and thus according to CEP P(A|B) will not be defined for propositions A and B:

> Here I am pulled in two directions. On the one hand, pairs <A,B> such that B can't be the sole source of warrant for A (or its denial) really don't meet the conditions of epistemic probability; in these cases B has no contribution to make strictly of its own. In a way, there really isn't any such thing as the epistemic conditional probability of A on B—B alone, so to speak. ... This suggests that the right course here is the same as in the cases of those pairs <A,B> such that B can't be the sole source of warrant for A because A already enjoys maximal warrant apart from any relation to B: such pairs are not in the field of the relation of epistemic conditional probability. (1993, 171)

His secondary strategy is to admit that the conditional epistemic probabilities in question are intuitively defined, and to propose a general outline of how those probabilities should be defined:

> On the other hand, in these cases B does (or can) contribute to the total warrant possessed by A, for S: B is (or can be) part of S's total evidence for A; it can be part of S's total case for A. That suggests that conditional epistemic probability is defined for such cases. If we are persuaded by the latter consideration, we must make a qualification: we must say for these pairs, that the epistemic probability of A on B is a function of the difference between the degree of confidence S would have in A if she had only the sources of warrant for A necessary for rationality, and the degree of confidence she would have in A if she had those sources of warrant and also B. I leave as homework the project specifying this function. (1993, 171)

With these two strategies we can see Plantinga as first claiming that the conditional epistemic probability is not defined when the restrictions of CEP are not satisfied, and secondarily claiming that if we don't accept that and believe these probabilities are defined, their values would be a function of the sort he mentions.

In the following I will present four arguments against the basic intuitions that Plantinga is trying to capture in CEP. First I will argue that neither of the above strategies are successful. Plantinga's primary strategy fails, because there are intuitive probabilities that are undefined according to CEP. As a result, CEP does not express our intuitive notion of conditional epistemic probability. Plantinga may have anticipated these problems, which may explain his secondary strategy. But I will also argue that his secondary strategy fails, and that any function of the sort Plantinga mentions will give the wrong results. My third argument is that even if Plantinga's primary or secondary strategy had been successful, there would be counterexamples to CEP; this is because Plantinga assumed that in all of the problematic cases B is not the sole source of warrant for A. This assumption is false, and I will give an example that shows there are problematic cases in which B is the sole source of warrant for A. In this example the restrictions of CEP are satisfied, the probability is clearly defined according to CEP, and yet the result is intuitively wrong. This example is a more complicated version of the counterexamples to van Inwagen's proposal, and arises because of the counterfactual nature of CEP. These first three arguments are all based on problems that arise from CEP giving the intuitively incorrect probability in certain cases. My fourth argument will show there is an even more fundamental problem with CEP. I will present very general considerations which show that the fundamental intuition behind CEP is flawed, and that no proposal that accounts for the intuition behind CEP will capture our intuitive notion of conditional epistemic probability.

In these arguments I will not simply propose counterexamples to CEP that can be repaired by minor modifications. Given that Plantinga claims CEP is only a first approximation of our intuitive ideas about the normative aspect of conditional epistemic probability, in order to be successful my argument must show that the intuitions captured in CEP are not our intuitions about conditional epistemic probability. Thus the following arguments and counterexamples are designed to illustrate fundamental problems with the intuitions Plantinga was expressing in CEP.

2.1. *Plantinga's First Strategy*

In order for Plantinga's strategy of having certain probabilities undefined to be successful, it must be plausible to claim that these conditional epistemic probabilities do not exist; otherwise CEP would not account for our intuitive notion of conditional epistemic probability. Unfortunately, there are examples in which we clearly know the value of certain conditional epistemic probabilities, but they are undefined according to CEP. Consider the following variation of one of Plantinga's examples:

P(people are sometimes appeared to redly | I am appeared to redly)

Intuitively this probability is 1; if I am appeared to redly, it must be the case that people are sometimes appeared to redly. But Plantinga claims that it is not possible for a rational person's sole source of warrant for *people are sometimes appeared to redly* to be *I am appeared to redly*. Thus this probability is undefined according to CEP, even though it obviously has a value of 1. This example shows that CEP does not account for our intuitive notion of conditional epistemic probability.

2.2. *Plantinga's Second Strategy*

Plantinga's second strategy is intended to account for those cases in which we do not accept that the problematic probabilities are undefined. In some cases P(A|B) appears to be defined even though B is not the sole source of warrant for A. About these cases, Plantinga says:

> On the other hand, in these cases B does (or can) contribute to the total warrant possessed by A, for S; B is (or can be) part of S's total evidence for A; it can be part of S's total case for A. That suggests that conditional epistemic probability *is* defined for such cases. If we are persuaded by the latter consideration, we must make a qualification: we must say, for these pairs, that the epistemic probability of A on B is a function of the difference between the degree of confidence S would have in A if she had only the sources of warrant for A necessary for rationality, and the degree of confidence she would have in A if she had those sources of warrant and also B. (1993, 171)

It is easy to see that no function of the sort Plantinga is talking about could be a measure of conditional epistemic probability. As an example let proposition A be a proposition that Plantinga discusses, and suppose we also have a lottery with 100 tickets:

A = It is wrong to hurt people just because it affords you a certain mild pleasure.

A* = A and ticket number 72 won the lottery.

Plantinga assumes that the epistemic probability of A is very high, but less than 1. To begin, note that our intuitions are that P(A | A) and P(A* | A*) should both be equal to 1. Any adequate theory of epistemic probability must be consistent with these intuitions. Furthermore, according to CEP, P(A | A) is undefined because A cannot be the sole source of warrant for A. Plantinga's second strategy directs us to look at the counterfactual situation in which a rational person has only the sources of warrant for A necessary for rationality, and to see how much this would change if the person were to fully believe A. Plantinga is proposing that conditional epistemic probability is a function of the difference between these probabilities. In this example, if the person believes A they will be certain of A; but since A was already believed very strongly, A will make only a very small difference. Thus, according to Plantinga's second strategy, the function corresponding to CEP is such that when the difference is small, the conditional epistemic probability is 1.

Now consider P(A* | A*). This is also undefined by CEP, but on Plantinga's second strategy we first look at how likely a rational person would believe A* if they had only the sources of warrant for A* necessary for rationality. This degree of belief would be quite low, somewhere less than .01, because it would be the probability of A multiplied by the probability of ticket 72 winning the lottery, which is .01. If the person were to fully believe A*, then she would be certain of A*. In this case A* makes a very large difference, somewhere around .99. Since P(A* | A*) equals 1, we know that the function corresponding to CEP must assign the value 1 when applied to a number close to .99. It is easy to construct similar examples that show the function corresponding to CEP will assign the value 1 no matter what the difference between the probabilities is.

But this creates a problem for Plantinga's proposal. Since Plantinga proposes that conditional epistemic probability is a function of the difference between two counterfactual degrees of belief, examples like the above show that for any difference between the counterfactual degrees of belief that Plantinga directs us to look at, the conditional epistemic probability must be 1. But surely not all conditional epistemic probabilities are 1 (consider P(A | not-A)). An acceptable account of CEP requires that values other than 1 be assigned in some cases. Since functions assign a unique number to each value in their domain, there is no function of the sort Plantinga proposes that can correspond to our intuitive notion of CEP in these cases. As a result, Plantinga's second strategy fails; we cannot define conditional epistemic probability in terms of the difference between these counterfactual beliefs.

Of course, my argument here depends on the assumption that the conditional epistemic probabilities of A given A and A* given A* are 1. Plantinga could deny this, but at a very high cost. Our intuitions strongly hold that P(A | A) = 1, and denying this would show that Plantinga's proposal does not account for our intuitive judgements of conditional probability.

2.3. *Problems with the Counterfactual Nature of CEP*

Plantinga placed the restrictions on CEP in order to avoid the types of problems that face austere-CEP; his primary and secondary strategies for dealing with these problems assume that the problematic cases do not satisfy the restrictions built into CEP. However, it is not difficult to construct similar examples that satisfy the restrictions of CEP. Consider the following:

P(there are no Americans | either there are no people or there are Americans)

According to CEP we should look at the counterfactual situation in which a rational agent believes either there are no people or there are Americans. Since a rational person could not believe there were no people, a rational person who believed that either there are no people or there are Americans would do so because she believed that there were some Americans. In this counterfactual situation the agent would believe to degree 0 that there are no Americans, and thus this probability is $<0, 0>$. Furthermore, the agent has no other source of warrant for there being Americans (or no Americans), and so the requirements of CEP are met. But this is obviously the wrong result. If it is at all possible that there are no people, then the rational agent should not assign $<0, 0>$ to this probability.[3] CEP gives the intuitively wrong result in cases like this.

This problem arises because of the counterfactual nature of CEP. Like van Inwagen's proposals and austere-CEP, CEP determines actual epistemic probabilities by looking at what a rational person would believe in certain counterfactual situations. But what rational people would believe in counterfactual situations may not match up with what it is rational to believe in our situation. Even with the restrictions on the counterfactual situation built into CEP, there are still counterfactual situations that give the wrong result. Of course, since CEP is not presented as a final analysis, it may be possible for Plantinga to modify it to account for this example. But I am arguing that there is no ground for optimism that this will be possible. It is a mistake to analyze actual conditional epistemic probabilities in terms of counterfactual degrees of belief.

2.4. *A More Fundamental Problem*

Plantinga's basic intuition is that the conditional epistemic probability of A given B is the contribution that B alone makes to the warrant of A. CEP is an attempt to separate B's contribution to A's warrant from other sources of warrant for A, including the rest of the agent's beliefs. However, I am not convinced that B alone contributes anything to the warrant of A; one belief provides evidence for another only relative to a set of beliefs. Although with CEP Plantinga attempted to provide an account of conditional epistemic probability that would not be relevant to the agent's background beliefs, he did not succeed. According to CEP, P(A|B) is an interval that will include all degrees of belief in A that a rational person who also satisfies all the restrictions of CEP could have. This is problematic, for the simple reason that rational people can often hold different opinions. The background beliefs of rational agents may differ greatly, and this allows rational people to have very different rational degrees of belief. According to CEP, the conditional epistemic probability of A on B is highly dependent upon background beliefs that an agent could rationally hold, and background beliefs about how likely A is given B will be especially relevant. For example, one agent may rationally believe that A is very likely given B and the rest of what he believes, and another agent may rationally believe that A is very unlikely given B and the rest of what she believes; neither of these is a source of warrant for A or not-A, and the requirements of CEP are satisfied.[4] If these agents were to fully believe B, one would rationally believe A to a very high degree and one would rationally believe A to a very low degree. According to CEP, the conditional epistemic probability of A on B will have to include both of these degrees of belief, and thus P(A | B) = <very low, very high>. This holds for almost any proposition that it is possible for rational people to disagree about. This is problematic because all conditional epistemic probabilities will be assigned the same large interval by CEP. This problem arises because whether B is relevant to A and contributes anything to the warrant of A depends upon the rest of the agent's beliefs. But Plantinga's whole account of conditional epistemic probability is based on the idea that one proposition can contribute to the warrant of another proposition independently of other beliefs the agent holds.

The natural response to this problem is to require that the agent have no beliefs (or source of warrant for beliefs) about how likely A is given B (and other beliefs). But the problem still arises in numerous forms. Without having an additional source of warrant for A, rational people could disagree on whether B is a good reason to believe A (given different background beliefs), and so P(A | B) will still be <very low, very high>. Or they might disagree on the objective probability or propensity of A on B, etc. I can see no plausible way to avoid these and similar problems. The only approach to avoiding these problems would be to require that the agent have no beliefs (or source of warrant for beliefs) that combined with B make A likely, that make claims about the rationality of believing A on the basis of B, that state how likely A is on the basis of B, etc. But then the agent is left with no beliefs or source of warrant for beliefs about the relation between A and B; all information that is relevant to the relation of A and B would have to be excluded. Given that all information about the relevance of B to A is excluded, a rational agent in this situation may simply withhold belief on how likely A is given B, and thus P(A | B) would be <0, 1>. Of course, this argument does not depend on all rational agents withholding belief and assigning the interval < 0, 1> to P(A/B); all that is required is that it be possible for a rational agent to withhold belief and assign that interval. It is almost always possible for a rational person with no beliefs about the relevance of B to A to withhold belief and assign <0, 1> to how likely A is on B; thus, according to CEP, P(A|B) will usually be <0, 1>.

This problem stems from Plantinga's intuition that we can separate out the contribution that B makes to the warrant for A. However, that looks to be mistaken. For these reasons Plantinga's CEP is not an acceptable analysis of our intuitive notion of conditional epistemic probability. But that should not surprise us. The conditional epistemic probability of A given B is not the contribution that B makes to the warrant of A.

3. CONCLUSION

In conclusion, we must be very careful in giving counterfactual analyses of probability. Both van Inwagen's and Plantinga's counterfactual analyses of epistemic probability have serious problems and should be rejected. Analyses of probability in terms of counterfactual situations end up assigning the wrong probability to certain propositions whose probability differs in our world and in the counterfactual situation. For this reason counterfactual analyses of probability should be rejected. Although counterfactuals may play an important role in philosophy, they do not provide an analysis of epistemic probability. [5]

NOTES

[1] van Inwagen never explains what it is for two beings to be in the same epistemic situation. One might object that the fully rational ideal bookmaker could not be in the same epistemic situation as us, and as a result B is not a counterexample. Unfortunately, van Inwagen's proposal is built upon the assumption that fully rational ideal bookmakers can be in the same epistemic situation as us, and this assumption cannot be denied while keeping his analysis.
[2] Although Plantinga only defines CEP for intervals, for ease in discussing his theory I will often say the probability is r instead of <r,r>. Nothing is lost by doing so.
[3] Other problems are easy to generate. Consider: P(evolutionary theory is true | none of our beliefs are reliable or evolutionary theory is false). This is especially important given Plantinga's evolutionary argument against naturalism.
[4] Beliefs about either objective or epistemic probability will be problematic for Plantinga's account. For example, beliefs like the following: the objective probability of A given B is r, and the epistemic probability of A given B is r, will result in the rational agent believing A in the counterfactual situation to degree r.
[5] Problems with counterfactual analyses were first brought to my attention by Alvin Plantinga's (1982) Presidential Address to the APA. In this address he raised similar problems for Putnam's pragmatic theory of truth, which analyzed truth in terms of what an ideally rational society would believe.

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