Probability, Practical Reasoning, & Conditional Statements of Intent

Dale Jacquette

1. An Apparent Fallacy

To QUALIFY THE TRUTH OF A PROPOSITION PROBABILISTICALLY IS TO PLACE IT within the scope of a special type of alethic modality. We expect that, as in other modal contexts, the merely probabilistic truth of an assumption in a valid inference must carry over to whatever conclusions are derived from the assumption. That expectation, however, is not always fulfilled in ordinary reasoning about conditional probabilities. There are simpler ways of illustrating what I shall call the paradoxes of conditional probabilistic reasoning in ordinary language, but the following argument is a colorful example. Consider an apparently deductively valid inference, by an imaginary inmate of a penal institution supervised by a bitterly hated warden who is surrounded by dangerous criminals, including the argument's author:

> *Argument A*:
> (1) (I declare that) If no one else (other than me) actually murders the warden, then I will probably murder the warden myself.
> (2) The warden is so unpopular with so many dangerous criminals that I will probably not need to murder the warden.
> (3) Moreover, it is not really in my nature to commit murder, unless I am forced to do so by drastic circumstances or in order to fulfill an oath, such as the one expressed above in proposition *(1)*, and I cannot imagine ever having an opportunity in which even to attempt to murder the warden, let alone succeed.

Dale Jacquette is Professor of Philosophy at The Pennsylvania State University. His research is primarily in philosophical logic and philosophy of mind. He has most recently published Ontology, On Boole, Symbolic Logic, David Hume's Critique of Infinity, Wittgenstein's Thought in Transition, *and* Meinongian Logic: The Semantics of Existence and Nonexistence. *His editing projects include* Schopenhauer, Philosophy, and the Arts; *Blackwell's* A Companion to Philosophical Logic; Philosophy, Psychology, and Psychologism: Critical and Historical Essays on the Psychological Turn in Philosophy; *and* The Cambridge Companion to Brentano. *He is currently Editor of* American Philosophical Quarterly.

(4)   Hence, it is not the case that I will probably murder the warden myself. *(2,3)*

(5) Therefore, it is not the case that no one else (other than me) actually murders the warden. That is, someone else (other than me) actually murders the warden. The warden will be murdered! *(1,4 MTT)*

There are several interesting aspects of this argument. The inference proceeds by an ordinary *modus tollendo tollens (MTT)* from the conditional oath in proposition *(1)*, and the negation of the consequent of the conditional in proposition *(4)*. We do not doubt the validity of this standard rule of deductive reasoning, so we turn our attention to the *truth* of propositions *(1)* and *(4)*.

Looking first at the conclusion in *(4)* that it is not the case that I will probably murder the warden, its truth seems unassailable given the truth of premises *(2)* and *(3)*. Indeed, almost any single consideration raised in these assumptions would individually be enough to secure the truth of *(4)*. The conclusion will hold, for example, if it is true as stipulated that the fictional argument author never even has an opportunity to murder the warden, perhaps because there is no reason to think that the author will ever be admitted into the warden's presence. Considerations of character, opportunity, and the likelihood that others more motivated and capable than the argument author will do the deed more speedily all contribute to make it improbable that the argument author will murder the warden.

What, then, about the statement of conditional oath in assumption *(1)*, which the author makes the basis together with *(4)* for the final inference in conclusion *(5)*? It might at least be true in this sense: that the assumption is an expression of the author's real and sincere intention to murder the warden if no one else does so, partly on the presupposition that the antecedent of the conditional is false, assuming circumstantially that there are many others who are ready to undertake the fatal action in any case, so that in all probability the author will not need to fulfill the consequent of the conditional oath with no risk to its truth, or to the oath maker's rough sense of honor.

There is an element of time that also enters into the calculation, since the conditional statement of intent does not propose to say when the promised action will take place after whenever the condition of the antecedent is true or satisfied. For example, if years and years go by and still no one has murdered the warden, the argument author through old age may become increasingly unfit to fulfill the promise in the conditional's consequent. We can tighten up some of these loose screws and still preserve the logical puzzle afforded by the example in specifying that if someone does not murder the warden by this weekend, then the argument author will probably try to do so by the following weekend.The argument author for all the reasons previously detailed once again will probably not try to murder the warden by the following weekend; therefore the warden more alarmingly and paradoxically is actually murdered by this weekend!

2. Conditional Statements of Intent

AN OATH IS LOGICALLY INTERESTING, AMONG OTHER REASONS, BECAUSE IT APPEARS THAT it can be true and function at least superficially almost normally in language and logic, as in the murder of the warden argument, in the logical form of a conditional. As such it can thereby be taken up directly into reasoning just like any other conditional proposition. Any propositional structure might be involved in the statement of an oath, as an oath maker tries to anticipate various conditions and logically branching possibilities or compossibilities, conjoint or disjoint circumstances occurring both before and after the action sworn by the oath is imagined to be implemented. The conditional in assumption *(1)* is already enough to convey an idea of the potential difficulties in trying to use classical symbolic logic to formalize the logical structure of sentences and inferences in colloquial language involving oaths, promises of action, and similar items of practical reasoning. What is noteworthy about the logic of oaths is that oaths can be true or false merely as a sincere or insincere expression of intent, but they can be made false extra-intentionally if an oath maker deliberately reneges on the promise to act as the oath requires.

This is what seems to be going on in the murder argument. We can assume the conditional oath in assumption *(1)* is true as a faithful expression of the argument author's intent. The author feels so strongly about the warden, hates the warden so bitterly, that the author at least in thought makes this grim conditional threat upon the warden's life, assuming or perhaps temporarily forgetting or overlooking the consideration that there is virtually no probability that the author will ever in fact be called upon to fulfill the oath. A similar but more extreme and obvious use of promising that reveals this underlying logical structure is found in playfully unfulfillable antecedents, again of conditional oaths, such as: "I will gladly pay for someone else's damage to your car, *when pigs fly*." In the murder argument, the intent is obviously much more serious, but in a way, given the prisoner's background knowledge formulated in premises *(2)* and *(3)*, the conditional oath has rather different force, indicating what the argument author truly intends to do if a condition that is never expected to be fulfilled despite all reasonable expectations were after all to occur.

The inference is logically paradoxical because the mechanism of *modus tollens* is so apparently innocent, and the assumptions can all be understood as true statements of intent or stipulated imaginary conditions that seem at least to be jointly logically consistent. The argument describes a possible set of circumstances in which all three assumptions could be true, provided that we interpret a sincere oath as a true statement of intent, and that the other conditions as they are described could obtain as they are said to in the prison. The inference is nevertheless deductively invalid, because the truth of the conclusion intuitively is not necessitated by the truth of the assumptions. The warden might or might not end up being murdered. Let us hope not. We surely do not expect to be able to deduce that a murder does or does not or will or will not actually occur merely from a set of assumptions including the conditional true intent that the murder take place. The road to

hell is paved with bad as well as good intentions.

Perhaps the most obvious factor to fasten on in critically analyzing the murder argument is the apparent disanalogy between the truth conditions of ordinary conditional propositions versus conditional sincere oaths or other expressions of intent. If assumption *(1)* were true in the same way and in the same sense as ordinary conditional propositions, then, if the antecedent were true or its condition were satisfied, the consequent would necessarily also be true. The trouble in the case of a conditional statement of intent, even if it is true in some sense or other, is that the truth or satisfaction of its antecedent at most calls upon the person who makes the conditional statement of intent to actually try to do something, and that this is not logically guaranteed. Conditional statements always have two faces, however. The truth of a conditional can lead to contrary conclusions, depending on whether or not its antecedent is independently true or its consequent independently false.[1]

3. Promising to Attempt and Attempting to Fulfill

THE MURDER BY LOGIC ARGUMENT INVOLVES A STIPULATIVELY TRUE CONDITIONAL STATEment of intent, that, if interpreted as functioning logically in the manner of an ordinary material conditional, results in a deductively invalid inference from true assumptions to a possibly (and hopefully) false conclusion.

Thus, there appears to be a paradox in practical reasoning for logicians trying to apply the truth table definitions of logical connectives to true conditional statements of intent. We might try to salvage the situation by saying that the conditional oath or statement of intent in proposition *(1)* is not literally true, even if the argument author is sincere about what the statement says and really intends to murder the warden if no one else does. The proper statement of the argument author's intent in that case might instead be something like:

(1') (I declare that) If no else (other than me) actually murders the warden, then I will probably try to murder the warden myself.

All of the reasons given in support of the original premises *(2)* and *(3)* equally support modifying them as stipulations to the effect that the argument author will not probably attempt to murder the warden. It remains true as before that the author is not by nature a murderer and has no expected opportunity *to try* to murder the warden, whereas the warden is surrounded by many hardened killers who have the necessary will, skill, and opportunity to kill, and have, let us now add, frequently themselves expressed the intent to murder the warden before this weekend. Merely *to try or attempt* to do something seems more within the realm of possible action for the argument author, even if the author does not have the knowledge, inclination or opportunity to fulfill the conditional oath when the specified time goes by and no else has yet murdered the warden. We can always try, even if we do not always succeed. It might be the mark of prudence generally to cast our promises conditionally or with any other logical structure in the

form of what we will *try* to do rather than what we will *actually* or *in fact* do. However sincere we may be, we cannot always know in advance whether or to what extent our efforts in fulfillment of our intended course of action may actually be accomplished.

Naturally, the argument author might still back away even from fulfilling the promise to attempt the warden's murder. In that case, however, by contrast with the original unqualified consequent in the conditional statement of intent and its supporting assumptions in the inference, we are conceptually on firm ground in denying that the assumption formulating the argument author's intent is true, once next weekend has come and gone and the warden (thankfully) remains not only unmurdered but with no attempt at the warden's murder having been undertaken even in the slightest degree by the reneging author. The author's prisonmates, if he or she has communicated the intent to them, would no doubt be justified in complaining that the author talked a good game to seem brave or to share in the general spirit of animosity enveloping the warden, but did not truly intend to murder the warden by the following weekend if no one else had done so by the end of this weekend. Such a strategy provides an easy way out of the argument's invalidity, but only for applications of the argument's propositional logical structure that turn out as a result of the oath maker's subsequent actions to be unsound. At the time when the author makes the oath, it might be as true as any other proposition, in the sense of corresponding positively to the author's actual intent, and only later, when the author has acted or failed to act in such a way as to cast doubt on the truth of the statement, can we judge that the assumption formulating the author's intent may have been false in the sense of failing to reflect the author's real intent.

4. Truth Conditions for Statements of Intent

THIS IS FINALLY WHAT SEEMS STRANGE ABOUT PRACTICAL REASONING INVOLVING PROBABILISTIC conditional statements of intent. There is a case to be made for saying that the epistemology required to justify the truth of assumptions in evaluating the murder argument as sound or unsound, given the deductive validity of *modus tollens*, is no different in practical reasoning than in any other type of logical, scientific or theoretical inference.

When I issue an argument like the imaginary author's, I may sincerely believe that what I promise is what I will try to do by next weekend if a certain prior condition is not satisfied by the end of this weekend. In that sense, my conditional or another truth-functionally constructed statement of intent might be categorically true. The same is true, remarkably, even of extra-intentional propositions that have nothing to do with what I promise or propose to do if a certain set of conditions is or is not satisfied. I might sincerely believe that I have created cold fusion in a fish tank in my kitchen, and begin rationally to draw exciting inferences from what can still turn out to be a false assumption. A similar phenomenon occurs in the derivation of so-called 'partial results' in mathematics, in which a deductive structure of theorem-like conclusions is grounded hypothetically, so to speak, on undemonstrated but believable propositions. Why should the case of an as-

sumption involving conditional intent be any different?

I want to suggest that part of the difference in what ought to seem to be subtly different cases of argumentation involving the same underlying propositional deductive logic is that in the murder inference concerning an assumption expressing conditional intent, the future course of events, which to a limited but relevant extent is in the hands of the argument author, determines whether or not the assumption turns out to be true. The fact is clearly recognized in the well-known phenomenon of persons acting in a certain way against their later better judgment simply because on a previous occasion, under who knows what emotional pressures, they promised to do so. We can act or fail to act with regret, and we can judge what it is right for us to do rather differently from moment to moment in the practical order of sometimes rapidly, complexly changing circumstances. We can confirm or cast doubt on the truth of our oaths and statements of intent in a sequence of practical reasoning by what we choose to do or refrain from doing. This power over the truth of personal statements of intent is an important feature of practical reasoning that has not received sufficient attention in informal or symbolic logic. It is already enough to make the logic of practical reasoning subtly different from that of theoretical, or what an earlier period in philosophy distinguished as speculative, reasoning. The presumably free choice and action of the reasoner can render a statement of intent true or false, and thereby render an argument in which the statement appears sound or unsound; thus, respectively, making the argument in question unequivocally deductively invalid or, by assuring its unsoundness, smartly avoid any such immediate challenge to its deductive validity.

5. Paradox and Persistence of the Fallacy

ALL WELL AND GOOD *IF* THE ARGUMENT AUTHOR SHOULD GIVE CAUSE TO DOUBT THE truth of the assumption expressing the author's statement of intent. What happens, on the other hand, if the argument author sincerely and consistently believes in the truth of his or her own statement of intent and, at the appointed time, when no one else has acted, does after all do something that represents a circumstantially best attempt to murder the warden, but the warden—an instant after the improbable attack of a practically reasoning prisoner who ordinarily would have had no access to the warden's person— contrary still to the argument's conclusion in *(5)*, does not actually die then or at any other time except as a result of natural causes?

There remains a deep paradox to be untangled involving the logic of propositionally complex statements of intent and their peculiar time-contexted truth conditions. Among many other morals that might be concluded from inferences like the murder argument, we might decide that the informal logic of practical reasoning cannot naturally be modeled in classical propositional logic combined with a preferred alethic modal logic and standard probability theory. We might decide that we need something weaker, stronger, or in any case different from the conventional material conditional. Is such a drastic conclusion necessitated by the paradox of the warden's murder? What can and what should we infer from philosophical problems

involving conditional statements of intent?

Let us take stock of what we are entitled to assert about conditional reasoning. Intuitively, we can truly commit ourselves to conditional intentions, to doing something or other provided that a certain condition is satisfied. There is thus far, moreover, no compelling justification for regarding conditional statements of intent as anything other than conditionals in the classical logical sense, as what are also known as material conditionals, defined by truth table analysis as true just in case, inclusively, either their antecedents are false or their consequents true. Nor is there yet any obvious reason to doubt the logic of conditionals as appropriate in argument *A* on the grounds that the consequent is qualified as only probably true.

The difficulty arises in the paradox because of a convergence of two factors. The proper diagnosis of the problem seems to involve: *(1)* The content of the antecedent in the conditional statement of intent, which expresses as a condition of an intended action the logically independent nonoccurrence of a certain event, which then occurs if the consequent fails to hold true (namely, that the argument author tries in that case to murder the warden); and *(2)* logically independent considerations for concluding that the consequent of the conditional is false, where the conditional's consequent is declared to be probable as an expression of the argument author's intent probably to do something that turns out to be improbable for external reasons that obtain regardless of the relevant facts concerning the agent's intent. The author, in other words, states what he intends probably to do relative to a particular set of considerations. The probable falsehood of the action's actually being accomplished, on the contrary, the strong or possibly overriding unlikelihood of the intent being carried out and the conditionally intended occurrence happening is relative to a quite different set of considerations. The argument author intends in all probability to murder the warden, we may suppose, because of the warden's longstanding practice of injustice and brutality, but the author will probably not do so in fact because violence is not in his character, as well as lack of opportunity, and the recognition that someone else will probably succeed before there arises a need for the author to act in fulfillment of the conditional statement of intent.[2]

We can block the paradox easily by refusing to formulate conditional intent as a conventional material conditional. To do so, unfortunately, involves several disadvantages in the logical analysis of related contexts of conditional discourse. If 'conditional' statements of intent are not generally materially conditional, then we disable the inferential mechanism of indefinitely many logically unproblematic deductive inferences involving similar conditional statements of intent. For example, suppose the author of the paradox argument had reasoned instead as follows, by *modus ponens* rather than *modus tollens*, beginning with the identical first assumption, under different imagined circumstances:

Argument B:
(1) (I declare that) If no one else (other than me) actually murders the

warden, then I will probably try to murder the warden myself.
(2) There is no one else (other than me) who has sufficient motive or opportunity to murder the warden; yet I have sufficient motive and expect to have many opportunities to commit the murder.

(3) Therefore, I will probably try to murder the warden myself. *(1,2 MPP)*

Here the inference involves precisely the same conditional statement of intent with probabilistic consequent as in argument *A*, but the external probabilities of the antecedent being satisfied or the consequent falsified are hypothetically modified in a significantly different scenario with contrary implications. Arguments *B* and *A* respectively illustrate the old saw that one person's *modus ponens* is another person's *modus tollens*.

If we were to legislate generally against all conditional statements of intent, or even more specifically against all those with probabilistic consequents, then we would obscure the logic of apparently correct deductively valid inferences involving conditional statements of intent with probabilistic consequents like those in argument *B*. In that case, we invalidate *B* in order to avoid validating *A*, whereas neither alternative is desirable. Or, to consider another equally innocuous and morally less sinister example, the same is true even for a very different style of inference predicated on another conditional statement of intent with a probabilistic consequent. We also have the logically valid inference, depending this time again on an application of *modus tollens* rather than *modus ponens*:

Argument C:
(1) (I declare that) If no else (other than me) wants to donate to the local charity, then I will probably not donate any money to the charity.
(2) I have excessive wealth, and I am favorably disposed to donating at least some money to the charity.
(3) Moreover, I have strong evidence to indicate that many other persons will also be making donations to the same charity.

(4) Hence, it is not the case that I will probably not donate any money to the charity. *(1,2 MTT)*

Many other valid inferences involving conditional statements of intent with probabilistic consequents can also obviously be adduced. The point is that to eliminate all such arguments indiscriminately for the sake of forestalling the paradox in the original argument *A* is too draconian in ruling against legitimate deductively valid reasoning also containing conditional statements of intent with probabilistic consequents, like arguments *B* and *C*.

The problem, as a result, does not seem to arise because of the conventional material conditional structure of putative conditional statements of intent, but because of the larger implicational logic of the inference taken as a whole, including the supplementary and background information with its relevant probabilities, together with the conditional statement of intent,

that leads to difficulty in the case of argument *A*. If, on the other hand, we try to implement more specific restrictions on the particular details of the overall inference context of reasoning in argument *A*, focusing on whatever salient features make it relevantly different from logically unproblematic implications like those in arguments *B* and *C*, then we risk losing sight of whatever instructive logically general aspects of conditional reasoning involving conditional statements of intent that might otherwise be derived from a more penetrating logical analysis of conditionals in arguments of these types, and we make our prohibitions against conditional inferences entirely unprincipled ad hoc measures dedicated to avoiding a very narrowly constrained and highly particular potential counterexample to the otherwise logically unchallenged deductive validity of practical conditional inferences from conditional probabilistic statements of intent. If we do not want to excessively restrict conditional reasoning by general prohibitions or settle for an ad hoc remedy, what can we do instead?

6. Indexing Equivocal Probability Sources

I WANT FINALLY TO PROPOSE A SOLUTION TO THE PARADOX OF MURDER BY CONDITIONAL logic. The solution is based, as I believe any adequate reaction to the problem should be, on a careful reexamination of the conditional reasoning in deductively valid and deductively invalid inferences involving conditional statements of intent with probabilistic consequents.

The proposal is to make explicit a subtle and initially implicit ambiguity in the distinct assumptions and conclusions of deductively invalid conditional inferences from conditional statements of intent. The deductively invalid instances of such inferences like argument *A* will thereby be exposed as committing a fallacy of equivocation, while deductively valid instances like *B* and *C* turn out to involve no such equivocation, and are cleared in this way from paradox or deductive invalidity objections. If the solution is successful, it permits a completely general but logically more nuanced application of conventional material conditionals that distinguishes intuitively between deductively valid and deductively invalid conditional practical reasoning without banning conditional statements of intent with or without probabilistic consequents or nonstandardly customizing the logic of conditionals or conditional inferences involving conditional statements of intent.

When we return to the question of what makes argument *A* deductively invalid and arguments *B* and *C* deductively valid, we see that the problem is not with conditional statements of intent per se, even when they include probabilistic consequents, since these occur alike in all three arguments. Nor does the difficulty arise because of the *modus tollens* conditional structure of argument *A*, which is also unproblematically present in argument *C*. What appears to make a difference, as we have already hinted but not yet fully developed, is the full context of further assumptions, also probabilistically qualified, in addition to the conditional statement of intent with probabilistic consequent, by which the conditional inference of these separate arguments is accomplished alternatively through conventional material conditional implication by *modus ponens* or *modus tollens*. The diagno-

sis of the paradox in argument A that has been sketched emphasizes the fact that the considerations that make it probable that the argument author will try to murder the warden are independent of and completely different from the considerations that make it probable that the argument author will *not* try to murder the warden. And this, after all, is the crux of the underlying contradiction that makes argument A logically paradoxical.

What can we do if we want to call attention to this basis of antinomy in conditional reasoning involving probabilistic consequents and probabilistic supplementary information by which the consequents or negated antecedents are supposed to be validly detached by conventional material conditional inference rules? I suggest that we explicitly *index* the distinct considerations or sources of consideration of the probabilistic qualifications of the consequents of conditional statements of intent, formally or informally, to indicate when equivocations threaten a syntactical distinction between deductively valid conditional inference forms, like arguments B and C, and deductively invalid ones, like argument A. The proposal is illustrated by rewriting argument A in this fashion:

Argument A^*:
(1) (I declare that) If no one else (other than me) actually murders the warden, then I will probablyC_1 try to murder the warden myself.
(2) The warden is so unpopular with so many dangerous criminals that I will probably-C_2 not need to murder the warden.
(3) Moreover, it is not really in my nature to commit murder unless I am forced to do so by drastic circumstances or in order to fulfill an oath, such as expressed above in proposition *(1)*, and I cannot imagine ever having an opportunity in which even to attempt to murder the warden, let alone succeed.

---

(4) Hence, it is not the case that I will probably-C_2 try to murder the warden myself. *(2,3)*
(5) Therefore, it is not the case that no one else (other than me) actually murders the warden. That is, someone else (other than me) actually murders the warden. The warden will be murdered! (INVALID)

The explicit indexing of relevant considerations on which the probabilities of assumptions *(1)* and *(2)* depend permits the valid inference of conclusion *(4)* from assumptions *(2)* and *(3)*, as in the original argument A. The deduction is warranted because assumptions and conclusion share a common evidentiary consideration base, C_2. Now, however, the paradoxical conclusion in *(5)* is blocked as deductively invalid as an inference by *modus tollens* from assumption *(1)* and penultimate conclusion *(4)*. The deduction explicitly involves an equivocation between the probability sources C_1 in assumption *(1)* and C_2 in conclusion *(4)*. If argument A is reformulated as A^*, then the original paradox disappears.

This is precisely the result we should welcome and expect. Moreover, probabilistic qualifications that derive from and depend on different

considerations or evidence bases ought to be syntactically distinguished — otherwise logical difficulties of a much more general type will inevitably ensue. Thus, it is true that it is probable that the next prime minister will be a conservative, *given that* the previous prime minister was a liberal, together with a history of past elections that justifies accepting the high probability of an alternation from liberal to conservative and conservative to liberal leadership in alternate election periods. Yet it may *also* be true that it is *not* probable that the next prime minister will be a conservative, *given that* the empirical evidence accumulating from ongoing exit polls supports the opposite projected election outcome. If we do not distinguish syntactically between the probabilistic qualifications of these two propositions relative to distinct relevant probability sources, then we can classically deductively prove anything we like, such as the existence of God:

> *Argument G*:
> (1) It is highly probable that the next prime minister will be a conservative.
> (2) It is not the case that it is highly probable that the next prime minister will be a conservative.
> _____
> (3) Therefore, God exists! *(1,2)*

Whereas, the evident fallacy in argument *G* is to equivocate on the two distinct senses in which assumptions *(1)* and *(2)* are probabilistically qualified. We avoid superficial paradox in argument *G* by making these senses explicit, indexing the probabilistic qualifications of the premises so as to preclude syntactical inconsistency of the two stipulatively true assumptions by which the inference is rendered sound and its conclusion paradoxically true. We then write:

> *Argument G**:
> (1) It is highly probable-C_1 that the next prime minister will be a conservative.
> (2) It is not the case that it is highly probable-C_2 that the next prime minister will be a conservative.
> _____
> (3) Therefore, God exists! (INVALID)

We can and should uphold the same reformulation in argument *A*, as we have already indicated, with the same effect of blocking the paradoxical inference in the original statement of the argument and making explicit the fallacy of equivocation that would otherwise arise but now invalidates the implication. The revision of argument *A* as *A**, like the revision of argument *G* as *G**, marks the distinction between different relevant probability sources in the argument assumptions and conclusions.

What, then, about arguments *B* and *C*? These conditional inferences also involving conditional statements of intent with probabilistic consequents, by contrast with that of argument *A*, appear intuitively to be deductively

valid. If we follow a general strategy of indexing distinct probability sources in conditional probabilistic reasoning, do we risk turning these intuitively valid inferences into invalid equivocations? The same indexing device applied to argument *A* for distinguishing different probability considerations or consideration sources used in argument *A* can also be used in arguments *B* and *C* *only* if the assumptions and conclusions of *B* and *C* depend on different probability sources. If these sources are truly different, then arguments *B* and *C* despite appearances might after all turn out to be deductively invalid, involving a similar implicit syntactical equivocation as in the case of argument *A*, and should accordingly be so acknowledged. Are we in fact dealing with distinct probability sources in arguments *B* and *C*? It does not appear that the probability sources are different in the assumptions and conclusions of arguments *B* or *C* for a very simple reason. We are not to syntactically distinguish probability judgments willy-nilly, but only in those cases where we can tell a plausible story about why particular probability judgments should be regarded as based on relevantly different evidence.

The issue of distinct probability sources arises only when the same proposition is made probable and improbable within a single argument context; otherwise, we can assume identity of probability sources as the default situation. There is no opportunity for distinguishing probability sources in arguments *B* and *C* in any event, because in argument *B*, the conclusion in *(3)* merely detaches the consequent of assumption *(1)* without invoking the probability of any other assumption, where assumption *(2)* is not probabilistically qualified. Similarly, in the case of argument *C*, the conclusion in proposition *(4)* detaches the probabilistic consequent of the assumption in *(1)*. There is equally no justification to distinguish probability sources in arguments *B* and *C*, because there is no inference involving conflicting probability judgments. We can freely assume that a common probability source supports the probabilistic qualifications of all the assumptions, and transfers unequivocally to the conclusions, preserving their probabilistically qualified truth, and thereby the argument's deductive validity.

7. Conclusion

THE SOLUTION DISTINGUISHES BETWEEN DEDUCTIVELY VALID AND INVALID CONDITIONAL reasoning involving conditional statements of intent with probabilistic consequents. The advantage of the analysis is not only that it avoids paradox in an intuitively satisfying way but that it does so within the classical framework of the conventional concept of a material conditional defined by the standard truth table.

The paradox remains valuable in pointing toward distinct sources of probabilistic qualification attaching to the conditionals and components of conditionals occurring in some kinds of conditional reasoning. In particular, conditional statements of intent with probabilistic consequents may need to index distinct probability sources, especially when conflicting inferences appear to be validly deducible from such conditionals in combination with supplementary probabilistically qualified information. If we observe obvious and independently justified rules for distinguishing distinct probability

sources as required, then we preserve the standard material conditional in formalizing conditional reasoning involving conditional probabilistic statements of intent even in situations in which conventional conditionals otherwise appear paradoxical. Although we have not argued for a more general conclusion, a further possible implication of the proposed solution suggests the possibility of logical analyses aimed at eliminating equivocations indexically to sustain ordinary material conditionals in a host of similar probability puzzles, such as the preface and lottery paradoxes.[3] φ

Notes

[1] Dale Jacquette, "Conundrums of Conditionals in Contraposition," in *Nordic Journal of Philosophical Logic*, 4 (2000): 117–126, discusses a meta-philosophical paradox about conditionals used to express the truth conditions of conditionals.

[2] See, among other sources on problems of interpreting conditionals, David H. Sanford, *If P, Then Q: Conditionals and the Foundations of Reasoning* (London: Routledge, 1989), especially pp. 87-100 in the chapter on "Belief and Probability." E.W. Adams, "Probability and the Logic of Conditionals," in *Aspects of Inductive Inference*, eds. Patrick Suppes and Jaakko Hintikka (Amsterdam: North-Holland, 1968), 265-316. Alan Gibbard, "Indicative Conditionals and Conditional Probability," in *Ifs: Conditionals, Belief, Decision, Chance, and Time*, eds. W.L. Harper, Robert Stalnaker, and C.T. Pearce (Dordrecht: Reidel Publishing, 1981), 253-256.