A DEFENSE OF MODUS PONENS

IN a recent article, "A Counterexample to Modus Ponens,"* Vann McGee claims that modus ponens "is not strictly valid" (462). He admits that "modus ponens is unexceptionable" when it is restricted to "conditionals that d[o] not themselves contain conditionals" (468), but he argues that modus ponens is not valid in special cases where the consequent of the conditional premise is another conditional.

McGee states his first counterexample as follows:

> Opinion polls taken just before the 1980 election showed the Republican Ronald Reagan decisively ahead of the Democrat Jimmy Carter, with the other Republican in the race, John Anderson, a distant third. Those apprised of the poll results believed, with good reason:
>
> [1] If a Republican wins the election, then if it's not Reagan who wins it will be Anderson.
>
> [2] A Republican will win the election.
>
> Yet they did not have reason to believe
>
> [3] If it's not Reagan who wins, it will be Anderson (462).

As McGee points out, this is not a case where we reject the conclusion and then go on to reject one of the premises. In his cases, "we do not renounce the premises" (463n).

The first thing to notice is that McGee describes the situation in terms of what people have reason to believe, whereas the validity of modus ponens concerns truth. Modus ponens is valid if it is impossible for the premises to be true when the conclusion is false. Thus, if McGee's example were a counterexample to modus ponens, it would have to be false that

(3) If it's not Reagan who wins, it will be Anderson.

McGee, however, never explicitly argues that (3) is false, so we have to guess why he thinks (3) is false. He might think (3) is false because it would be odd or misleading to assert (3). One reason why this would be odd is that (3) is very weak, and in the circumstances we can make a stronger claim, that Reagan will win. Another reason why it would be odd to assert (3) is that we don't normally assert something unless we have reason to believe it.[1] And McGee does claim that

* This JOURNAL, LXXXII, 9 (September 1985): 462–471. All references in the text are to this article.

[1] These explanations can be supported by Grice's rules of quantity and quality in "Logic and Conversation," D. Davidson and G. Harman, eds., *The Logic of Grammar* (Encino, Calif.: Dickenson, 1975): 64–75, p. 67.

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there is no reason to believe that (3) is true (462). None of this, however, implies that (3) is false. (3) can be true even if it is so weak that it would be misleading to assert it. And (3) can be true even if there is no reason to believe it.

So why does McGee think he has a counterexample? One possible explanation is that he was really trying to refute a principle different from standard modus ponens. He suggests this when he writes, "as the following examples show, [modus ponens] is not strictly valid; there are occasions on which one has good grounds for believing the premises of an application of modus ponens but yet one is not justified in accepting the conclusion" (462). This comment and his discussion of examples suggest that he intended to refute a principle such as:

(MPG) If someone has good grounds for believing that ⌜If *A*, then *B*⌝ and also has good grounds for believing that *A*, then he has good grounds for believing that *B*.

In other contexts, he formulates his arguments in terms of what is likely; so he then seems to be trying to refute a related principle:

(MPP) If it is highly probable that ⌜If *A*, then *B*⌝ and it is highly probable that *A*, then it is highly probable that *B*.

In fact, both these principles, as stated, have counterexamples that have nothing to do with McGee's intended criticism of modus ponens. We can have good grounds for each premise of an argument individually without having good grounds for their conjunction. Similarly, each premise of an argument can be highly probable without their conjunction being highly probable. To avoid these difficulties, (MPG) should be replaced with

(MPG*) If someone has good grounds for believing that both ⌜If *A*, then *B*⌝ and *A*, then he has good grounds for believing that *B*.

and (MPP) should be replaced with

(MPP*) If it is highly probable that both *A* and ⌜If *A*, then *B*⌝, then it is highly probable that *B*.

In general, the probability of the conclusion of a valid argument cannot be less than the probability of the conjunction of its premises.

McGee's counterexamples appear to be aimed at such principles and may seem to invalidate them. We have very good grounds to believe both (1) and (2), but we may seem to have very little, if any, grounds to believe (3). And the conjunction of (1) and (2) is highly probable, but the probability of (3) may seem to be very low.

We believe, however, that this counterexample does not invalidate either (MPG*) or (MPP*). Since the concept of probability is more precise than the concept of having good grounds, we will defend (MPP*), but our defense of (MPP*) can be extended naturally to (MPG*).

Simply put, McGee's counterexample rests on an equivocation between the probability of a conditional and a conditional probability. The claim that the conclusion of the argument is not highly probable can be interpreted either as a claim about the probability of the conditional "If it's not Reagan that wins, it will be Anderson" or as a claim about the conditional probability that Anderson will win, given that Reagan won't win. A confusion of these probabilities can deceive one into thinking that (MPP*) is violated.

The distinction between conditional probability and the probability of a conditional can be illustrated by assigning probabilities to the alternatives. The particular probabilities don't matter as long as the relation between the three candidates is preserved. Suppose the election is decided by rolling a six-sided die. The die has R on three sides, and Reagan wins if R comes up; so the probability of Reagan winning is 3/6. The die has C on two sides, and Carter wins if C comes up; so the probability that Carter will win is 2/6. The die has A on one side, so the probability that Anderson will win is 1/6.

Now let's calculate the probabilities of the premises. Premise (1) has a probability of 1, since, if the die indicates a Republican (either an R side or an A side), and it's not Reagan (an R side), it must be Anderson (the A side). The probability of the second premise is 4/6, since a Republican wins if either Reagan wins (three R sides) or Anderson wins (one A side). The probability of the conjunction of the premises is calculated by multiplying the probability of the first premise by the conditional probability of the second premise given the first premise. In this case, though not in general, the conditional probability is equal to the probability of the second premise, since the first premise has a probability of 1. Hence, the probability of the conjunction of the premises is 4/6.

The probability of the conclusion depends on how the conditional is interpreted. If it is interpreted as a material conditional, it is true if either Reagan wins (three R sides) or Anderson wins (the A side); so the probability of the conditional is 4/6. This result is completely in accord with (MPP*), since the probability of this conditional is just as high as the probability of the conjunction of the premises.

However, the probability of the conclusion might seem to be lower if it is confused with a conditional probability, i.e., the probability that Anderson will win given that Reagan does not. Once Reagan is ruled out, three sides remain, and only one has A on it; so the conditional probability that, given it's not Reagan who wins, Anderson will win is only 1/3. McGee seems to have this conditional probability in mind at several places. For example, when he argues that the conclusion should not be interpreted materially, he writes:

> If we have seen the polls showing Reagan far ahead of Carter, who is far ahead of Anderson, we will not for a moment suppose that
>
> If Reagan doesn't win, Anderson will
>
> is true, even though we will resign ourselves to the truth of
>
> Reagan will win (464).

The cited polls do not show that the probability of the conditional is low, but only that the probability that Anderson will win, given that Reagan won't, is low. But this low conditional probability does not refute (MPP*), since (MPP*) does not imply that this conditional probability is high. (MPP*) implies only that the probability of the conditional (3) will be high if the probability of the conjunction of (1) and (2) is high. And the probability of the conditional (3) is high, according to the above calculation.

McGee might deny that he confuses conditional probability with the probability of the conditional. He might then respond that the English conditional (3) should not be interpreted materially, and the probability of this conditional on the correct interpretation is too low to satisfy (MPP*). However, McGee has not shown either that the English conditional is not material or that the probability of the English conditional (3) is low. His only argument is that we do not have good reason to believe that, if Reagan doesn't win, Anderson will; but this claim is obvious only when interpreted as a claim about conditional probability. Furthermore, if McGee offers an interpretation of the English sentence (3) such that its probability is low, we will have to recalculate the probability of (1), since, in order to avoid equivocation, the consequent of premise (1) must be interpreted in the same way as the conclusion (3). Thus, McGee owes us an interpretation of the English conditional, an argument that this interpretation is correct, and calculations of the probabilities both of this conditional and of the conjunction of the premises, to show that (MPP*) is violated. The burden is on him.

(MPG*) can be defended along similar lines. Grounds or reasons for believing a conditional can be distinguished from grounds or reasons for believing the consequent, given the antecedent. McGee argues that there are not good grounds for believing the consequent, given the antecedent. But (MPG*) claims only that there are just as good grounds for believing the conditional as for believing the conjunction of the premises. Thus, McGee's first example does not refute (MPG*).

McGee's other two examples play on similar equivocations. His second example reads as follows:

> I see what looks like a large fish writhing in a fisherman's net a ways off. I believe
>
> If that creature is a fish, then if it has lungs, it's a lungfish.
>
> That, after all, is what one means by "lungfish." Yet, even though I believe the antecedent of this conditional, I do not conclude
>
> If that creature has lungs, it's a lungfish.
>
> Lungfishes are rare, oddly shaped, and, to my knowledge, appear only in fresh water. It is more likely that, even though it does not look like one, the animal in the net is a porpoise (462/3).

McGee cites the fact that lungfish are rare, etc. This might show that there is a low conditional probability that the creature is a lungfish, given that it has lungs. Nonetheless, the conditional "If that creature has lungs, it is a lungfish" is still highly probable, since it is highly probable that it is a fish. Thus, McGee's second example fails to invalidate (MPP*).

McGee's third example runs as follows:

> Having learned that gold and silver were both once mined in his region, Uncle Otto has dug a mine in his backyard. Unfortunately, it is virtually certain that he will find neither gold nor silver, and it is entirely certain that he will find nothing else of value. There is ample reason to believe
>
> If Uncle Otto doesn't find gold, then if he strikes it rich, it will be by finding silver.
>
> Uncle Otto won't find gold.
>
> Since, however, his chances of finding gold, though slim, are no slimmer than his chances of finding silver, there is no reason to suppose that
>
> If Uncle Otto strikes it rich, it will be by finding silver (463).

This example seems to cause trouble for (MPP*) only because the conditional probability that Uncle Otto finds silver, given that he strikes it rich, is low. However, the probability of the conditional "If Uncle Otto strikes it rich, it will be by finding silver" is still no lower than the probability of the conjunction of the premises.

In summary, McGee's case against modus ponens depends upon three confusions. First, modus ponens preserves truth, not grounds for believing or probabilities. A real counterexample would have to use modus ponens to go from true premises to a false conclusion. Second, an analogue of modus ponens for grounds or probabilities must not confuse good grounds or high probabilities for the premises separately with good grounds or high probability for the conjunction of the premises. Finally, the probability of a conditional must not be confused with a conditional probability. With these confusions removed, McGee's case against modus ponens loses its force. Modus ponens lives!

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