

# A Challenge to Positive Relevance Theorists: Reply to Roush\*

Peter Achinstein<sup>†</sup>

---

Recently in this journal Sherrilyn Roush (2004) defends positive relevance as a necessary (albeit not a sufficient) condition for evidence by rejecting two of the counterexamples from my earlier (2001) work. In this reply I argue that Roush's critique is not successful.

---

According to the standard positive relevance theory of evidence, a piece of information is evidence for a hypothesis if and only if it increases the probability of the hypothesis. Using a series of counterexamples, I have argued that positive relevance is neither necessary nor sufficient for evidence (Achinstein 2001).

Sherrilyn Roush (2004) defends positive relevance as a necessary (albeit not a sufficient) condition for evidence by rejecting two of my counterexamples. In the first, let  $h$  be the hypothesis that Bill Clinton will win a certain lottery,  $e_1$  is that the *New York Times* (NYT) reports that Clinton owns all but one of the tickets,  $e_2$  is that the *Washington Post* (WP) reports that Clinton owns all but one of the tickets, and  $b$  is background information that this is a fair lottery of 1000 tickets, one of which will be drawn as the winner. I assume that  $e_2$  is evidence that  $h$ , given  $e_1 \& b$ , even though

$$p(h/e_2 \& e_1 \& b) = p(h/e_1 \& b) = 999/1000, \quad (1)$$

i.e., even though  $e_2$  does not increase  $h$ 's probability.

Roush objects to (1) because it implies that the NYT is a perfect transmitter, i.e., it implies

$$p(e_3/e_1 \& b) = 1, \quad (2)$$

where  $e_3$  = Bill Clinton owns all but one of the lottery tickets. And she

\*Received January 2004; revised March 2004.

<sup>†</sup>To contact the author write to Department of Philosophy, Johns Hopkins University, Baltimore, MD 21218; e-mail: peter.achinstein@jhu.edu.

Philosophy of Science, 71 (October 2004) pp. 521–524. 0031-8248/2004/7104-0007\$10.00  
Copyright 2004 by the Philosophy of Science Association. All rights reserved.

regards (2) as false. So it is, in the real world. But let us suppose a “perfect” world in which the NYT (as well as the WP) always gets it right, so that (2) is true, as well as (1). Then my counterexample stands:

Given the NYT report ( $e_1$ ), the fact that the WP reports what it does ( $e_2$ ) is evidence that Clinton will win ( $h$ ), (3)

despite the fact that  $e_2$  fails to raise the probability that Clinton will win, i.e., despite the fact that (1) is true.

Now let’s talk about the real, imperfect world in which even the NYT and the WP sometimes get it wrong. Let  $N$  = the NYT is correct in its report about how many lottery tickets Clinton holds, and let  $W$  = the WP is correct in its report about how many lottery tickets Clinton holds. I would claim that

Given  $W \& e_1 \& N \& b$ ,  $e_2$  is evidence that  $h$ . (4)

And in this case

$$p(h|e_2 \& W \& e_1 \& N \& b) = p(h|W \& e_1 \& N \& b) = 999/1000.$$

If so, the evidential claim (4) violates Roush’s positive relevance requirement.

Both my evidential claim (3) (for the perfect world) and (4) (for the imperfect one) are based on the idea that in these cases the putative evidence provides a good reason to believe the hypothesis, without raising the probability of the hypothesis.

A second counterexample of mine that Roush cites is supposed to show that information can be evidence for a hypothesis even though it *lowers* the probability of that hypothesis. Let

$e_4$  = At 10 A.M. David, who has symptoms  $S$ , takes medicine  $M$  to relieve  $S$ .

$e_5$  = At 10:15 A.M. David takes another medicine  $M'$  to relieve  $S$ .

$b$  =  $M$  is 95% effective in relieving  $S$  within 2 hours;  $M'$  is 90% effective within 1 3/4 hours, but has fewer side-effects. When taken within 20 minutes of having taken  $M$ ,  $M'$  completely blocks the causal efficacy of  $M$  without affecting its own.

$h$  = David’s symptoms are relieved by noon.

My claim is that

Given  $e_4 \& b$ , information  $e_5$  is evidence that  $h$  will be true, (5)

since  $M'$  is 90% effective in relieving  $S$  and its efficacy is not blocked by having already taken  $M$ . Yet

$$p(h|e_4 \& b) = .95, \text{ and } p(h|e_5 \& e_4 \& b) = .90. \quad (6)$$

That is,  $h$ 's probability is lowered by  $e_5$ , despite the fact that, given  $e_4 \& b$ ,  $e_5$  is evidence that  $h$  (i.e., (5)). This again violates Roush's positive relevance requirement for evidence.

Roush agrees with me about the probability claims in (6), but not about (5). On her view it is the conjunction  $e_5 \& e_4$  that is evidence that  $h$ , given  $b$ ; it is not the case that  $e_5$  is evidence that  $h$ , given  $e_4 \& b$ . And with the conjunction  $e_5 \& e_4$  as evidence that  $h$  positive relevance is satisfied, since  $p(h|e_5 \& e_4 \& b) > p(h|b)$ .

So far as I can see, the only reason Roush suggests for saying that (5) is false is that information  $e_5$  offers "nothing new about whether [David] will recover—the point at issue in the hypothesis [ $h$ ]" (115) whereas the conjunction  $e_5 \& e_4$  does offer something new (over  $b$  alone) about David's recovery. This is reinforced by her claim at the end that knowing that  $e_5$  is true does not increase one's "confidence" that  $h$  is true, "since the information it gives about whether [David] will recover is redundant with information we already had" (115).

In one sense, as Roush notes,  $e_5$  does offer something new about the recovery, viz. about its mechanism (it will be  $M'$  not  $M$  that produces it). In another sense—that in which it provides information that changes the strength of the previous evidence—it also offers something new. Only in the sense that information  $e_5$  does not "increase [one's] confidence in recovery" can it be deemed not new. And the latter seems to be enough for Roush to deny that  $e_5$  is evidence that  $h$ , given  $e_4 \& b$ .

This is to demand of evidence that it be something that should provide a more convincing reason for believing a hypothesis than before, a reason that should increase one's confidence in the truth of the hypothesis—which, of course, fits in with Roush's idea that evidence should increase the probability of an hypothesis. On my view, which is defended in my 2001, and which Roush needs to confront directly, what evidence has to supply is simply a good reason for believing, not necessarily a reason that is better, or more convincing, or more confidence-producing than before (though, of course, it can do that too). Indeed, the point of my two counterexamples is that evidence can provide a good reason for belief even if (as in the first counterexample) that reason does not increase the probability of the hypothesis (and in that sense does not increase one's confidence in its truth), and even if (as in the second counterexample) that reason, while still a good one, is weaker than one we had previously and in fact decreases the probability of the hypothesis. To reject my coun-

terexamples Roush and other positive relevance defenders need to show why this idea is mistaken.

## REFERENCES

- Achinstein, Peter (2001), *The Book of Evidence*. New York: Oxford University Press.  
Roush, Sherrilyn (2004), "Positive Relevance Defended", *Philosophy of Science* 71: 110–116.