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## INSTRUMENTAL RATIONALITY AND NATURALIZED PHILOSOPHY OF SCIENCE

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In two recent papers, I criticized Ronald N. Giere's and Larry Laudan's arguments for 'naturalizing' the philosophy of science (Siegel 1989, 1990). Both Giere and Laudan replied to my criticisms (Giere 1989, Laudan 1990b). The key issue arising in both interchanges is these naturalists' embrace of instrumental conceptions of rationality, and their concomitant rejection of non-instrumental conceptions of that key normative notion. In this reply I argue that their accounts of science's rationality as exclusively instrumental fail, and consequently that their cases for 'normatively naturalizing' the philosophy of science fail as well.

Ronald N. Giere (1984, 1985, 1987, 1988, 1989) and Larry Laudan (1984, 1987a, 1987b, 1988, 1990a, 1990b) both defend the 'naturalizing' of the philosophy of science. They argue that important philosophical questions concerning science—including questions concerning the normative evaluations of competing scientific theories, and the rationality of decisions to accept/reject such theories—are properly settled on empirical grounds. Giere and Laudan both accept the legitimacy of normative rationality<sup>1</sup>, but insist that rationality be understood instrumentally, in means-ends fashion. According to this sort of naturalism, we can scientifically investigate the instrumental value that beliefs, cognitive processes and scientific methodologies have in achieving our ends; insofar as they have instrumental value, we can say that such beliefs and methodologies are rational. On this view rationality is instrumental, naturalistic and fully normative.

I will argue in what follows that the success of the case for naturalizing the philosophy of science in a way that maintains its normativity<sup>2</sup> turns on the adequacy of the naturalist's treatment of rationality. I will criticize those versions of normative naturalism, like Giere's and Laudan's, which are committed to a wholly instrumentalist conception of rationality. In particular, I will challenge their claim

<sup>†</sup>This paper draws upon an invited address presented at the Eastern Division APA meeting in Washington, D.C. on December 29, 1992. I am grateful to Robert Almeder for his insightful commentary on that occasion, to Hal Brown, Jaegwon Kim, Ellen Klein, and Matthias Steup, and to members of audiences at the APA session, the University of Florida, and the University of Miami, especially John Biro, Leonard Carrier, Susan Haack, Risto Hilpinen, Alan Goldman, Peter Klein, Kirk Ludwig, and Howard Pospesil, for their incisive criticisms of earlier drafts. Special thanks to Ed Erwin for his excellent analysis and suggestions.

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<sup>1</sup>Interpreting Giere on this point is not straightforward. Giere's earlier papers appear to eschew normative rationality altogether (see Siegel 1989 for textual support), but by his (1988) and (1989) he embraces instrumental rationality. In my (1989) I criticize Giere when interpreted as rejecting normative rationality in his version of naturalized philosophy of science; here I criticize his instrumentally normative version of naturalism.

<sup>2</sup>In Siegel 1996 I criticize non-normative naturalism. In this paper I am concerned only with normative naturalism of the sort defended by Giere and Laudan.

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that an instrumental, means-ends rationality is as rich a conception of rationality as we should want or can have. I will argue that the instrumental-normative naturalistic account of rationality is inadequate, and that an adequate account must go beyond instrumental concerns and be 'categorical'.

**1. Giere and Laudan on the Instrumental Character of Science's Rationality.** Giere explicitly distinguishes categorical or unconditional rationality from instrumental rationality, and insists that the latter, though not the former, has a proper home in his naturalized philosophy of science (1988, 7-10). And in his (1989) Giere, responding to Siegel (1989), underlines this insistence:

The central issue, I believe, is this. Siegel, following the dominant tradition, believes that it is possible to discover epistemological principles that are *autonomous* from science. Such principles would provide an autonomous warrant for normative claims as to how scientists should act. They would provide criteria for *categorical*, or unconditional, rationality among scientists.

The naturalist, by contrast, believes that there is no autonomous realm of epistemological principles. This is not to deny that there are better and worse ways of attempting to do science, or to reject the possibility of giving advice about how best to proceed. But the corresponding principles of rationality are only *instrumental*, or conditional. They connect research strategies with the goals of research. And establishing these connections itself requires scientific inquiry. (Giere 1989, 377; emphases in original)

If there were autonomous principles of justification, they would provide standards of what is often called *categorical*, or unconditional, rationality. But there is another, weaker, form of rationality which is conditional, or *instrumental*. To be instrumentally rational is simply to employ means believed to be conducive to achieving desired goals. . . . [T]here is also a more *objective* sense of instrumental rationality which consists in employing means that are not only believed to be, but are *in fact* conducive to achieving desired goals.

This latter, objective, sense of instrumental rationality provides the naturalistic theorist of science with ample means for making normative claims about science. These claims, however, are not autonomous but are grounded within science itself. It requires empirical research to determine whether a particular strategy is in fact likely to be effective in producing valuable scientific results. (1989, 379-80; emphases in original)

Thus a naturalized philosophy of science . . . can provide a basis for *normative* judgments. These judgments would, of course, be only *instrumentally*, and not *categorically*, normative. But for the naturalist, that is the only kind of normative judgment anyone can legitimately make. There is no "higher" rationality. (1989, 382; emphases in original)

In these passages Giere makes clear both his rejection of categorical rationality and his acceptance of instrumental rationality. He also makes clear why he thinks the latter sort of rationality is at home in a naturalistic setting: it is so because ("objective") instrumental rationality "consists in employing means that are not only believed to be, but are *in fact* conducive to achieving desired goals," and whether means are so conducive is an empirical question open to naturalistic investigation. Determinations of instrumental rationality thus require naturalistic investigation, and such investigation fully licenses judgments of instrumental rationality. Thus, for Giere, are naturalism and instrumental rationality joined.

Laudan, like Giere, explicitly rejects any non-instrumental version of rationality; his account of rationality is thoroughly instrumentalist:

The conduct of a given inquiry will be *rational* just insofar as we have grounds to believe that that inquiry process will be likely to realize our ends. . . . (Laudan 1988, 349; emphasis in original)

. . . an empirical approach to epistemology requires attention to precisely those normative linkages between cognitive ends and means which constitute scientific rationality. (Laudan 1984, 41)

On Laudan's view, the rationality of science involves simply these instrumental, "normative linkages between cognitive ends and means." And in his response to Siegel (1990), Laudan emphatically insists that rationality can only be instrumental:

Siegel tells us that there are two, mutually exclusive forms of rationality and justification: instrumental and epistemic. But . . . epistemic justification—even in Siegel's sense—is simply a species of the genus instrumental rationality. . . . Epistemic rationality, no less than any other sort of rationality, is a matter of integrating ends and means. (1990b, 318)

Good reasons are instrumental reasons; there is no other sort. (1990b, 320)

The view here articulated by Giere and Laudan—that the only legitimate conception of rationality is instrumental—is very widely held in contemporary epistemology and philosophy of science. Advocates of normative naturalism are virtually unanimous in embracing this sort of instrumentalist account of epistemic rationality/normativity.<sup>3</sup> Consequently, although in what follows I restrict myself to discussion of Laudan and Giere, and to the notion of rationality as it arises in the philosophy of science, the issues here addressed have a much wider epistemological significance than these self-imposed restrictions might suggest. In any case, I turn now to a critical evaluation of Giere's and Laudan's discussions.

**2. Can Rationality in Science Be Instrumental Only? The Basic Argument.** I will now argue that instrumental rationality itself depends on a non-instrumental conception of rationality—that is, that instrumental rationality cannot be coherently understood without recourse to a 'categorical' conception of rationality which underlies it. The fundamental difficulty with regarding instrumental rationality as exhaustive of rationality, either in science or in general, is that making sense of it requires appeal to an underlying, non-instrumental conception of rationality; consequently, instrumental, means-ends concerns cannot be the whole story about science's rationality (or epistemic normativity more generally).<sup>4</sup>

It is clear, as naturalists insist, that judgments of instrumental efficacy require appeal to empirical evidence concerning the efficacy of proposed means with respect to the achievement of given ends. In a case in which such efficacy is established by such evidence, we have good instrumental reason to utilize the means established by that evidence as efficacious for the realization of those ends, in so far as we embrace them as our ends.

But how are we to understand the relationship between the evidence for instrumental efficacy and the means-ends pairs concerning whose efficacy it is evidence? What we have is a situation of the following form: Evidence *E* suggests that means *M* is instrumentally efficacious with respect to goal *G*. It is *M*'s efficacy with respect to *G* which is established by *E*. What is the relationship between *E* and the rest of

<sup>3</sup>Brown (1988, 65), Fuller (1988, 1989), Gibson (1988, 16, 47, 69), Kitcher (1992, 62–64), Kornblith (1993), Maffie (1990a, 1990b), and Quine (1986, 655) are among the many contemporary epistemologists and philosophers of science who join Giere and Laudan in rejecting categorical conceptions and embracing instrumental conceptions of epistemic rationality/normativity.

<sup>4</sup>The germ of the argument which follows is offered, but only very briefly, in Siegel 1990.

this 'formula'? In order for the judgment or claim *C* (that *M* is indeed instrumentally efficacious with respect to *G*) to be justified, it must be the case that *E* constitutes evidence which warrants, or makes justified, or renders it rational to accept, the belief/claim *C*, i.e. the claim that *M* is indeed so efficacious. But this further claim, concerning the probative or evidential force of *E* with respect to *C*, is not a claim involving instrumental efficacy at all. *M* may be instrumentally efficacious with respect to *G*; but the relationship between *E* and that claim concerning instrumental efficacy is not itself one of instrumental efficacy. On the contrary: in order for our judgments concerning instrumental efficacy to be themselves rationally justified, they must be related to the evidence for them in a non-instrumental, standardly epistemic or probative sense. In this way, claims concerning instrumental efficacy *presuppose*, and depend for their own justification on, a non-instrumental (and in that sense 'categorical') relation between such claims and the evidence for them. That relation cannot itself be understood in terms of instrumental efficacy: it is not that regarding the evidence for such a claim as powerful is a matter of seeing that regarding it that way serves to further some other goal that we happen to have. Rather, the evidence must establish it as justified or warranted that the means is indeed instrumentally efficacious with respect to the goal. This relation, between the evidence which justifies the claim and the claim (concerning instrumental efficacy) which it renders justified, is just the traditional (categorical) epistemic relation between a claim or belief and the reasons or evidence which support(s) it. Thus the instrumentalist-only normative naturalist requires a non-instrumental account of evidential support or epistemic warrant; she needs a 'categorical', i.e. non-instrumental, normative theory of evidence to make her instrumental story work.<sup>5</sup>

The point can be seen more clearly if we attend to a buried equivocation in the case for instrumental rationality considered thus far. The instrumentalist conflates instrumental *efficacy* and instrumental *rationality*, and uses these notions interchangeably. This adds undeserved plausibility to her account of rationality. For the former is a *causal* notion: *M* is efficacious with respect to *G* iff (utilization of) *M* tends to bring about the achievement of *G*. But why should such causal efficacy be thought to have anything to do with *rationality*, or with normative notions of epistemic evaluation more generally?

Consider an example. Let *M* = the utilization of double-blind methodology. Let *G* = the discovery of the actual medicinal properties of a drug, e.g. its ability to ameliorate some disease. Now, what is the relationship between *M* and *G*? Suppose that *M* is efficacious with respect to *G*. This is a causal relation: if we utilize double-blind methodology, we are more likely to discover the actual medicinal properties of the drug. How does rationality enter the picture? Once we've established the causal efficacy of double-blind methodology with respect to that goal, we are rational to utilize that methodology given our wish to accomplish that goal. The rationality of our utilization of *M* is not constituted by the causal relation obtaining between *M* and *G*, however. Rather, it is constituted by an epistemic rather than a causal relation—namely, the relation between *E* (the evidence which suggests that *M* is in fact causally efficacious with respect to *G*) and the claim *C* concerning causal efficacy for which it provides evidential support. That is, what makes the utilization of *M* *rational* is the evidence which justifies our judgment that that utilization is efficacious with respect to the achievement of *G*. The relation between *M* and *G* is causal, not epistemic; the relation between *E* and the efficacy

<sup>5</sup>Virtually the same point, made in terms of "irreducible epistemology", is made by John Worrall (1990, 318).



claim *C* it supports is epistemic, not causal. When the instrumentalist runs together instrumental efficacy and instrumental rationality, she runs together two quite distinct relationships, which obtain between quite distinct relata (Kim 1988, Siegel 1996).

Thus, underlying judgments concerning instrumental efficacy is an epistemic, (non-instrumentally) normative relation between reasons or evidence and the judgments, beliefs, and claims concerning causal efficacy which those reasons or that evidence render(s) justified and so rational to believe. Judgments of instrumental efficacy—or, if we continue to conflate causal and epistemic relations, instrumental rationality—are dependent upon judgments concerning that epistemic relation. Consequently, instrumental rationality must be seen not as the whole of rationality, but rather as itself dependent upon non-instrumental, ‘categorical’ conceptions both of rationality and of the relation obtaining between good reasons/evidence and the beliefs, judgments, and claims for which they are (it is) good reasons/evidence. Instrumental rationality can be regarded as a dimension or form of rationality only to the extent that it is underwritten by non-instrumental rationality.

**3. Replies to Giere and Laudan.** It is instructive to consider Giere’s and Laudan’s responses to my earlier critiques in light of the argument just made.

Giere, under the sub-heading “Can Instrumental Rationality Be Enough?”, argues that:

One way to challenge a naturalistic approach is to argue that a rationality of means is not enough. There must be a rationality of goals as well because, it is claimed, there is no such thing as rational action in pursuit of an irrational goal. (Siegel 1985)

This sort of argument gains its plausibility mainly from the way philosophers use the vocabulary of “rationality.” If one simply drops this vocabulary, the point vanishes. Obviously, there can be effective action in pursuit of any goal whatsoever—as illustrated by the proverbial case of the efficient Nazi. The claimed connection between instrumental and categorical rationality simply does not exist. (Giere 1988, 10)

Giere is of course correct that there can indeed be “effective action in pursuit of any goal whatsoever.” Does this establish that “effective action in pursuit of any goal” exhausts the philosophical legitimacy of questions about the rationality of both means and goals? Hardly. Giere here equivocates. If by “the vocabulary of ‘rationality’ ” he means simply philosophical use of the *word* ‘rationality’, then he is wrong that questions concerning the rationality of ends vanish. For they are readily replaced by other, more or less equivalent questions: e.g., “Should that goal have been pursued?”, or “Are/were there any good reasons for pursuing it, or for not pursuing it?” Thus redefining ‘rationality’ in terms of effective action does not do away with substantive questions (which do not involve action-effectiveness) concerning the evaluative status of candidate ends. On the other hand, if by “the vocabulary of ‘rationality’ ” Giere means to include questions which are couched in terms of words like ‘should’, ‘reasons’, and the like, then it is clear that questions about the rational status of ends *do* vanish with the dropping of *all* this vocabulary. But why should we emasculate our language so? Does Giere really deny that we can coherently criticize as irrational or epistemically indefensible the goal of the efficient Nazi; does he deny that there are powerful reasons for rejecting the Nazi’s goals (or that we can intelligibly evaluate, in terms of reasons, other candidate goals)? In short: if ‘rationality’ is simply redefined, as Giere redefines it, in terms of effective action, then Giere wins a Pyrrhic victory—

all questions about 'rationality' so redefined can be treated in an instrumental, means-ends way; but many important philosophical questions about rationality are not captured by this redefinition. In this case, the baby goes the way of the bathwater. On the other hand, if we resist Giere's redefinition, and instead continue to understand 'rationality' as involving the epistemic or normative force of reasons, then it will be immediately obvious that many legitimate questions concerning rationality cannot be resolved in instrumental terms. Either way, Giere's argument fails to resolve the issue concerning the rationality of ends in the way he hopes.<sup>6</sup>

Even if we grant Giere's claim that 'rationality' applies only to means (and their efficacy) and not to ends, moreover, the fundamental difficulty remains: the utilization of *M* in pursuit of *G* will be *rational* only if the relevant evidence *E* supports the claim *C* that *M* is efficacious with respect to *G*; and, while the relation between *M* and *G* may be one of instrumental efficacy, the relation between *E* and *C* is not. The establishment of a claim concerning instrumental efficacy remains an epistemic, and not an instrumental, matter. This difficulty is not addressed in Giere's response.

Laudan's response is more extreme: he denies that there is an instrumental/epistemic distinction to be drawn, and asserts that epistemic rationality is itself just a special case of instrumental rationality:

There is no coherent sense of justification (epistemic or otherwise) . . . in the absence of the specification of the ends with respect to which an action is deemed justified or rational. (1990b, 317)

Siegel tells us that there are two, mutually exclusive forms of rationality and justification: instrumental and epistemic. But . . . epistemic justification—even in Siegel's sense—is simply a species of the genus instrumental rationality. . . . Epistemic rationality, no less than any other sort of rationality, is a matter of integrating ends and means. (1990b, 318)

Good reasons are instrumental reasons; there is no other sort. (1990b, 320)

It may be that Laudan is thinking only of rational *action*, and does not intend his claim to be applied also to beliefs or claims, as the first citation indicates; that might partly explain our divergent analyses.<sup>7</sup> In any case, his response fails utterly to establish that there are no reasons but instrumental ones. As argued above, *E*'s constituting good reason for "*M* is causally efficacious with respect to *G*" is not dependent upon or relative to any particular end. *E*'s goodness as a reason for that claim is a matter entirely of the content(s) of *E*, the claim concerning causal efficacy, and the epistemic relations which exist between them. Laudan acknowledges that he relies on a notion of *good reasons* or *suitable grounds* (1990b, 315–316, 318), but he offers no clue as to how these locutions are to be understood in means/ends terms, or on what ends these epistemic notions are supposed to depend. Consider the example above, concerning single- versus double-blind methodology, which Laudan introduced in his (1984). We have lots of empirical evidence that

<sup>6</sup>It is obvious, I hope, that Giere's comment in the cited passage regarding Siegel 1985 does not succeed, for it trades on the equivocation just discussed. When I suggested that effective action in pursuit of an unjustifiable goal is irrational, I of course did not mean that such action is ineffective—*ex hypothesi* it is. The point is rather that, however effective, there may nevertheless be powerful reasons which speak against the pursuit of that goal (as, e.g., in Giere's Nazi case). In that sense—i.e., in the sense in which 'rationality' involves not pragmatic effectiveness but rather reflectiveness of the epistemic force of relevant reasons—there clearly can be effective but nevertheless irrational action.

<sup>7</sup>I am grateful to Ed Erwin for this suggestion, and for his good advice concerning the following paragraphs.

double-blind experimental procedures control for a source of bias—the placebo effect—that single-blind procedures do not control for. That evidence gives us good reason to believe that double-blind methodology is a better indicator of the actual medicinal properties of drugs than single-blind methodology. Does this evidence constitute good reason for that claim only relative to some particular end? What end would that be? Despite Laudan's protestations, there is no such end. The evidence warrants the claim, independently of the ends any student of the question might happen to have. Even if I do not have the goal of discovering the actual efficacy of a drug, the evidence in question nevertheless provides good reason to believe that the evidence for the efficacy of a drug stemming from double-blind research is more probatively forceful than parallel evidence stemming from single-blind research. That is, the epistemic strength of the reasons is not, *contra* Laudan, relative to aims, ends, or goals.

The point becomes even more clear when we consider Laudan's own examples:

But the giving of evidence, no more than the proffering of justifications, does not occur in a vacuum; it is always modulo some aim or other. It is clear, for instance, that evidence for the empirical adequacy of a statement is not necessarily the same as evidence for the truth of a statement. Evidence that a statement can be accepted at a 95% confidence level will not necessarily be evidence for that statement at a 99% confidence level. (1990b, 320)

These examples do not help Laudan's case. Laudan here conflates the *giving* of evidence with the epistemic forcefulness of the evidence given. That one chooses to provide evidence that a statement is empirically adequate rather than that it is true may depend partly on one's ends, but that the evidence in fact supports the statement's empirical adequacy (but not its truth) does not itself depend on one's ends. Whatever one's ends, *E* may be good enough to establish *S*'s empirical adequacy but not its truth (or its acceptability at a 95% but not a 99% confidence level). Indeed, Laudan's very articulation of the case depends upon this non-instrumental understanding of the relationship between *E* and *S*. In no sense is *E*'s evidential/probative force dependent upon which of those ends one happens to have.

**4. Conclusion.** Naturalists are of course correct that the establishment of claims concerning instrumental efficacy/rationality requires appeal to (naturalistic, empirical) evidence. It remains, nevertheless, that a non-naturalistic, non-instrumental story about that evidence and the rational warrant it provides is needed in order to make sense of the alleged instrumental connection between candidate means and ends. For how will we tell whether or not some means *M* is indeed efficacious for the achievement of some goal *G*, such that we are instrumentally rational in utilizing *M* or in believing the result of its utilization? By gathering evidence, presumably, about the efficacy of *M* with respect to that achievement. When the evidence is gathered and evaluated, it will (ideally) yield conclusions like "Method *M* is efficacious for the achievement of our epistemic ends; method *M*\* is not (or is less so). Therefore we should utilize method *M*." But that the evidence indeed warrants such conclusions is not something that can be understood in instrumental terms: to what further end could we appeal in arguing that our evidence does or does not support such conclusions? There is no such further end—and, moreover, it is a mistake to understand the question in this way, since, as just argued, it confuses causal and epistemic notions and relations. Rather, we have no choice but to refer to our best theory of evidence; to our best theoretical account of the epistemic or normative force that reasons and evidence might enjoy and transmit



to the claims which they support. This theory cannot be a naturalistic theory, if naturalism restricts itself to instrumental concerns, for instrumental considerations will not serve to justify such claims of instrumental efficacy. When the naturalist argues that "*E* shows or suggests that *M* is more efficacious than *M*\* with respect to *G*," she is appealing not to some further goal.<sup>8</sup> She is appealing rather to some non-instrumental account of evidential warrant or probative force, such that (according to that account) *E* warrants that claim. I do not for a moment suggest that any particular account of such force enjoys wide acceptance among contemporary epistemologists/philosophers of science. I am suggesting rather that the naturalist needs such an account every bit as much as the non-naturalist does, but that such an account cannot be had naturalistically, if naturalism is restricted to instrumental concerns. Hence naturalism is at most a seriously incomplete philosophy of science—and a non-naturalistic, 'categorical' conception of rationality a prerequisite for its completion.

## REFERENCES

- Brown, H. I. (1988), "Normative Epistemology and Naturalized Epistemology", *Inquiry* 31: 53–78.
- Fuller, S. (1988), *Social Epistemology*. Bloomington: Indiana University Press.
- . (1989), *Philosophy of Science and Its Discontents*. Boulder: Westview Press.
- Gibson, R. F. (1988), *Enlightened Empiricism: An Examination of W. V. Quine's Theory of Knowledge*. Tampa: University Presses of Florida.
- Giere, R. N. (1984), "Toward a Unified Theory of Science", in J. T. Cushing, C. F. Delaney, and G. M. Gutting (eds.), *Science and Reality: Recent Work in the Philosophy of Science*. Notre Dame: Notre Dame University Press, pp. 5–31.
- . (1985), "Philosophy of Science Naturalized", *Philosophy of Science* 52: 331–356.
- . (1987), "The Cognitive Study of Science", in N. J. Nersessian (ed.), *The Process of Science*. Dordrecht: Martinus Nijhoff Publishers, pp. 139–159.
- . (1988), *Explaining Science: A Cognitive Approach*. Chicago: University of Chicago Press.
- . (1989), "Scientific Rationality as Instrumental Rationality", *Studies in History and Philosophy of Science* 20: 377–384.
- Kim, J. (1988), "What Is 'Naturalized Epistemology'?", in J. E. Tomberlin (ed.), *Philosophical Perspectives, 2: Epistemology, 1988*. Atascadero, CA: Ridgeview Publishing Company, pp. 381–405.
- Kitcher, P. (1992), "The Naturalists Return", *The Philosophical Review* 101: 53–114.
- Kornblith, H. (1993), "Epistemic Normativity", *Synthese* 94: 357–376.
- Laudan, L. (1984), *Science and Values*. Berkeley: University of California Press.
- . (1987a), "Progress or Rationality? The Prospects for Normative Naturalism", *American Philosophical Quarterly* 24: 19–31.
- . (1987b), "Relativism, Naturalism and Reticulation", *Synthese* 71: 221–234.
- . (1988), "Methodology's Prospects", *PSA 86*, Volume 2, pp. 347–354.
- . (1990a), "Normative Naturalism", *Philosophy of Science* 57: 44–59.
- . (1990b), "Aim-less Epistemology?", *Studies in History and Philosophy of Science* 21: 315–322.
- Maffie, J. (1990a), "Recent Work on Naturalized Epistemology", *American Philosophical Quarterly* 27: 281–293.
- . (1990b), "Naturalism and the Normativity of Epistemology", *Philosophical Studies* 59: 333–349.
- Quine, W. V. (1986), "Reply to Morton White", in Hahn, L. E., and P. A. Schilpp (eds.) 1986, *The Philosophy of W. V. Quine* (The Library of Living Philosophers, vol. XVIII). La Salle, IL: Open Court Publishing Company, pp. 663–665.

<sup>8</sup>If she is, then not only is she conflating causal and epistemic questions; in addition, a problematic regress threatens.

- Siegel, H. (1985), "What Is the Question Concerning the Rationality of Science?", *Philosophy of Science* 52: 517-537.
- . (1989), "Philosophy of Science Naturalized? Some Problems with Giere's Naturalism", *Studies in History and Philosophy of Science* 20: 365-375.
- . (1990), "Laudan's Normative Naturalism", *Studies in History and Philosophy of Science* 21: 295-313.
- . (1996), "Naturalism and the Abandonment of Normativity", in W. O'Donohue and R. Kitchener (eds.), *Psychology and Philosophy: Interdisciplinary Problems and Responses*. London: Sage Publications (in press).
- Worrall, J. (1990), "Rationality, Sociology and the Symmetry Thesis", *International Studies in the Philosophy of Science* 4: 305-319.