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Joseph Rouse
Wesleyan University

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FROM REALISM OR ANTI-REALISM TO SCIENCE AS SOLIDARITY

Joseph Rouse, Wesleyan University

> There is nothing wrong with science, there is only something wrong with the attempt to divinize it, the attempt characteristic of realistic philosophy.[1]

The pragmatist tradition, with which Richard Rorty actively aligns himself, has long been closely affiliated with the sciences. Pragmatists such as John Dewey or Willard van Orman Quine have understood themselves to be philosophical naturalists, where naturalism is defined as the view that philosophy is continuous with, or even a part of, a scientific understanding of the world. The significance of such a proposed assimilation of philosophy to science depends, however, upon the specific conception of science and scientific understanding that philosophy is supposed to emulate. An important and controversial aspect of Rorty's own contribution to pragmatism has been his reformulation of the terms in which we should understand the sciences and the scientific culture that the pragmatists endorse.

Rorty's conception of science, along with his view of the relations of science to philosophy and to culture more generally, has evolved in conversation with philosophical debates about scientific realism, and about a broader conception of scientific "objectivity" which scientific realism exemplifies. Part of the difficulty of getting a handle on these arguments, and on Rorty's own position, is that the term 'realism' has been fraught with ambiguity. Sometimes it has been used simply to assert continuity between the familiar objects of our everyday surroundings, and the strange and often unobservable objects postulated within scientific theories (electrons and black holes are just as "real" as tables and chairs). Sometimes it has been used to say that only the objects that function within scientific theories are real (e.g., that beliefs and desires are merely part of "folk psychology," which neuroscience will replace by talking about patterns of brain activity; or even that tables and chairs might be illusory remnants of folk physics, to be replaced by talk of quantum fields). Alternatively, it has been used to distinguish the natural objects whose existence is independent of human beings and their concepts and practices from objects that are inextricably part of a human social world (e.g., institutions, practices, roles, or meanings). Perhaps the most clearly articulated philosophical use of the term is the claim that science aims, and often succeeds, at developing theories that are true in the specific philosophical sense of a correspondence between the content of linguistic expressions and the "way the world is" independent of human concepts or practices. Yet as Rorty himself has noted, the significance of even this last sense of 'realism' depends upon which of several different 'antirealist' doctrines are the focus of the realist's ire.[2]

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[1] Richard Rorty, Objectivity, Relativism and Truth: Philosophical Papers, Volume 1 (Cambridge: Cambridge University Press, 1991), p. 34.

[2] Rorty, Objectivity, Relativism and Truth, p. 49. 'Antirealism' is not a single doctrine, but an umbrella term for a family of views that define the aspirations of science in terms of specific human capacities or interests. The significance of such views depends upon which capacities or interests are given prominence for a philosophy of science, and how the goals of science are supposed to be fixed by those capacities or interests. Empiricist antirealists define the goals of science as accounting for those features of the world that are observable by human

Rorty's criticisms of scientific realism are not merely aimed at one or more specific philosophical doctrines. More fundamentally, he objects to an underlying yearning for "objectivity" that motivates both the persistent search for a philosophically viable realism, and some of the familiar alternatives to realism. Rorty thinks that the quest for objectivity (or reality) reflects an unwillingness to settle for the best beliefs and reasons that we fallible human beings can muster with our best efforts. Instead, realists and others seeking objectivity want some stronger guarantee that we are really on the right path: our theories and methods are not just the best we can do, but they are objectively valid, or correspond to reality independent of human interests. Like moralists seeking natural, rational, or divine authority for their recommendations, philosophers of science have looked beyond mere human reasoning for some transcendent grounds for the authority of science. Science as realists conceive it aims for and supposedly attains something greater (and more reliable) than do other, all-too-human activities. Rorty believes that such transcendent grounds for our beliefs and practices are both unattainable and uncalled for. Instead, he urges that respect for and reliance upon the sciences be detached from an urge for transcendence. To that end, he asks that we reconceive the sciences as aiming toward solidarity with a human community rather than toward objectivity or reality. Scientific communities should be admired for their constitutive moral virtues (at least relative to other communities) rather for than their supposedly rational methods. We should certainly appreciate and utilize the enhanced capacities for prediction and control of our surroundings that the sciences often provide, but we need not think that such capacities signify anything more than an ability to fulfill those particular human interests that depend upon reliable interaction with our surroundings.

My discussion of Rorty's conception of science falls into three sections. I shall first consider Rorty's interpretation and criticisms of scientific realism and other philosophies of science that he thinks still seek objectivity as a way of transcending our all-too-human limitations. The second section takes up his alternative conceptions of science as seeking solidarity within the ongoing "conversation" in which human beings develop vocabularies for understanding and coping with themselves and the world. In the final section, I consider whether Rorty's constructive reconception of science succeeds in surpassing the philosophical conceptualizations that he takes to embody a mistaken attempt to transcend the contingencies of

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beings, rather than as discovering the truth about unobservable entities. Instrumentalist antirealists (sometimes called pragmatists, although not all who call themselves pragmatists are instrumentalists) understand science as aspiring to more reliable prediction and control of ourselves and our environment. Social constructivist antirealists understand science as determined by the specific, historically contingent interests and goals of the communities in which it is undertaken. Note that these views differ dramatically in the universality of the goals they attribute to science. Empiricists treat the goals of science as universal, to the extent that human beings have fairly similar sensory capacities. The goals attributed by instrumentalists include some that are relatively universal (because human beings have some common needs for survival), and some that vary with the purposes of particular historical communities. Social constructivists may regard the goals of science to be completely dependent upon the interests of a particular community.

history and social practices.

Realism and the Quest for Scientific Objectivity

An influential recent anthology in the philosophy of science holds that there is a consensus among philosophers of science that "three distinct alternative general approaches–scientific realism, neo-Kantian constructivism, and post-positivist empiricism– [are] the major competitors" as contemporary accounts of science.[3] Rorty's arguments against science-as-objective are aimed at all three of these approaches, so it is not surprising that he frames his objections around the very idea of a "philosophy of science".

> One of the principal reasons for the development of a subarea within philosophy called "philosophy of science" was the belief that 'science' (or at least, 'natural science') named a natural kind, an area of culture which could be demarcated by one or both of two features: a special method, or a special relation to reality.[4]

Each of the three competitive approaches identified in the Boyd anthology indeed fits within Rorty's schema. Typically, scientific realists argue that the sciences at their best have a special relation to reality (articulated in terms of reference and truth), while antirealists (empiricists and "constructivists") have looked instead to differing conceptions of method.[5] These appeals to reality or methodology are intended to serve at least three functions: to articulate crucial differences in kind between the (natural) sciences and other cultural practices, to understand the distinctive outcomes attributable to those differences, and to legitimate the distinctive authority that accrues to scientific claims as a result.

Rorty initially criticizes an assumption he takes to underlie realist and antirealist philosophies of science alike, namely that scientific theories are attempts to "represent" the world. According to the standard representationalist conceptions, scientific theories propose a specific description or model of what some aspect of the world is composed of, and how these components characteristically interact. Thus, the kinetic theory of gases represents gases as

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[3] Boyd, Richard, Philip Gasper, and J.D. Trout, The Philosophy of Science (Cambridge: MIT Press, 1991), p. xiii.

[4] Rorty, Objectivity, Relativism, and Truth, p. 46.

[5] For empiricists such as Bas van Fraassen or Clark Glymour, the distinctive feature of science is its constitutive accountability to empirical observation. Constructivists in the Boyd anthology's sense are more varied. They (Thomas Kuhn, Larry Laudan, Helen Longino, or Philip Kitcher might be among the paradigm cases) typically deny that there is a scientific method in general, because scientific methods are too closely tied to historically particular, field-specific theoretical schemes, but most then seek to identify some meta-methodological basis for choosing between such schemes, often on the basis of the historical record. Another group of constructivists, more often sociologists than philosophers, have argued that there is no such meta-methodological basis of evaluation, and that scientific beliefs can best be explained through the social histories of their communities. These "social constructivists" still fit within Rorty's schema to the extent that they think that the distinctive authority of the sciences within modern societies needs such objective justification, but cannot acquire it.

composed of discrete molecules traveling at varying velocities, colliding with one another and with the walls of any surrounding container; the observable macroscopic properties of the gas (e.g., its temperature and pressure) are to be explained by the average kinetic energy of the molecules that compose it. Similarly, one part of molecular genetics represents the chromosomes of eukaryotic cells as containing sequentially ordered molecules of DNA, some of whose sequences of constituent chemical bases serve as templates for the intracellular construction of corresponding sequences of bases in shorter RNA molecules, which serve in turn as templates for the sequential assembly of chains of amino acids into proteins; the specific proteins present in those cells are thereby explained by the sequential order of the DNA in the cell's chromosomes.

If you were to ask scientists why we ought to believe these theories, their answers would typically appeal to specific experimental or observational evidence, particular explanatory capacities and conceptual economies of the theories themselves, and the manifest failure of any presently conceived alternative theory to account for this evidence in other terms. Philosophers who think of scientific knowledge as representation cannot simply accept these local, highly specific reasons at face value, however. The reasons scientists give are typically couched in terms of the vocabularies and methodological assumptions characteristic of the theories and the disciplinary practices in which they are employed.[6] If it turned out that these theoretical vocabularies and methodological assumptions were seriously flawed, that should also cast doubt upon the patterns of reasoning that employ them to justify the theoretical representations themselves. So representationalist philosophers of science see their task as providing a more general account of the difference between successful and unsuccessful theories (where "theories" are conceived as including their associated methods, instruments, conceptualizations, and patterns of reasoning).

The difference between realists and antirealists is due to their overall strategies for understanding and accounting for the difference between successful and unsuccessful theoretical representation. Realists typically argue that the crucial difference is a matter of whether the

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[6] There has been a substantial consensus among philosophers that has resulted from the extensive criticism of the logical empiricist tradition in the 1960's and 1970's, to the effect that theoretical vocabularies, methodological assumptions, instruments and the practices and skills required to use them, and procedures for the interpretation and analysis of data come together as a more or less tightly linked package whose components cannot provide fully independent justification for one another (Frederick Suppe, ed., The Structure of Scientific Theories (Urbana: University of Illinois Press,1977) canonically marks the formation of that consensus). More recent work emphasizing the autonomy of experiment from theory or the "disunity" of science does not do so in ways that might restore the hope for independent, objective justification of one component of scientific practice on the basis of others. On the autonomy of experiment, see Ian Hacking, Representing and Intervening: Introductory Topics in the Philosophy of Natural Science (Cambridge: Cambridge University Press,1983), and "The Self-Vindication of the Laboratory Sciences," in Andrew Pickering, ed., Science as Practice and Culture (Chicago: University of Chicago Press, 1992), pp. 29-64. A good introduction to discussions of disunity is Peter Galison and David Stump, ed., The Disunity of Science: Boundaries, Contexts, and Power (Stanford: Stanford University Press, 1996).

terms of a theory successfully match up with real kinds of objects or processes that occur in the world, such that the claims the theory makes about those objects are at least approximately true. For them, what matters is that molecules and electromagnetic fields actually exist, and behave in much the way current theories represent them as behaving, whereas other proposed entities such as phlogiston, bodily humours, or vital entelechies do not exist. Antirealists, acutely aware that we have no independent access to what really exists apart from our scientific theories and practices, instead look to some internal feature of scientific practices or their human practitioners to account for the difference between successful and unsuccessful representation. Typically then, antirealists make less ambitious claims for what successful ("objective") theoretical representation amounts to: it is empirically adequate, rationally warranted, or based upon a consensus of the scientific community rather than true in the robust sense of corresponding to a mind-independent world.

Philosophers of science have developed many different interpretations of realism, and many variants of empiricism, instrumentalism, social constructivism, and other antirealist approaches; they often believe that the subtle differences among these variants are crucial to their success or failure. Rorty's objections do not depend primarily upon the specific differences among their many versions, or even upon the more general differences between realist and antirealist strategies. He hopes to challenge realists' and antirealists' shared commitment to a representationalist conception of theory, which is needed to confer significance upon their different accounts of successful representation. For example, in response to the worry that his criticisms of realism would give aid and comfort to instrumentalist versions of antirealism, Rorty rejoins that "we pragmatists try to distinguish ourselves from instrumentalists not by arguing against their answers, but against their questions."[7] I believe that we cannot avoid looking at these various answers, however, because Rorty's arguments against realists' and antirealists' questions turn on the supposed futility of trying to answer them. To see why this is so, I turn first to his criticism of the most widely discussed strategy for defending scientific realism.

To understand this strategy for defending scientific realism, we must first recognize the untenability of any direct argument for realism. Realists claim that the objects postulated in the best scientific theories correspond to kinds of objects whose existence is independent of human practices and capacities, and that the postulated behavior of those objects at least approximately corresponds to the ways those independently existing objects actually behave. If we had direct access to what the world is really like independent of what our theories say about it, we could then readily assess the extent of their correspondence to one another. But of course we have no such direct access to the world–that is why the problem supposedly arises in the first place. Any argument for scientific realism must therefore be indirect.

The most influential such indirect argument for a robust scientific realism takes the form of an "argument to the best explanation" modeled on such arguments in the sciences themselves. Arguments to the best explanation begin with some phenomenon already known to exist, and postulate some other phenomenon whose existence would explain why the known phenomenon occurs in just the way that it does. If no other explanation is available for this phenomenon, or the other possible explanations are not adequate, the argument goes, then we are justified in

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[7] Rorty, Objectivity, Relativism, and Truth, p. 52.

accepting the existence of the theoretically postulated phenomena. Thus, in the examples mentioned earlier, we supposedly accept the kinetic theory as the best explanation for the observed behavior of gases, and we similarly accept theories about the genetic code as the best explanation for a wide range of phenomena ranging from hereditary transmission of traits to intracellular protein synthesis. But what do such arguments have to do with scientific realism?

Realists claim that there is another striking phenomenon that is very much in need of explanation, for which scientific realism provides the only plausible or acceptable account. Scientists investigate the world using concepts and methods that are substantially dependent upon the theories that they accept, and yet the results of those investigations are highly reliable in practice. Lights normally go on when we flip the right switch, bridges don't fall down, antibiotics cure infections, and so forth. Moreover, such reliability tends to increase over time through more refined development and application of theory. It would be very surprising, perhaps even miraculous, realists tell us, if highly theory-dependent methods achieved such extensive instrumental success using false theories, especially theories whose terms for object-kinds did not correspond to real kinds of objects in nature. Hence, they conclude, the best, and perhaps only, adequate explanation of the widespread instrumental success of theory-dependent methods in science is scientific realism.

Rorty criticizes this line of argument at multiple levels. He first criticizes its underlying presumption that there is some clear, well-defined pattern of inference denoted by "arguments to the best explanation," which is both distinctive to science, and assessable in general.

> Almost everybody who tries to resolve, rather than dissolve, the issue of realism versus instrumentalism takes for granted that we can find something like an "inferential principle" which can be called ["argument to the best explanation"] and which is more prevalent in modern science than in, say, Homeric theology or transcendental philosophy. ... Postulating things you can't see to explain things you can see seems no more specific to those activities normally called "science" than is modus ponens.[8]

Unless such a distinctive pattern of scientific inference can be identified and shown to be generally successful, however, the argument for realism cannot get off the ground.[9]

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[8] Rorty, Objectivity, Relativism, and Truth, p. 53.

[9] Arthur Fine, whose stance against both realism and the various antirealisms Rorty mostly endorses, also notes another problem with the phenomenon that the realist hopes to explain. In trumpeting the successes of science in using methods dependent upon its current theories to improve those very theories, realists are providing only a partial history.

> The history of science shows well enough how [modifying a theory in its less-confirmed parts on the basis of its better-confirmed parts] succeeds only now and again, and fails for the most part. ,,, The idea that by extending what is approximately true one is likely to bring new approximate truth is a chimera. ... The problem for the realist is how to explain the occasional success of a strategy that usually fails. Arthur Fine, The Shaky Game: Einstein, Realism and the Quantum Theory (Chicago: University of Chicago Press, 1986), p. 119.

Yet Rorty points out that Fine's principal argument against realism may concede too much. Fine

Rorty then argues that this strategy for defending realism substitutes hand-waving for an argument. We are supposed to accept scientific realism because the argument for it is of the same kind that we routinely accept in the sciences themselves. Scientists normally offer much more substantially developed arguments than scientific realists provide, however. Familiar scientific explanations typically give richly detailed understandings of the causal mechanisms that are postulated as the best explanation for various phenomena (that is a crucial part of what makes them good explanations). No one has a comparably detailed causal account of how scientists' talk about electrons or genes is reliably connected to the successful applications of scientific theories and methods. Thus, Rorty concludes,

> If realists are going to do any explaining that is not of the [vacuous] "dormitive power" sort they are going to have to describe two bits of mechanism and show how they interlock. They are going to have to isolate some reliability-inducing methods which are not shared with the rest of culture and then isolate some features of the world which gear in with those methods, ... exhibited in sufficiently fine detail so that we can see just how they mesh.[10]

Rorty finally calls attention to one other crucial presumption of this argument for realism that may be difficult to defend. Why should we think that what suffices to explain some aspect of the world to us has anything to do with how the world really is apart from our concerns? The standards of explanatory success may have as much to do with what we the explainers are like as with the world to be explained. If, as Rorty believes, explaining is a thoroughly human, situated practice, then there is no reason to think that any explanation of the success of scientific methods should point toward an objective truth about reality.

> From a Wittgensteinian or Davidsonian or Deweyan angle, there is no such thing as "the best explanation" of anything; there is just the explanation that best suits the purpose of some explainer. Explanation is, as Davidson says, always under a description, and alternative descriptions of the same causal process are useful for different purposes. There is no description which is somehow "closer" to the causal transactions being explained than the others.[11]

This problem afflicts both sides of the realist's purported explanation of the success of science. It is not just that the theories invoked to explain the instrumental success of science answer to our all-too-human interests in explanation. The same is true of the pattern of instrumental success

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begins with the claim that what is at issue between realists and instrumentalists is whether the appropriate conclusion to draw from an argument to the best explanation is that the explanatory account is true, or only that it has some lesser degree of warrant. Realists cannot then appeal to an argument to the best explanation for the truth of realism without begging the question against the antirealist. But Rorty objects to the beginning point that Fine shares with realists and antirealists, that there is a general form of inference, argument to the best explanation, whose appropriate conclusion can be assessed in a general way at all.

[10] Rorty, Objectivity, Relativism, and Truth, p. 55.

[11] Rorty, Objectivity, Relativism, and Truth, p. 60.

that the realist hopes to explain. These successes can only provide prediction and control in specific respects, which are valued because of their relation to particular human aspirations. Any explanation of those successes will still reflect the interests they satisfy. Thus, Rorty asks,

> Why should we think that explanations offered for [the purpose of prediction and control] are the "best" explanations? Why should we think that the tools which make possible the attainment of these particular human purposes are less "merely" human than those which make possible the attainment of beauty or justice? What is the relation between facilitating prediction and control and being "nonperspectival" or "mind-independent"? [12]

Rorty's conclusion from these kinds of argument reiterates his more general arguments against correspondence theories of truth. Rorty accepts the straightforward, deflationary sense of truth in which to say of a sentence 'p' that it is true says no more, and no less, than to say p. The context-specific arguments that scientists provide for their claims often give good reason to believe that they are true in this sense. But Rorty thinks that to say that scientific claims are true in the realist's stronger sense of correspondence to a mind-independent structure of the world ("really true," perhaps uttered accompanied by a resounding thump of the table) is to pay science a compliment that is both vacuous and impossible to vindicate. It is vacuous, because the reasons that can be mustered for claiming that theories are "really true" are the same ones that led to the assertion of the theories in the first place, and their deployment a second time around confers no added authority. It is impossible to vindicate, because the aspiration underlying the realist argument is that one can remove oneself from the particular historical nexus of beliefs, reasons, and purposes that provide concrete standards of justification, in order to ask what would be good reasons and true beliefs apart from any set of purposes and accepted patterns of beliefs and reasons. Bas van Fraassen once highlighted the quasi-theological aspirations of scientific realism by showing how the arguments for realism closely paralleled traditional arguments for the existence of God.[13] Rorty likewise sees the realist quest for a vindication of scientific objectivity and truth to be a last undesirable vestige of a theological impulse, "a legacy of an age in which the world was seen as the creation of a being who had a language of his own."[14]

Although Rorty devotes most of his discussion of the philosophy of science to criticisms of scientific realism, he also objects to the familiar versions of antirealism. Antirealists seek to vindicate the objectivity of scientific representations not by showing their connection to a world that transcends human practices, interests, and capacities, but by identifying some distinctively human feature of science that serves comparable ends. Whether these features have to do with our sensory capacities (empiricism), our interests in prediction and control (instrumentalism), or our norms of justification, rationality or progress (historical metamethologies and "internal realisms"), they aim to show that science achieves some end that transcends particular historical contingencies without transcending human concerns and interests altogether. Despite Rorty's

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[12] Rorty, Objectivity, Relativism, and Truth, p. 58.

0. Bas Van Fraassen, The Scientific Image (Oxford: Oxford University Press,1980), ch. 7.

[14] Richard Rorty, Contingency, Irony and Solidarity (Cambridge: Cambridge University Press, 1989), p. 5.

lack of sustained attention to particular versions of antirealism, the locus of his objections to them is clear.

First and foremost, Rorty objects to antirealists' conception of theories as representations, and to their aspiration to determine a general criterion for representational adequacy. Rorty would find antirealists' praise for the empirical adequacy, rational warrant, or progressive development of scientific theories to be just as vacuous as realists' claims that theories are ("really") true. He would recognize no warrant for these general claims that goes beyond the more specific arguments for particular claims within the sciences. Rorty's expressed sympathy with Arthur Fine's "Natural Ontological Attitude" as a rejection of both realism and antirealism might plausibly be taken to endorse Fine's specific arguments against empiricist and "truthmongering" antirealisms,[15] which suggest that many of these positions cannot even be coherently formulated (their conceptions of rational warrant or the empirical basis of science are supposedly determined by procedures whose application requires that these conceptions already be in place). And finally, ironically, antirealist positions are unacceptably conservative and backward-looking. They elevate some particular aspect of scientific work (e.g., observational capacities, justification practices, or patterns of theory change) into the characteristic mark of scientific objectivity or rationality. Since the resulting norms of objectivity or rationality are supposed to be the basis upon which other changes in the sciences are to be assessed, the aspects of scientific work that define these norms must be exempt from subsequent articulation and development. Antirealists recognize that the future course of scientific work will likely alter our currently accepted beliefs and practices,[16] but if they allow that the features of science that define its objectivity are also subject to change, then they must either recognize that contemporary scientific work is less objective than they claimed, or that the subsequent scientific work that revised these features of science is regressive and unacceptable.

If we accept that the arguments for realist and antirealist construals of scientific objectivity fail, what conclusions would follow? Rorty does not think that scientific claims themselves are in any way undermined by these failures, because he does not think that the sciences need philosophical legitimation as objective. Nor is the success of the sciences thereby rendered miraculous or inexplicable. What explains the successes of science, to the extent they need explaining, are the relevant scientific theories themselves in their particulars. Why do the lights go on when we flip the switch? The answer is to be provided by electromagnetic theory, not by scientific realism. If we ask why we should believe electromagnetic theory, there is no better answer than the specific reasons that emerge from the detailed history of scientific practice and reasoning in this field. Rorty is content with

> simply explaining why these beliefs rather than others are actual. [That] sort of explanation is provided by intellectual history, including the history of science, ...[which]

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[15] Fine, The Shaky Game, ch. 8.

[16] Indeed, one of the most prominent antirealist arguments (Larry Laudan, "A Confutation of Convergent Realism," Philosophy of Science 48 (1981), pp. 19-48) is that scientific realism is committed to an historically mistaken conservatism about the continuity of scientific methods, standards, and ontologies over time.

> stays on a "perspectival" level, the level of beliefs and desires succeeding one another and interacting with one another over the course of time.[17]

We can accept the outcome of such interactions, while freeing ourselves from the remnants of theological, supernatural, and superhistorical conceptions of their authority.

What is undermined by the failure of realist and antirealist arguments is the idea that natural science as such is different in kind from other human enterprises. This occurs not because the natural sciences and the social sciences, or the sciences and the humanities or arts, really are the same kind of activity. Their differences are many, but so are the differences among the sciences themselves. We no longer need to discern common features among paleontology, cell biology, and high-energy physics that would differentiate them collectively from similarly common features among social psychology, comparative politics, or microeconomics. Nor do we need to differentiate the whole lot from philosophy, history, and literature. By the same token, doubts about the adequacy of particular theories in, for example, welfare economics, sociology, or evolutionary psychology, cannot be removed by assurances that these disciplines satisfy the latest philosophical criteria for scientific objectivity. Nor can such philosophical arguments about objectivity settle questions about the safety and desirability of radioactive waste disposal or genetically altered foods. In all such cases, there is no substitute for detailed reflection upon what is at issue and what is at stake, and what specific reasons can be marshalled as relevant considerations in that context.

Science as Solidarity

Having rejected any attempt to demarcate the sciences as objectively grounded, Rorty goes on to propose some different terms in which we may talk about and praise the sciences. Such an alternative vocabulary would serve several useful roles. First, it would help remove the temptation to think of the sciences as getting human beings in touch with something transcendent to and less transient than their mundane concerns. As the quest for objectivity and transcendence informs most of the familiar ways of thinking and talking about science, such an alternative vocabulary would be useful.[18] Second, and most important, Rorty wants to praise and endorse the sciences, despite his criticism of the familiar ways of doing so. However fuzzy their boundaries and mutual similarities, the sciences are an important component of the "postmodern bourgeois liberal" culture that he admires and would like to strengthen.[19] Finally, as we shall see, the invention of new vocabularies for talking about ourselves and the world is something that Rorty thinks is valuable in its own right. Indeed, the sciences' ability to articulate such novel ways of thinking and talking are part of what Rorty admires in them.

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[17] Rorty, Objectivity, Relativism, and Truth, p. 55.

[18] Rorty does not think that linguistic reform can by itself insure against backsliding into these familiar conceptions, however. The introduction of new terminology cannot reliably compel the inferences we endorse or prohibit those we reject, for the introduction of the terms cannot determine their subsequent use.

[19] Richard Rorty, "Postmodern Bourgeois Liberalism," in Objectivity, Relativism, and Truth, pp. 197-202.

In this section, I shall highlight three aspects of the sciences that Rorty finds deserving of praise and endorsement, and discuss the terms in which he proposes to offer such praise. The first is familiar: Rorty admires the instrumental reliability often provided by the natural sciences, the very same capacities for prediction and control that realists and antirealists saw as in need of their distinctive philosophical explanations. The second, which figures most prominently in Rorty's recent discussions of science, concerns the ways in which scientists frequently conduct themselves in their work. Rorty suggests that we substitute for familiar discussions of scientific method an inclination to praise the sciences for their frequently exhibited moral virtues, and for their contribution to human solidarity. Finally, in terms more frequently applied to the humanities and the arts, Rorty values the sciences for their contributions of novel vocabularies that enable human beings to "reinvent themselves." None of these features are unique to the sciences, and none can serve as defining characteristics (although prediction and control comes close for Rorty), but they all show how the sciences should matter to "postmodern bourgeois liberals."

Rorty thinks it incontrovertible that the sciences have greatly enhanced the predictability and manipulability of human beings' environment. These achievements have by and large reduced human suffering and freed human beings for devotion to other ends, even though not all of their consequences have been beneficial. Indeed, the association between science and technological control (with all its benefits and dangers) is ubiquitous enough that for many purposes, including some of Rorty's own, the two can be simply identified:

> Baconians will call a cultural achievement "science" only if they can trace some technological advance, some increase in our ability to predict and control, back to that advance. .....This pragmatic view that science is whatever gives us this particular sort of power will be welcome if one has developed doubts about traditional philosophical inquiries into scientific method and into the relation of science to reality. ... Despite [its] fuzziness, [this Baconian way of defining 'science'] is [also] probably the one most frequently employed by deans, bureaucrats, philanthropoids, and the lay public.[20]

Rorty's aspiration to praise the technological achievements of the sciences, while disconnecting that praise from the suggestion that such achievements can be explained by a distinctively scientific method or relation to reality, might then seem to amount to an instrumentalist antirealism. Rorty's admiration for the applicability of scientific understanding nevertheless differs from that of instrumentalists in two ways. Because he offers no independent way of identifying scientific practices apart from their technological consequences (e.g., as theoretical representations, or as experimental methods), his suggestion is not another effort to legitimate those predetermined practices, but only a partly revisionary suggestion for how to delimit the use of the term 'science' for some purposes (on such a conception, 'mortuary science' is a perfectly appropriate phrase, whereas a term other than 'science' would likely have to be found for some high-level theory in physics that has no straightforward applications). Second, although technological applicability is then criterial for 'science' for some purposes, there are other contexts in which a different extension of the term is called for, and different virtues are to be emphasized.

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[20] Rorty, Objectivity, Truth, and Relativism, p. 47.

Among those other contexts are precisely the ones that call attention to what realists and antirealists have identified as 'scientific reasoning' or 'scientific method', but which Rorty would prefer to redescribe in rather different terms.

> Pragmatists would like to replace the desire for objectivity–the desire to be in touch with a reality which is more than some community with which we identify ourselves–with the desire for solidarity with that community. They think that the habits of relying upon persuasion rather than force, of respect for the opinions of colleagues, of curiosity and eagerness for new data and ideas, are the only virtues scientists have. They do not think that there is an intellectual virtue called 'rationality' over and above these moral virtues.[21]

On this conception, what is to be admired in the intellectual work of the sciences is the consistency of their aspiration to and the frequency of their achievement of "unforced agreement" amongst themselves. There is indeed more to be said about how such agreement is achieved, but Rorty thinks that is to be found more in the institutions and social practices of science than in any distinctively cognitive capacities or activities of individual scientists. On Rorty's view, we should

> praise the institutions in which [scientists] have developed and within which they work, and use these as models for the rest of culture. For these institutions give concreteness and detail to the idea of "unforced agreement," ... and flesh out the idea of a "free and open encounter"–the sort of encounter in which truth cannot fail to win. To say that truth will win in such an encounter is not to make a metaphysical claim about the connection between human reason and the nature of things. It is merely to say that the best way to find out what to believe is to listen to as many suggestions and arguments as you can.[22]

Of course, the idea that the sciences provide a model for a liberal, democratic community that substitutes dialogue for force is not original with Rorty.[23] Usually, however, the deliberative practices of scientific communities have been cited as by-products of their commitment to rationality and empirical accountability, rather than as constitutive institutional (rather than cognitive) virtues.[24] Rorty asks that we focus upon the moral/practical/political terms of

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[21] Rorty, Objectivity, Truth, and Relativism, p. 39.

[22] Rorty, Objectivity, Relativism, and Truth, p. 39.

[23] Among those who have prominently defended science as a model for the conduct of liberal democracy are Robert Merton, The Sociology of Science: Theoretical and Empirical Investigations (Chicago: University of Chicago Press,1973), Karl Popper, Conjectures and Refutations: The Growth of Scientific Knowledge (New York: Basic Books, 1962), and James Conant, On Understanding Science: An Historical Approach (New Haven: Yale University Press,1947). Paul Feyerabend, Science in a Free Society (London: New Left Books, 1978) prominently argues the reverse.

[24] Note, however, that Steven Shapin and Simon Schaffer, Leviathan and the Air Pump (Princeton: Princeton University Press, 1986) interpret the new experimental philosophy of Boyle and the Royal Society precisely as organized around the political problem of how to reach

solidarity and responsibility to the community as the characteristic features that commend the sciences to us, in place of any distinctive cognitive methods or rational norms.

Such emphasis upon the advantages of open intellectual encounters offers none of the assurance that realists and antirealists typically seek by characterizing the sciences in terms of the reliability of arguments to the best explanation. Nor does it offer the epistemic advantages of empirical accountability or scientific rationality or progress. For there is no guarantee that we will continue to find better beliefs in this way; perhaps "human creativity will dry up,"[25] or perhaps, as a contingent matter, it will turn out that the possibilities for revealing exploration of nature have been pretty much exhausted, in which case "the best way to find out what to believe" won't find out very much more. But he might well say under those circumstances that a community whose mutual solidarity embraces an openended commitment toward arriving at unforced agreement would be worth having in any case.

Rorty thinks it highly unlikely that there are limits to human creativity, of course, and he looks to science as exemplary in just this respect. Such continuing effectiveness of the sciences in proposing new ways to talk and think about the world, however, would offer no aid and comfort to realists and other seekers of scientific objectivity. For Rorty does not see the possibilities for novel redescription of the world to be convergent upon some ultimate end that would vindicate the objectivity of science. Instead, he sees them as exemplifying the openness and instability of human purposes, and the undesirability of achieving closure to scientific knowledge.

An important theme Rorty emphasizes is the historically contingent divide between those domains in which people have developed fairly stable and reliable ways of talking and coping, and those in which they are casting about for alternative vocabularies and practices. In Philosophy and the Mirror of Nature, Rorty generalized Kuhn's distinction between "normal" and "revolutionary" science to that effect. Systematic philosophical conceptions of meaning and knowledge have some plausible application within domains of "normal" discourse and practice, where there are well-established norms of correct and incorrect use and relatively few phenomena that trouble the familiar categories. Systematic epistemology and semantics, however, have no place in those domains where discursive norms are unsettled. In those settings, there is no substitute for open-minded and imaginative conversation, without prior commitment to "rational" norms of adjudication. Nostalgia over the absence of such settled criteria is also out of place here. Rorty thinks that "a talent for speaking differently, rather than for arguing well, is the chief instrument of cultural change," and he shares with the Romantics a visionary appreciation for how "changing languages and other social practices may produce human beings

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unforced agreement among a community of "gentlemen," defining the appropriate objects of natural philosophy ("matters of fact") as those aspects of the world about which such unforced agreement can be obtained, and the membership of the community itself in terms of the reliability of their commitment to abiding by appropriate procedures for reaching such agreement.

0. Richard Rorty, Philosophy and the Mirror of Nature (Princeton: Princeton University Press, 1979), p. 351.

of a sort that never before existed."[26] Inventing vocabularies, reweaving webs of belief, and the consequent redescriptive remaking of ourselves are among the human possibilities that Rorty most enthusiastically celebrates.

The Romantics often opposed the innovative genius of poetry and revolutionary politics to the supposedly stultifying rationality of science. Rorty agrees that more characteristically,

> we think of poets and painters as using some faculty other than "reason" in their work because, by their own confession, they are not sure of what they want to do before they have done it. They make up new standards of achievements as they go along. ... The scientist, [by contrast], knowing in advance what would count as disconfirming his hypothesis and prepared to abandon that hypothesis as a result of the unfavorable outcome of a single experiment, seems a truly heroic example [of rationality].[27]

But the sciences have also frequently been the source of dramatically new ways of talking and acting, and Rorty thinks our image of science would be drastically incomplete without recognizing and celebrating their more imaginative and inventive moments. He is happy to recognize and appreciate the ineluctably metaphorical character of theoretical innovation in science. Rorty only objects to those philosophers who would domesticate scientific and other metaphors by arguing that these are "cognitive" achievements, which should be acknowledged as expressing symbolic meanings or even metaphorical truths.[28] We should

> see metaphors on the model of unfamiliar events in the natural world–causes of changing beliefs and desires–rather than on the model of representations of unfamiliar worlds, worlds which are 'symbolic' rather than 'natural'. ... The metaphors which make possible novel scientific theories [are likewise] causes of our ability to know more about the world, rather than expressions of such knowledge.[29]

Metaphors (even scientific metaphors like "genetic code," "chaotic behavior," or "tectonic plates") are first introduced as "unfamiliar noises" rather than symbolic cognitions. The best of them have their world-changing effects not because they latch onto something inherently meaningful, but because other speakers happen to pick up on them and thereby forge new ways of talking and acting of which they are a part. Such metaphors then eventually become domesticated elements of normalized theories, but Rorty strenuously objects to projecting this rationalized fate back into their original invocation.

Rorty thus refuses to differentiate his commitment to science from his larger commitment to the liberal, democratic cultures alongside which the sciences have primarily developed and

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[26] Rorty, Contingency, Irony, and Solidarity, p. 7.

[27] Rorty, Objectivity, Relativism, and Truth, p. 36.

[28] Rorty sees this way of talking about metaphor as a residual sign that "philosophers still tend to take 'cognition' as the highest compliment we can pay to discourse," which is itself a vestige of the "concern to raise the rest of discourse to the level of science" (Objectivity, Relativism, and Truth, p. 162)

[29] Rorty, Objectivity, Relativism, and Truth, p. 163.

flourished. Rorty sides with those strains in pragmatism that "attempt to level down the natural sciences to an epistemological par with art, religion, and politics," rather than those that would "raise the rest of culture to the epistemological level of the natural sciences."[30] He would complement that emphasis, however, by also encouraging art, religion, and politics to aspire to the civility and community solidarity he finds more adequately realized in the institutionalized practices of natural science.

Surpassing Rorty?

Rorty's talk of science as solidarity rather than objectivity, of theoretical innovation as more akin to poetry than calculation, and of scientific capacities of prediction and control as indicating the serpentine tracks of human interests rather than the luminosity of a transcendent natural reality can be startling when juxtaposed to more familiar philosophical discussions of science. Yet Rorty would readily recognize that he can no more vault out of traditional ways of thinking and talking than can anyone else. In this final section, I consider whether Rorty might still owe too deep a debt to the representationalist, objectivist philosophies of science that he strives to replace. In particular, I want to ask whether Rorty's talk of community "solidarity," and of science as a form of "conversation" that can be identified by its "vocabulary," pays insufficient attention to the material practices of scientific manipulation and experimentation. Rorty's conception too sharply isolates scientific talk from the many other things scientists do to make sense of the world. He thereby draws too sharp a divide between the social, normative interactions among scientists and the material, causal interactions between scientists and their apparatus and objects of inquiry.

To see the point of my concerns, we should remind ourselves of the direction in which Rorty's critique of the representationalist tradition has aimed to move us. Rorty has objected to the dualism underlying both realist and antirealist representationalisms (a "dualism" is a distinction drawn so as to render unintelligible the relations between the items being distinguished[31]). Realists sharply distinguish the theory-dependent field of human understanding and practice from the way the world is, completely independent from the categories and aims with which we interpret it. The initial separation must be sharp, so as to valorize the distinctive success of the sciences in overcoming this divide, and achieving an objective understanding that transcends our merely subjective categories and interests. Moreover, even this success does not overcome the world's transcendence of mere human categorization; for the success of the sciences supposedly results not in the direct presence of real natural kinds, but only their indirect manifestation through the merely instrumental success of theory-dependent methods. Antirealists agree with realists' initial characterization of the fundamental divide between us and the world as it "really" is, disagreeing only with the latter's claim that the gap can be bridged even indirectly. Antirealists seek the marks of objectivity entirely within the human side of a fundamental divide between subject and object, knower and known.

In opposition to all of these positions, Rorty objects to any effort to distinguish the

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[30] Rorty, Objectivity, Relativism, and Truth, p. 63, my emphasis.

[31] Robert Brandom, Making It Explicit: Reasoning, Representing, and Discursive Practice (Cambridge: Harvard University Press 1994), p. 615.

objective from the subjective, the transcendent from the immanent, or the true from the merely justified. He likewise objects to efforts to distinguish the methods and aims of the human sciences, which might be thought to interpret an immanent world of human meanings and practices, from the natural sciences as aspiring to understand and account for non-human nature.

When Rorty characterizes the achievements of the sciences in terms of (social) solidarity with other human inquirers, however, he seems to fall back within the familiar, dualistic terms invoked by representationalist theories. Why should the virtues of the sciences be limited to the ways in which they relate to other scientists, and not also incorporate the ways in which they interact with their instruments, other research materials, and objects of inquiry? Why place the morally relevant divide precisely at the traditional boundaries between human society and non-human nature? The force of this question may be heightened if we situate Rorty's talk of social solidarity within the history of the representationalist tradition. Theories of mental representation presented two classic questions of transcendence, concerning how a mind could ever have knowledge of either the "external world," or of other minds. To speak of solidarity within a community of human knowers is to bring other minds across the divide onto the knower's side, but it still seems to make common cause with representationalists in leaving the material world alien to one's conception of scientific knowing.

Rorty might plausibly retort that it makes a relevant difference that he has shifted the issue from epistemic justification to moral responsiveness and responsibility. In the latter context, it might be perfectly appropriate to distinguish our relations with other people from our interactions with electrons or cells. Scientific understanding requires many kinds of interaction with our material surroundings, but it does not normally involve relations of conversation, mutual understanding, and agreement or disagreement. To speak of "science as solidarity" as Rorty does is merely to locate the distinctive virtues of scientists in their discursive practices of assertion and justification as distinct from their material practices of experimental manipulation. That is not to deny that material practice is important in science; as we have seen, Rorty places the sciences' achievement of more reliable control over our surroundings as a crucial part of their success. Yet he insists that prediction and control are to be admired as contributions to thoroughly human purposes, and he would undoubtedly add that the criteria that distinguish success and failure in this respect are defined in relation to these socially defined purposes by discursive norms of justification.

There are, however, a number of reasons for questioning the adequacy of this response. First, it would be very odd for a pragmatist like Rorty to decide in advance that our moral responsibilities and solidarities in scientific practice are limited to human beings. That is especially odd nowadays when this issue has been actively disputed by animal rights activists, on the one hand, and by defenders of a broader ecological responsibility in science, on the other hand. My point is not that either line of criticism is necessarily correct, but only that Rorty's account of scientists' domain of moral accountability may rule out these criticisms on the basis of pre-determined philosophical criteria, which would be a very odd stance for a pragmatist.[32]

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[32] For a more extensive discussion of how a theory about the accountability of scientific practices might thus objectionably discount specific lines of political criticism, in this case directed at Charles Taylor in his disagreements with Rorty over relations between the natural and

A more fundamental criticism arises when we think about how Rorty has characterized the relation between capacities for prediction and control, and the practices of belief-formation and justification that he commends under the heading of science-as-solidarity. Two aspects of that characterization concern me. First, Rorty writes as if the "prediction and control" achieved by the sciences is a massive, univocal achievement, that can be appropriately described in a general and abstract way. Second, he writes as if the relation between this achievement and the ways in which we talk about and understand the world scientifically is merely instrumental. The widespread achievement of such prediction and control within the natural sciences, he suggests, occurs partly because their objects are the kinds of things people are interested in predicting and controlling,[33] and more fundamentally because of the historical coincidence that their "vocabularies" contingently turned out to be more suitable for those purposes than other vocabularies.[34] Rorty talks in these ways to counter objectivist claims that physical objects or sensory experiences provide a body of linguistically unarticulated "objective evidence" to which those practices are accountable. Instead, he argues, "we have to see sentences as connected with other sentences rather than with the world," and the confidence we have in the natural sciences as "a matter of conversation between persons rather than a matter of interaction with a nonhuman reality."[35]

The problem is that these contrasts are misplaced. Rorty is wrong to see the only alternative to objectivism in terms of conversation, social solidarity, and the achievement of unforced agreement among persons. To talk about the sciences solely in terms of their intralinguistic coherence, and the social practices and institutions that enable its consensual achievement, is to overlook the significance of the specific ways in which the sciences are material practices. Rorty is correct to say that the practices through which utterances are connected to their publicly accessible surroundings are not a justificatory encounter between already "interanimated" sentences and something alien to language and social norms. He has nevertheless retained from the representationalist tradition the underlying conception of inferential relations among sentences and causal relations among things as alien to one another. Causal interaction with unfamiliar objects or unfamiliar noises (i.e., metaphors) can (causally) prompt new sentences, he argues, but they cannot belong to networks of meaning and understanding. Rorty thereby hopes to avoid the objectivist claim that causal relations with things can justify some of these inferential networks from the "outside."

There is, however, a different way to challenge realists' claim that causal interaction with

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the human sciences, see Joseph Rouse, "Interpretation in Natural and Human Science," in David Hiley, James Bohman, and Richard Shusterman, ed., The Interpretive Turn: Philosophy, Science, Culture (Ithaca: Cornell University Press, 1991), pp. 42-56.

[33] Rorty, Objectivity, Relativism, and Truth, p. 40.

[34] Richard Rorty, Consequences of Pragmatism (Minneapolis: University of Minnesota Press, 1982), pp. 191-95.

[35] Rorty, Philosophy and the Mirror of Nature, p. 372, 157, my emphases.

the world can provide an external vindication of some of our theories. Rorty overlooks the possibility that scientists' material interactions with apparatus and objects are too integral to scientific discourse to provide it with the kind of external, objective justification that realists seek. The practices that connect utterances to their circumstances are not justifications of independently meaningful utterances, but instead are already part of the articulation of those utterances as meaningful sentences (and simultaneously of those surroundings as intelligible objects and processes). On such an account, the development of a science involves new ways of talking and new ways of encountering and dealing with its objects, articulated together. For example, modern cell biology emerged through the simultaneous development of new instrumental practices (e.g., using the ultracentrifuge and the electron microscope), in the course of which new, subcellular objects (mitochondria, ribosomes, Golgi bodies) became manifest in concert with new ways of talking about and dealing with them.[36] Rorty himself noticed this connection between novel talk and novel phenomena when he pointed out that metaphors work in much the same way as "anomalous non-linguistic phenomena like platypuses and pulsars," but he drew the wrong inference from it.[37] He concluded that,

> [Platypuses and pulsars] do not (literally) tell us anything, but they do make us notice things and start looking around for analogies and similarities. They do not have cognitive content, but they are responsible for a lot of cognitions. For if they had not turned up, we should not have been moved to formulate and deploy certain sentences which do have such content. As with platypuses, so with metaphors.[38]

Rorty thereby maintains a sharp distinction between contentful language and the world, at the cost of relocating novel ("metaphorical") utterances from the former to the latter. I urge a different conclusion: neither meaningful sentences or theories, nor articulated objects, can be manifest except through their ongoing mutual interrelations. Contra Rorty, both newly manifest phenomena, and new ways of talking, can be telling, but only because even in their novelty, they already belong to larger patterns of material and discursive practices. Practical interactions with our material surroundings are not external to our discursive practices, but indispensable components of them.

This point explains why the capacities for prediction and control that emerged with many of the natural sciences are not merely contingent, and not only the result of a prior interest in controlling aspects of our physical surroundings. To understand the predictive capacities of a science, it is not enough to characterize either some general characteristic of its objects (e.g., as physical, non-intentional, causally interconnected) or the purposes for which the science is developed; there is no substitute for an historical accounting of the detailed ways in which

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[36] For thoughtful discussions of this example, see William Bechtel, "Integrating Sciences by Creating New Disciplines: The Case of Cell Biology," Biology and Philosophy 8 (1993): pp. 277-99, and Hans-Jörg Rheinberger, "From Microsomes to Ribosomes: 'Strategies' of 'Representation' 1935-1955," Journal of the History of Biology 28 (1995): pp. 49-89.

[37] Rorty, Objectivity, Relativism, and Truth, p. 167.

[38] Rorty, Objectivity, Relativism, and Truth, p. 167.

patterns of talk and other interactions were worked out together. One needs to talk seriously about laboratories, the creation of phenomena, and the transformations of the world that result from the extension and adaptation of laboratory phenomena, before one has any conceptual handle on scientific predictions.[39] Rorty's general, undifferentiated references to "prediction and control" thus need to be replaced by a more finely-grained description of a complex, multi-faceted, subtle, localized, and sometimes jury-rigged network of practical capacities. Such descriptions would show that these developments are not independent of discursive and conceptual practices, and hence provide the latter with no independent warrant. On the other hand, they would also cohere with the recognition that we generally value not prediction and control per se, but rather a discursively articulated prediction and control which thereby yields understanding.

Overcoming this residual divide between language and the world would accommodate within Rorty's pragmatism what is perhaps the deepest insight of Thomas Kuhn's philosophy of science. Instead of distinguishing vocabularies and theories from the objects or causal processes they described, Kuhn talked about "paradigms-- accepted examples of actual scientific practice which include law, theory, application and instrumentation together."[40] He argued that these simultaneously material and discursive practices are more basic to scientific research than either the theories, empirical evidence, or causal processes that philosophers try to extract from them, and that scientific work normally consists of "articulating" these examples theoretically and experimentally rather than justifying them.

What should we conclude from these criticisms of Rorty's constructive discussions of science? I suggest they are best read as extending and consolidating Rorty's pragmatism rather than objecting to it. My criticisms do not undercut Rorty's objections to conceiving of scientific theories as representations, and to realist or antirealist accounts of such representation as objective. Indeed, these arguments suggest another, complementary objection to scientific realism. Rorty argues that we can never get outside our language, experience, or methods to assess how well they correspond to a transcendent reality. My line of argument suggests that the "near" side of realists' supposed correspondence relation is just as problematic. We should not think of our web of belief as itself intelligible apart from ongoing patterns of causal interaction with our surroundings (good Davidsonian that he is, Rorty recognizes that utterances are only interpretable as part of a larger pattern of action, in a shared set of circumstances). To that extent, the Quinean metaphor of a "web of belief" might better be replaced by that of a "field of possible action," or a "meaningfully configured world."

Rorty characterizes his (and Davidson's) pragmatism as "an account of how the marks and noises made by certain organisms hang together in a coherent pattern, which can be fitted

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[39] On the creation of phenomena in laboratories, see Hacking, Representing and Intervening, ch. 13. On the extension of such phenomena outside the laboratory, see Joseph Rouse, Knowledge and Power: Toward a Political Philosophy of Science (Ithaca: Cornell University Press, 1987), ch. 4, 7.

40. Thomas Kuhn, The Structure of Scientific Revolutions, Second Edition (Chicago: University of Chicago Press), p. 10.

into our overall account of the interaction between these organisms and their environment."[41] The point of my criticisms is that these marks and noises do not form a coherent pattern by themselves, but only as part of that larger pattern of practical engagement with the surrounding world. Rorty has already argued forcefully that scientific understanding cannot be disaggregated into distinct components of meaning and fact, fact and value, or linguistic scheme and experiential content. My arguments suggest that we also cannot usefully divide human interaction with the environing world into distinct components of social solidarity and material practice, unforced agreement and prediction and control, inferential norms and causal effects, or (familiar) meanings and (unfamiliar) noises. In giving up the quest for objectivity, we do not lose the world, but instead rediscover that it has been there all along.

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[41] Rorty, Objectivity, Relativism, and Truth, p. 10.