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Relativism, Truth, and Progress†

IN THIS PAPER, I shall examine the notion of progress from a post-modernist perspective, one which holds that science is not just a human achievement but a cultural achievement as well.[1] On the face of it, the suggestion that science is just another culture would appear to undermine the deeply-entrenched belief that it is cognitively superior to other human activities because it is the very paradigm of cognitive progress. But even if we accept the relativist thesis that the goods of science are on a par with other cultural products so far as their methods of production are concerned we can still defend the notion that science is conducive to progress. Folk wisdom may evolve and it is doubtless informative, but science changes in a way that sets it apart from other cultures. What distinguishes science is its success in fostering *stable* disciplinary structures that allow its practitioners to examine bits of nature *as though they are not bound by their contextual horizons*. It is this movement from unstable belief systems to relatively stable disciplinary structures that furnishes us with an external yardstick for measuring change in science and judging it to be progressive.

SCIENCE TRANSCENDENT

The flourishing of relativism in recent times is closely related to cultural diversity, and to the belief that pluralism is a social good. But to the generals who masterminded the victory of Newtonian science over the Scholasticism of the Schools, the diversity fostered by tradition was one of the primary obstacles

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1 My discussion will be restricted to progress in terms of our cognitive goals; worries about spiritual, moral, and other senses of the term will be set aside.

to enlightenment. Voltaire's *La Princess de Babylone* (1768) is representative of a large body of eighteenth-century literature that exploits this supposed opposition between science and tradition. It is a tale of a pair of lovers, Amazon the Gangaride from further India and Formosante the Princess, and their pursuit of one another across the continents of Asia and Europe. At least a paragraph is devoted by Voltaire to each location visited by the lovers, revealing his belief that tradition and the diversity which it engenders are opposed to enlightenment (see Brown 1976). The eighteenth century witnessed a dazzling array of governmental systems, varieties of republics, principalities and federations, monarchies (hereditary and elective), free cities, and theocratic states. Even so, Voltaire was convinced that a mind equipped with the scientific method could overcome the dogma and illusion nurtured by tradition; from the Sirian giant Micromégas to Candide and the Huron of *L'Ingenu* (1767), each of Voltaire's fictional heroes seeks to overcome the prejudice fostered by tradition, according to the objectivity afforded by a scientific outlook (cf. Brown 1976).

Voltaire's fictional work displays a blindspot that is characteristic of eighteenth-century writings on science, one which has contributed more to our contemporary view of cognitive progress than perhaps any other single factor. As keen a mind as Voltaire's was not altogether insensitive to the fact that a vital ingredient in the rise of Newtonian science was the creation of new institutional structures; i.e., science was hailed not only for its practical achievements, such as Newton's reflecting telescope, Huygens' pendulum clock, and the barometer, but also for its development of professional associations with rigorously defined goals, which replaced the informal meetings of well-intended but poorly organized amateurs. Despite Voltaire's membership in numerous scientific societies, he failed to discern that the rising citadel of Newtonian science signalled not only the repudiation of tradition in the form of Scholasticism, as Bacon had supposed, but also the establishment of a new tradition.

Although the emergence of modern science represented a remarkable feat of social engineering, Voltaire and his confreres justified the special status accorded to its products by submitting that its methods of production were universally reliable, irrespective of time or place, the nature of the inquiry, or the interests of the investigators. Science would not only unravel the mysteries of nature, but the application of its methods to human institutions and practices would finally put an end to the disorder wrought by cultural diversity.[2] It is in this spirit that Condorcet's monumental *Esquisse d'un tableau du progrès de l'esprit humain* of 1795 declared that political and moral injustice is occasioned by ignorance of the laws of nature and the false beliefs nurtured by the failure to reason in a scientific way. In the rational scientific method, Condorcet discerned an instrument that would "console [us] . . . from the errors, the crimes,

2 The notion of progress is essentially a secular one. If human progress was contingent on the will of a benevolent entity, the notion of progress would collapse into the idea of Providence. It is this consideration that inspired Voltaire's polemic against Leibniz's contention that this is the best of all possible worlds.

the injustice, with which the earth is still polluted . . ." (Teggert 1929, p. 276). Like other eighteenth-century thinkers, Voltaire, Condorcet, and their associates were indifferent to the role of contextual factors in the development of modern science; indeed, so far as they considered contextual factors at all, they *castigated* them as sources of irrationality.

SCIENCE AS A CULTURE

The Enlightenment account of science is rooted in a putative distinction between its methods of production and judgments about the goodness of its products.[3] The methods and procedures of the scientific community convey its members ever closer to achieving worthy goals (truth, knowledge, explanatory power, etc.), but they *are not responsible for the goodness of its products*; i.e., these methods do not confer goodness on the fruits of scientific practice, in the same way that a style of painting is reflected in the aesthetic value of a portrait. Indeed, in so far as science's methods of production are conducive to progress, their goodness does not depend on anything, and certainly not on any contextual factors.

The supposition that the excellence of the products of science is secured by a method that transcends the particular features of discrete societies gives rise to many well-documented problems. An especially glaring difficulty concerns the fairly innocuous contention that cognitive progress is a historical judgment to the effect that science is *moving* in a definite and in a desirable direction (cf. Bury 1955, p. 2). The problem concerns just how we are to reconcile this historical thesis with the suggestion that our human epistemic practices are cogent in so far as they are not contaminated by contextual factors. One would presume that remarkable scientific achievements, such as Newton's law of universal gravitation and Darwin's theory of evolution, are celebrated by historians because they ushered in new (and often revolutionary) ways of reasoning about nature. On the assumption that Newton was successful because he tapped into methodological criteria that transcend the bounds of particular societies, an unwelcome implication of the aprioristic rendering of science's methods is that he could have been led to discern the intellectual merit of Darwin's non-teleological rendering of human origins. This implication would appear to undermine the very historicity of Newton's ideas, because, unlike Darwin, who held that nature is constantly producing evolutionary novelties, Newton believed that the world is perfect, if not at the level of immediate experience, then at least at the more fundamental level expressed by physical law.

Evidently, more needs to be said about the artifacts produced by the scientists

3 This distinction roughly parallels the distinction between the context of discovery and the context of justification of scientific belief that is often touted in the philosophical literature, but it does not presuppose that science is geared toward the production of true beliefs about the world. Since those philosophers who support this distinction tend to dismiss contextual factors altogether, a more precise way of expressing this contrast is in order.

of different periods if we want to hold that they were more than just accidental by-products of a global recipe applied to extant theoretical and material resources. One of the more exciting turns in recent scholarship is motivated by an attempt to identify just what it is that each period contributes to its science. What has emerged is the thesis that scientific goods reflect the interests of the culture which produced them; i.e., that science's methods of production embody a host of contextual factors (gender, psychology, social position, and related factors) that are indelibly stamped on its products. Science is not opposed to tradition, as Voltaire supposed, but is merely another culture.

If we are prepared to concede that scientific products are artifacts, and not sets of statements that the rational agent would accept in any epoch, the issue is just how far we are to press their dependency on cultural practices. The relativism that haunts Voltaire's fictional writing can be interpreted *metaphysically* as a view about truth, as asserting that the very truth and falsity of the beliefs associated with science depend on the activities of its practitioners; that relativism, as Ernst Gellner asserts, entails that "there is no unique truth, no unique objective reality" (Hollis and Lukes 1982, p. 183).[4] Granted that proponents of relativism hold this view to be true, the vexing reflexivity problems occasioned by this construal is cause for alarm: "there is no room for the assertion of relativism itself," as Gellner remarks, "in a world in which relativism is true" (Hollis and Lukes 1982, p. 183).

There are two responses to this and related worries. The first is to hold fast to the traditional supposition of the transcendence of science's methods of production; in the last fifty years or so, philosophers have shown no end of ingenuity in formulating methodologies that strive both to furnish normative advice to practising scientists and to display the entire spectrum of historical methodological practices as the successful application of their tenets (e.g., Laudan 1977 and Brown 1989). Besides the fact that this spectrum is much too rich and varied to be reduced to a simple formula, this apriorist strategy inadvertently robs the history of science of its value. One would presume, after all, that one important reason for studying its history is that science is a process of enlightenment. An important element in this process surely is the novel and unexpected ways scientists have learned to reason about nature.

An alternative approach is to interpret relativism epistemologically as a thesis about the justification of scientific knowledge, as holding that what we traditionally call knowledge is dependent on our cultural orientation.[5] Inter-

4 Cf. Karl Popper 1966, p. 369ff, who asserts that relativism "is the theory that the choice between competing theories is arbitrary; since either there is no such thing as objective truth; or, if there is, no such thing as a theory which is true or at any rate (though perhaps not true) nearer to the truth than another theory. . . ."

5 See Paul Feyerabend 1987, p. 125, who remarks that "the validity of Maxwell's equations is independent of what people think about electrification. But it is not independent of the culture that contains them. It needed a very special mental attitude inserted into a very special social structure combined with sometimes quite idiosyncratic historical sequences to divine, formulate, check, and establish the laws scientists are using today." The epistemological relativism that I defend in this paper is consistent with this passage and, along with Feyerabend, I hold that cultural diversity is consistent with a viable notion of progress.

preted in this way, relativism is opposed to the global standing traditionally accorded to the products of science, since it suggests that they are not only a human achievement but a cultural achievement as well. The advantage of this epistemological construal is that it firmly demarcates relativism from mere subjectivism, the idea that statements are true or false simply on our say-so (see Hacking 1982, p. 49). If relativism is to present an interesting thesis about the evolution of scientific ideas, and if it is to pose more than an idle challenge to the traditional Enlightenment portrait of science, it should be cast in a purely epistemological light. The historian can hold quite plausibly that relativism makes no pretensions about the truth values assigned to scientific products, that while science's methods of production furnish a cluster of beliefs to be investigated by its practitioners, the activities of scientists do not determine the truth value of these beliefs.

Organic development furnishes a useful analogy, albeit one which should not be pressed too hard. A naive realist, who is sympathetic to the traditional notion of progress, would submit that organisms are shaped by hostile environments that weed out the many unfit variations produced by the random mutation and recombination of genes. It is the world, on such an account, that fosters evolutionary success, the activities of organisms playing no part in their survival. A metaphysical relativist would counter that organisms actually assemble their environments out of bits and pieces of nature and, therefore, that the selective pressures that mould their patterns of development are their own constructions. On this view, the world contributes nothing to organic development. The epistemological relativism which I am advancing combines features of these two accounts: it holds with the metaphysical relativist that the activities of organisms generate the possibility of evolutionary novelties and that the various candidates for evolutionary success are furnished by the activities of organisms, but along with the naive realist holds that the flourishing of some of these candidates is dictated by the way the world is. Extending this line of reasoning to science, we can hold that its products are constituted by the doings of scientists, but that their truth value (i.e., whether they flourish or not) depends on the way things are and not on the mere say-so of scientists.

The historian / relativist can hold that the products of different cultures are equivalent *so far as their methods of production are concerned* and, to this extent, that the goods of science do not enjoy the cognitive superiority traditionally accorded to them.[6] It is at best an expression of Enlightenment enthusiasm for science to suppose that it somehow manages to avoid this post-modernist predicament. In the next section. I argue that even if science's products are on an equal footing with other cultural products so far as their methods of production are concerned, it does not follow that all cultural

6 Barnes and Bloor (1982, p. 23) construe relativism as asserting that "all beliefs are on a par with respect to the causes of their credibility. It is not that all beliefs are equally true or equally false, but that regardless of truth and falsity the fact of their credibility is to be seen as equally problematic." Accordingly, they regard relativism primarily as a *normative thesis* about how sociologists ought to explain scientific belief, rather than as I argue in this paper.

products are equally right or wrong, good or bad, true or false, as some critics of relativism declare. Indeed, on my view, the recognition that science is a culture is compatible with the claim that the beliefs of our Western scientific tradition are unique among cultural products in so far as they are progressive. To motivate this thesis, I now turn to some considerations about the disciplinization of scientific knowledge.

STABILITY IN SCIENCE

In the wake of the revolutionary upheaval in the physical sciences in this century, philosophers have taken it as a datum that an account of progress in science must presume that our knowledge of nature is unstable. Only if we presume that all scientific statements *in principle* are capable of revision can we justify the judgment that change is conducive to progress, i.e., that conceptual change ensures successively cognitively superior views of the world (cf. Hacking 1988). Two models with associated variations have been invoked to rationalize conceptual change, the idea that knowledge grows gradually through the successive modification of existing theoretical and material resources (e.g., Popper 1963), and the idea popularized during the eighteenth century that science grows primarily through revolutionary upheaval. Although these approaches differ in significant ways, both models presuppose that the instability of scientific knowledge is a necessary ingredient in any account of cognitive progress.

To motivate the judgment that change in science is desirable (i.e., that it is progressive), it seems reasonable to presume that it must be regulated by some stable mechanism.[7] One of the strengths of the supposition that the methods of science do not change along with substantive theory is that it furnishes a stable framework for evaluating change and ascertaining whether it is progressive or not. In view of the relativist thesis that even the methods of science are cultural products, we can no longer countenance this idea. However, we still need a criterion to motivate the judgment that some proposed change represents an improvement. Failing this, there would be no argument against leaving things just as they are.

If it is not the substantive theories of science that are stable, then the question is what warrants the judgment that change in science is conducive to progress. By and large, scholars who are alive to the importance of contextual factors contend that certain features of the social organization of science are invariant throughout change, i.e., that whatever stability science has is to be explained in terms of the relationship between knowledge producers, and not in terms of the

7 This paper describes one factor in the stability of a system of hypotheses (namely, the relationship between its laws and the phenomena that they describe), but it does not rule out other considerations. Hacking (1988, p. 312), for example, argues that theories and laboratory equipment evolve in such a way that they match each other and are mutually self-vindicating. On Hacking's view, then, experiment and stability are closely related, so much so that laboratory stability can bring with it a certain sort of local disunity.

relationship between the products of scientific activity and the world. This brand of relativism is basically the metaphysical variety, although its proponents often feign an agnosticism about the place of truth in their account in order not to offend our realist sensibilities. The effect of this brand of relativism is that it is impossible to defend the judgment that science is progressive, unless such a judgment is interpreted as merely a *conventional* decision on the part of its practitioners.

To flesh out this allegation, one may say that the mechanism identified by metaphysical relativists as responsible for the stability of science is a *consensus* of scientific opinion. Since "consensus" is essentially a sociological expression, signifying a relation in which knowledge producers stand to one another, this approach has been exploited by social scientists who regard scientific belief as a cultural phenomenon and nothing more. On this view, we do not need to assume anything about science over and above consensus in order to explain the stability of its disciplines. One of the more vocal proponents of this approach, David Bloor, writes:

> such stability as there is in the system of knowledge comes *entirely* from the collective decisions of its creators and users. It derives from the active protection of parts of the network. That is to say: from the requirement that certain laws and classifications be kept intact, and all adjustments and alterations carried out elsewhere. . . .We need not assume that a protected law or classification is singled out because of any intrinsic properties like truth, self-evidence or plausibility. Of course, such properties will be imputed to them, but this will be a justification for the special treatment rather than the cause of it. (Bloor 1982a, p. 280)

Bloor offers little by way of evidence for the thesis that closure of a scientific debate is affected by consensus of opinion, save "the fact that with no change whatsoever in their evidential basis, systems of belief can be and have been destabilized. Conversely they can be and have been held stable in the face of rapidly changing and highly problematic inputs from experience." "The stability of a system of belief," Bloor concludes, "is the prerogative of its users." (1982b, p. 305f)

Bloor is right to assert that entire systems of belief can become unglued after a time; e.g., that the transition from classical mechanics to the special theory of relativity led to the disappearance of the classical theory of the kinematics and the dynamics of solid objects. And other belief systems, such as Darwinism, were vigorously defended for many years, despite the fact that its proponents were unable to specify a mechanism for the transmission of heritable factors. It is pretty clear, however, that we simply do not know enough about the disciplinization of scientific knowledge to state with any real warrant that consensus is the only factor in the closure of a scientific debate. Moreover, there is an alternative explanation for stability in science, one which does not rely on purely contextual factors and is compatible with what we do know about the

social context of scientific practice. Since it is difficult to see how we can justify the belief that change in science represents cognitive growth if the only consideration is a consensus of scientific opinion, this alternative is perhaps our only hope for salvaging the notion of progress from the excesses of metaphysical relativism.

As against Bloor, we can hold that stability is a function of truth but still defend a relativist thesis, so long, that is, as we take relativism to be about science's methods of production and not about the veracity of its products. We could then simply hold that in terms of a given set of methodological practices, these statements emerge as true or as false. On this view, then, our methods help us to produce scientific artifacts, but they do not determine how our artifacts will fare with respect to the world. A caveat is that since a method of production produces an entire range of inter-related artifacts, an assessment of how well a given scientific artifact fares with respect to the world will involve a systemic judgment about all of its associated products, whether they be experimental devices, statements found in scientific books, methods of generating and calculating data, etc. If we call the range of products normally associated with a given disciplinary structure a belief system, this is just an oblique way of asserting the well-established view that any evaluation of a scientific belief involves all of its associated beliefs and material resources.

What I want to claim is that *some* of the belief systems devised by scientists have a feature which sets them apart from the belief systems of other cultures. It is a feature which gives science the stability required to motivate the judgment that it is progressive. The feature which I have in mind was sketched by Werner Heisenberg as follows:

> the fact is that some theories seem to be susceptible of no improvement. . . ; they signify a *closed system* of knowledge. I believe that Newtonian mechanics cannot be improved at all; and thereby I mean the following: As far as any phenomenon can be described by the concepts of Newtonian mechanics, namely, position, velocity, acceleration, mass, force, etc., the Newtonian laws are also valid with absolute precision, and this will not change during the next hundred thousand years. More precisely I should perhaps say: With that degree of accuracy with which the phenomena can be described by the Newtonian concepts, the Newtonian laws are also valid. (1969, p. 135; cited by Scheibe 1988, p. 252)

On Heisenberg's view, the *stability* of the system of Newtonian hypotheses reflects a special relationship between Newtonian science and the world; i.e., in so far as phenomena can be described by the concepts of this system, its laws will be valid for these phenomena. The Newtonian system cannot be improved by modification of its guiding assumptions. Of course, experiment may disclose that new concepts are required to express some novel state of affairs. In this event, there will be some prospect for improvement, but only because *the*

old concepts are no longer applicable. Any improvement, therefore, will lead to conceptual change, i.e., to a new system of beliefs produced to explain the novel state of affairs.

Theoretical novelty can be interpreted in two ways: as a limitation of the applicability of the old belief system, or as a refutation of that system. The latter approach is embraced by scholars who have been conditioned by the revolutionary events in this century to suppose that the instability of belief is a prerequisite for justifying the judgment that science is progressive. The transition from classical mechanics to quantum physics, on this view, parallels a movement from closed systems rooted in relatively stable institutions, practices and beliefs, to open societies that subject every feature of the world to criticism. As against this approach, however, the fact remains that in some cases of conceptual change the predictions of the old belief system still hold for a limited range of phenomena. The Newtonian belief system is still valid within a limited domain, a fact which supports the first approach to theoretical novelty. Of course, we can no longer contend that the Newtonian system represents the world as a whole, but we can reasonably maintain that it captures bits and pieces of reality, that as a system it is true within a certain domain of applicability.

The advantage of this approach which is pertinent here, however, is that it yields a new way of looking at cognitive progress, one which does not violate the enthusiasm for science reflected in the writings of Voltaire and Condorcet but which is fully responsive to our post-modernist sentiments. The basis for this conception is Heisenberg's observation that science has produced a number of belief systems that are effectively closed since they allow for no improvement. Taking Heisenberg's observation a step further, I want to argue that science is unique among the various cultures in so far as some of its belief systems match bits and pieces of the world in a way that precludes further development. This position in itself does not warrant the claim that science's methods and products are conducive to progress. However, since every closure signifies the addition of a new body of knowledge, it can be reasonably held that progress consists in moving from one closed system to another, i.e., that while other belief systems no doubt change in various ways, science moves from system to system in a desirable manner. Not only does this pluralism grant the scientific community the advantage of adopting different belief systems as circumstances dictate, it also liberates this community of the need constantly to tear apart its extant belief systems as new information arises.

An advantage of this approach is that it restores some prestige to the idea that science is constantly adding to our storehouse of knowledge, an idea which has been maligned by scholars who claim that scientific knowledge is unstable. But I shall hold that it is whole disciplines that are added to this storehouse, not dislocated facts or beliefs about the world. On the other side of the coin, the suggestion that more than one belief system can be true is worrisome, but only if we subscribe to the thesis that science is converging on one grand theory, i.e.,

that the various scientific disciplines are (or should be) unified into one coherent structure of deductively interrelated parts.[8] Rather than presume that the aim of science is to describe the one unique reality, we can just as well conceive of our various scientific disciplines as addressing different features of the world; i.e., these theories can each be true but mutually inconsistent (see Hacking 1988).

CONCLUSION

An unmitigated cognitive relativism entails that scientific products are on an equal footing with other cultural products so far as their methods of production are concerned. Our Western tradition does enshrine science, but the explanation enjoined by relativism is that we are part of a culture that has been saturated with heroic tales about the great men and women of science, and not that its products are truer, more rational, or progressive than other cultural products.

Even if we are willing to concede that science does not overcome tradition, as Voltaire reckoned, and that in this respect it is on a par with the spiritualism of the North American Indian, Eastern mysticism, and Azande witchcraft, we can still defend the thesis that science is progressive. We can reconcile a robust relativism with a viable account of progress, one which does not violate the enthusiasm for science that is the chief legacy of the Enlightenment.

In so doing, we must relinquish the myth that science's methods of production are immune to evolutionary change. During the eighteenth century, it was fairly natural to presume that the methods responsible for the success of Newtonian science would be extended to other disciplines but, then again, no one envisioned the specialization and differentiation both in method and content that would come to characterize the present state of human knowledge. We can now claim with great confidence not only that the various scientific disciplines proceed in ways specifically tailored to the phenomena that collectively constitute their *raison d'être* but also, with the benefit of hindsight, that the discovery of new ways of interacting with nature is perhaps our primary token that the entire historical process is one of enlightenment.

Although science's methods are constantly open to revision as new data emerge, it exhibits a stability that justifies the judgment that the historic movement from one method of production to the next (say, from classical mechanics to quantum theory) represents cognitive growth. While it is true that science displays the telltale signs of a culture, and to this extent is steeped in tradition, it also has given us closed systems of knowledge, such as classical mechanics, that allow us to investigate nature *as though we are not restricted by our cultural horizons*. To my knowledge, no analogue is to be found in the folk belief of other cultures. No doubt, Taoist beliefs have changed in response to environmental stimuli and interaction with the West, but there is no correspond-

8 See Hacking (1988, pp. 290–91) who rejects the thesis that "there is a humanly expressible, uniquely richest statement of how the world is. Realism does not demand humanly accessible unity as an ideal, any more than theism demands monotheism."

ing movement from closed system to closed system to match the historical development of scientific knowledge. As evidence for this thesis, we can point to the disciplinization of scientific knowledge; if the need arises, we can interact with the world according to the equations and theorems of classical mechanics and be confident that, within the framework defined by this discipline, there are no phenomena that will not bend to analysis. It is true that beliefs of the founders of classical mechanics were social products, but they function *as though they are absolute within the limitations inscribed by this discipline*.

This approach to the notion of progress does not completely arrest Voltaire's worry about cultural diversity. Science is no better or worse than other cultures in terms of the limitations imposed on it by the vagaries of place and time, but it does give its practitioners the liberty of investigating nature in ways that effectively conceal the cultural roots of their methods of production. We can rightly hold that this liberation represents progress, while respecting what we know about the cultural limitations of even the very best scientific belief.

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