

Discussion

Multiculturalism and Postcolonialism: *What Difference Do They Make to Western Scientific Epistemology?*

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Science and technology studies have emerged from distinctive intellectual and political histories and interests in the last half of the Twentieth Century. Here I look at some central concerns in multicultural and postcolonial science and technology studies, and try to identify some of the issues that these raise for conventional postpositivist philosophies of Western modern sciences and technologies. In some respects the former provide additional evidence for postpositivist revisions of philosophy of science; in other respects they raise new issues. In both respects they can motivate critical re-evaluations of modernity, enlightenment and the Liberal political philosophy embedded in Western philosophies of science.

Today it is virtually impossible to miss recognizing the vast and increasing inequality between the world's "haves" and "have nots." Even the International Monetary Fund and the World Bank now acknowledge this fact. Western modern sciences and technologies (WMST) and their philosophies have been implicated in this tragic phenomenon in a number of ways – a point to which we shall return. Yet from its origins in the Renaissance and the Enlightenment to the present day, scientific and technological knowledge has been understood as a force for decreasing human misery and increasing human welfare. Today, many progressive social movements, such as

those of feminism, environmentalism, health movements, and Third World emancipation movements again appeal to scientific and technological knowledge as a resource for their social and political goals. In these cases, however, it is not only WMST in which they place their hopes.

Here I look at one set of concerns in what we could call post-modern science and technology movements: multicultural and postcolonial (MC/PC) science and technology studies (STS). I shall briefly describe multicultural and postcolonial science and technology studies and then turn to identify five of the issues these raise for conventional

philosophies of Western modern sciences and technologies. We will see that in some respects these MC/PC studies reinforce post-positivist revisions of philosophy of science that are familiar in the North and that in other respects they raise new issues.

Multicultural and Postcolonial Science and Technology Studies: Origins and Themes

These accounts have three main sources.¹ First I will look at comparative ethno-science studies. Early contributors to one focus of these studies can be found in Joseph Needham's accounts of Chinese science and technology, and in some of the studies of Arabic and Islamic S&T. (Needham, 1954ff; Lach, 1977; Sabra, 1976) These accounts and their successors, not only refuse the Eurocentric devaluation of other culture's knowledge systems that was characteristic of the era, but also point to the way European sciences, too, were shaped by religious and other cultural beliefs and projects. Sometimes cultural beliefs blocked the growth of knowledge. In other cases they advanced it. The new studies show how these knowledge systems have been resourceful at enabling effective interactions with nature and that some have developed knowledge that still is not available in WMST. (Goonatilake, 1984; 1992; Selin, 1997)

The exploration of cultural features of "good science" in the West took an important turn in the 1960s when ethnographers proposed using for the study of WMST the ethnographic methods developed to examine other cultures' knowledge systems. Thus WMST and other cultures' knowledge systems were to be

treated in a methodologically symmetrical way. Bruno Latour and Steve Woolgar's (1979) 'Laboratory Life' provided a well-known early example of such ethnography of the practices of a Western modern science, even though its perspective remained firmly located within the West. Sharon Traweek's (1988) comparative study of Japanese and European-American high-energy physics and Donna Haraway's (1989; 1991) studies of American, Japanese, African and Indian primatology do take up authorial positions outside the West. This methodological symmetry contrasts with the conventional Western practice of exempting the cognitive, technical core of WMST from social explanations.

Another origin of MC/PC STS can be found in anti-Eurocentric histories of WMST, of its encounters with other cultures' knowledge systems and of its services to European expansion. One such project has been to provide a more accurate account of the "European Scientific Revolution." The standard exceptionalist and triumphalist accounts depended on the invention of three phantasmic historical phenomena: the "dark ages," the "European miracle" and the "scientific revolution" itself. To summarize a complex account, the European scientific revolution was neither a revolution, nor European, nor scientific by today's standards. The emergence of modern science occurred during a long and gradual process extending over several centuries. It drew important resources from the Islamic culture that permeated Southern Europe until the Fifteenth Century as well as Christian beliefs. It was permeated to its cognitive, technical core by Egyptian hermeticist mystical elements, alchemy, astronomy, sun worship, and other ele-

ments and practices foreign to what we mean today by science. Referring to the era as the “dark ages” and to the Renaissance as the “European miracle” succeeds in obscuring these non-European and cultural elements. (Blaut, 1993)

Another project of these historians has been to examine the causal relations between the emergence and flourishing of WMST in Europe and of the European voyages of discovery. The standard histories most of us learned implied that there were no important causal relations between them; the topic was simply not raised. In contrast, these postcolonial accounts show how the success of each of these processes marking “modernity” required the success of the other. (Brockway, 1979; Crosby, 1987; Headrick, 1981; Kochhar, 1992-93; Kumar, 1991; McClellan, 1992; Nandy, 1991; Petitjean *et al.*, 1992; Sardar, 1988) The European voyagers needed better information about the winds and tides of the Atlantic and the astronomy of the Southern Hemisphere, better cartography and better marine engineering in order to get to the Americas and then return to Europe. They needed information about the climates, flora, fauna, terrains and threats to health and life that they would encounter if they were to survive and flourish in the new lands. They also needed much more information for their various economic enterprises to thrive.

In return, European sciences needed the funding and sponsorship of the European states and their merchant companies to gather and develop such knowledge. European sciences hitched rides with the explorers, and borrowed information, methods and new ways of thinking about nature and inquiry from the cultures they encountered in the

Americas and, eventually, Australia, Africa and Asia. Moreover, with the increasing power of the European empire, Europeans were able to command more and more of the lands and oceans of the world, and thus to critically synthesize knowledge gathered from different parts of the world as, for example, did Darwin. They could test their hypotheses against greater and greater expanses and diversity of nature’s heterogeneous order. The different sciences benefited to different degrees and in diverse ways from European expansion, but benefit they did. A similar process had begun earlier within Europe as feudal economic relations began to transform into early capitalist relations. Newton’s physics and subsequent work in chemistry as well as physics addressed intellectual problems that shifting social relations had made interesting. (Shapin & Shaffer, 1985)

Thus, it is not just the valuable “internal” features of the epistemology of WMST that have been responsible for its successes – science’s distinctive methods, its ontology of primary and secondary qualities, or the like. Rather, expansionist projects have provided both resources and direction to the West’s patterns of systematic knowledge and systematic ignorance, as Western patterns of knowledge and ignorance have in turn provided resources and direction for social relations.

A third origin of these studies is to be found in the criticisms of Western development policies for the Third World that began emerging alongside those policies fifty years ago. Development was from its beginnings conceptualized as the transfer of Northern sciences and technologies and their standards of rationality and objectivity to the South. Yet the

greatest effects of this process have been to create de-development and mal-development for the sixty or seventy percent of the world's citizens who are economically and politically most vulnerable. Development policies have primarily served to develop elites in the North and their allies in the South, and especially the global "investing classes." (Braidotti *et al.*, 1994; Sachs, 1992; Shiva, 1989) By now even the IMF and World Bank have confirmed this account.

Finally, feminist analyses have made important contributions to all three approaches to MC/PC STS. They have shown women's daily contributions to the development and accumulation of empirical knowledge of nature's order. Women occupy distinctive standpoints on nature. These are established through the assignment to them of distinctive interactions with nature's order required by their responsibilities for children, family and community health, household nutrition, firewood and other energy resources, as well as manufacturing and other wage-labor. (Harding, 1998: Ch. 6) Moreover, these accounts describe the profitable interaction between scientific sexism and racism as the sciences made their contributions to European expansion. What kinds of issues do these multicultural and postcolonial science and technology studies raise for Northern epistemologies and philosophies of science?

Issues for Epistemologies and Philosophies of Science

To begin, let us recollect that Western sciences, philosophies of science and epistemologies have themselves always been historically dynamic systems of

thought and practice. They have changed in response to such shifting social relations as those of the industrial revolution, the two World Wars and the Cold War. A culture's scientific and everyday beliefs are always deeply intertwined; they form a network of belief, as the philosopher W.V.O. Quine (1953) pointed out many decades ago. Thus we should not be surprised that our best scientific and epistemological beliefs cannot be kept immune from deep and vast changes in everyday belief brought on by shifts in global social relations since World War II. Here we can identify just a few of these challenges that have been noted or pre-figured already.

Expanding Horizon of Sciences

These accounts expand the horizons of what we should reasonably consider the sciences about which we philosophize. Of course it is also Eurocentric to insist that the European word for systematic knowledge about nature's order be the one used to describe every culture's knowledge system. Yet I think it is useful to do so at least in the context of this paper's issues, in order to counter the exceptionalism of conventional Western philosophies of science. Thus this is a strategic, rhetorical move, not an ontological one.

Three conceptual obstacles confront us here: Western exceptionalism and triumphalism, and the notion that science is a limited and surveyable domain. The exceptionalist and triumphalist halo through which we have learned to think about the history and achievements of WMST vs. the knowledge systems of other cultures clearly has been less than maximally objective. The comparative

ethnoscience movement challenged these theses by showing the practical value of other cultures' knowledge systems, some unsuspected limitations of WMST, how cultural values and interests permeate the cognitive, technical cores of the projects and claims of every knowledge system, and unsuspected material conditions (such as European expansion) that contributed to the rise of European sciences and decline of other cultures' knowledge systems. Moreover, many of the achievements WMST claim properly should be shared with the knowledge systems of the cultures from which WMST borrowed. Others can no longer be rightfully claimed. For example, public health historians have shown how improvement in nutrition, including the widespread introduction into Europe of the potatoes developed in the Andean cultures of South America (Weatherford, 1988) and sanitation, rather than in the sciences of disease and its control were in fact responsible for the great increases in longevity in Europe and the U.S. in the Eighteenth and Nineteenth Centuries. Furthermore, the history of the West's systematic destruction of other cultures knowledge systems, coupled with the often brutal material conditions of imperialism and colonialism that made possible the advance of European science, set the achievements of European sciences in quite a different moral and political light.

Another problem here is the false assumption that what we call "science" is a delimited and surveyable domain that can thus be analytically or descriptively defined. As my remarks above suggested, what counts as "real science" and "real nature" have constantly shifted in the history of Western thought. We

should expect such terms to continue to respond to recent shifts in global social relations. Can our philosophies of science represent this process?

More Objective Accounts of WMST

Correlatively, MC/PC STS provide more objective representations of Western sciences, their histories and philosophies. We in the elite classes in the North are "the natives" to the history and worldview of WMST. We have been taught the exceptionalist and triumphalist understandings of our own enterprise, which reinforce our own cultural self-images as intellectually, socially and politically progressive peoples. The accounts of WMST upon which we grew up and which still shape Western media representations of WMST stress the benefits of the history of WMST, which have accrued largely to us, its natives. Typically they neglect to identify the costs of this history, which have been borne largely by the others inside our national boundaries and in other parts of the world. MC/PC perspectives from the periphery of the Enlightenment provide just that more distanced view that WMST themselves always recommend, and that we know is so hard for the "natives" to achieve. MC/PC STS reveal new kinds of material conditions for the successes of MWST and for the apparent plausibility of its philosophies. How will our philosophies of science represent these more objective histories of WMST?

I must note here that it is important to be clear that this is not a call for "science-bashing," as perpetrators of the "Science Wars" in the U.S. and France have assumed in their attacks on feminist and poststructuralist analyses of the Enlight-

enment world view. (Gross & Levitt, 1994; Gross *et al.*, 1996; Sokal & Bricmont, 1998; See also Ross, 1996). Rather, it is a call for more realistic and less romantic analyses and evaluations of the knowledge system that is the authority for one powerful form of “folk knowledge” of educated classes in the West. It is also important to analyze carefully how evaluations of WMST that are progressive in one social context can end up supporting regressive political and intellectual tendencies in other contexts. For example, Indian scholars of science and technology point to the liberatory effects today of classical Enlightenment philosophies of WMST in their context of politically regressive local intellectual traditions.

Culture and Power Can Be Productive of Knowledge

These accounts enable us to see how culture and power are productive of the growth of knowledge, not just obstacles to it (as they certainly sometimes are).² One could say that culture is a toolbox, not just a prisonhouse, for knowledge. After all, different cultures occupy different locations in nature’s heterogeneous order. They must ask questions about it in order to survive. Different cultures will ask different questions even in the “same” environment. On the borders of the Atlantic, one culture will ask questions about how to fish, another about how to use it as a coastal trading road, another how to mine the oil and minerals under its floor, and yet another how to use it as a dump for toxic wastes. So different cultures will develop different patterns of systematic knowledge and systematic ignorance about their environments.

Will these patterns of knowledge fit together smoothly, filling in the empty spaces in nature’s great jigsaw puzzle (as the old unity of science theorists imagined)? No, they will not, because cultures bring distinctive metaphors, models and narratives of nature and inquiry to their knowledge-collection projects. Consider the conceptual shifts the environmental movements have brought to our conceptions of nature. Models of nature as a spaceship or a lifeboat have replaced ancient ones of nature as a bounteous cornucopia of resources with which “Mother Nature” or the Christian god have gifted humans. The environmental models direct scientific inquiries in valuable directions, as did the older ones. Such disjunctures between patterns of knowledge are as valuable when one model comes from another culture as they are within the history of Western thought.

Moreover, culturally distinctive work practices also generate distinctive patterns of knowledge. Different information about HIV and AIDS have been produced in the labs of National Institutes of Health, in physicians’ offices, and in gay health clinics, for example. Additionally, macro social structures of class, race, ethnicity and gender shape who gets to live in which parts of nature’s order, what questions they will ask, the models and narratives they will favor, and the forms of producing knowledge that they will choose or to which they will be restricted. In these ways, culture and politics can be productive forces in the generation of knowledge as well as, often, obstacles to it.

Finally, the MC/PC STS help us to understand power relations as a matter not only of external forces but also as discour-

sive codes that enable some groups and restrict others. It is codes of race, class and gender hierarchy that infuse the standards for good science, objectivity, and rationality in the West, and that disvalue the knowledge seeking practices of non-Western cultures.³ How shall our philosophies of science represent these ways that culture and power shape the best as well as the worst scientific practices?

De-centered Subjects of Science

Finally, the subject of sciences, their speakers, are de-centered for the MC/PC STS. Western philosophies of science have assumed a single, homogeneous, speaker of science's truths. He is the Enlightenment's rational man. In its strongest form, the Unity of Science movement that shaped Western philosophy of science from the late Nineteenth until the mid-Twentieth Centuries assumed that there was one world, one "truth" about it, and one science that could accurately reflect that coherent, universally valid account in its glassy-mirror mind. It also assumed that there was one and only one legitimate subject of that science – and it was us, the "rational men" of the modern West. The MC/PC STS reinforce post-Kuhnian tendencies to value disunity in collective human scientific endeavors. (Galison & Stump, 1996; Harding, 1998: Ch.10; Schuster & Yeo, 1986; Shapin, 1994; Watson-Verrn & Turnbull 1995) Just as biological diversity is crucial for human survival (not to mention for those other species who share this planet with us) so, too, is cognitive diversity a resource to be cultivated. We can now see that it would be a great tragedy were there to be one and only one coherent

human scientific system of knowledge. How shall philosophies of science represent such de-centered subjects of sciences?

Conclusion: Tempting "Differences" to Avoid

Finally, it is important to keep firmly in mind tempting positions that are not called for by MC/PC STS, and that there are strong reasons to avoid. Here I can only briefly gesture toward them. Some fans of these MC/PC STS accounts have given up the conventional romantic attitude toward WMST only to romanticize and exoticize the knowledge systems of other cultures. Yet other cultures' knowledge systems had their limitations in the past and have them in today's world no less than do the systems of the West. These fans of the Other all too frequently abandon the critical task that it is so important for the beneficiaries of WMST to take on. This is to reevaluate our local knowledge system (WMST), seeking a more balanced appraisal of its strengths and limitations than the exceptionalist and triumphalist accounts could provide.

Relatedly, it is easy to fall into the practice of homogenizing either other cultures' or our own, as the somewhat oppositional framework I have adopted here can seem to promote. Yet other cultures, no less than our own, are internally diverse; they, too, have only de-centered cultural subjects shaped by religious, class, gender, ethnic and other differences.

Finally, the arguments of MC/PC STS can seem to support an epistemological or cognitive relativism. How can we decide which of these knowledge systems

is best? If each is embedded in local social, political and cultural projects, aren't they incommensurable? Can we even understand each other across such cultural divisions? For almost half a century, post-Kuhnian STS have detailed the ways in which moments in the history of Western sciences have had an integrity with their historic eras, as Kuhn put the point. Philosophic responses at the time focused almost obsessively on just these kinds of fears of relativism. The persistence of these kinds of anxious questions reveals how intricately our philosophy of science beliefs are integrated with our everyday understandings of our places in the world. For Westerners, if we are not the absolute centers of the world, the absolute authorities on what counts as science, then there is nothing but a cacophony of dissonant knowledge claims with no authoritative way to settle disputes. "Après moi, le déluge!"

I wouldn't presume to hope to dispel such anxieties in a few sentences. Rather, I note that MC/PC STS are certainly not the first of the new science studies to raise such issues and they are yet to be well represented in our philosophies of science. But they can be, and that is another task that lies before us.

These are some of the possibilities that should not be seen as consequences of taking seriously the arguments of the MC/PC STS. Instead, these accounts can motivate critical reevaluations of modernity, enlightenment and the Liberal political philosophy of Western philosophy of science. They can help us in the West to begin to see how to join the rest of the world's citizens in creating theories of knowledge and philosophies of science for the world we find ourselves in today.

This is the world, as I indicated in opening, where increasing inequality is accompanied by renewed hopes for renegotiating the terms of global democracy including relations between science and society.

Notes

- 1 The material of this section is reviewed in greater detail in Harding (1998). See also Hess (1995).
- 2 This section draws on Harding (1998: ch.4).
- 3 See also Rouse's (1987) helpful discussion of power as productive.

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