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Essay

Gender, Democracy, and philosophy of science

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Abstract
Feminist epistemologies and philosophies of science have challenged conventional standards for objectivity, rationality, "good method" and "real science." This paper looks at the stronger standards for maximizing objectivity which feminists have demanded, and the challenges to conventional philosophies and histories of science arising from non-Western science and technology traditions. Sciences and philosophies of science which want to advance social progress and social justice cannot do so if the ignore these challenges from groups located at "the peripheries of the Enlightenment."

Keywords
Gender, democracy, philosophy of science, feminist epistemologies, non-Western science

Introduction

It is now three decades since critics began to look at the theories and practices of science and technology (S&T) through the distinctive perspectives produced by the women's movement in the U.S. and Europe. These critics asked to what extent do modern S&T fail to give equal attention to women's interests? How does a sexist social structure in science and society shape both modern sciences' patterns of knowledge and their patterns of ignorance? What can be done to increase the democratic effects of S&T projects? In the last decade especially, analyses that start off from the lives of women from racial and ethnic minorities in the North and women in the Third World have added distinctive perspectives to these debates.[1] Here I shall briefly review main themes in these literatures, and then, even more briefly, turn to their implications for theories of democracy and philosophies of science.

Gender issues

Five kinds of gender issues initially attracted the attention of critics.[2] Space permits only a brief mention of major themes in the first four approaches. One focused on the absence of gender equity in the social structure of the sciences, mathematics, and engineering. Historians have provided accounts of ways women and gender have influenced European and North American sciences, and social scientists have documented the continuing obstacles to equality confronting women. Today girls and women have largely gained access to

science, math, and engineering pre-professional and professional education, teaching and lab appointments, publication in research journals, and membership in S&T societies. Yet the higher that one looks in S&T worlds, the fewer women one finds. In the North as in the South, few women direct the most prestigious laboratories, chair university science, mathematics and engineering departments, or hold top positions in international S&T policy agencies or organizations. (HARDING et al., 1996; MIT, 1998; SCHIEBINGER, 1989; *SCIENCE* 1992, 1993, 1994)

The persistence of this discrimination against women raises other troubling questions. Would more women's issues be addressed by S&T projects if there were more women making S&T policy in the North and in the South? Moreover, does this gender discrimination damage the objectivity of the knowledge claims and the patterns of knowledge produced by S&T? Shouldn't we always worry when those who hold economic, social, and political power and those who determine what counts as truth are the same people?

A second concern has focused on cases of sexist and androcentric applications and technologies of S&T. Reproductive, household and workplace technologies, architecture, and urban landscapes have been designed with little concern for women's health, safety, or well-being. Feminist constructivist approaches to technology have developed illuminating analyses that were blocked by older conceptions of technologies as culturally neutral "hardware." These accounts show how artefacts have gender (COCKBURN, 1985; BERG et al., 1995; WAJCMAN, 1991). Critics have pointed to how so-called development practices have added sexist Northern assumptions of European and North American cultures, international agencies and transnational corporations to those of Southern societies to decrease the likelihood of women in the South receiving benefits of S&T research designed in either the North or the South. Especially egregious examples of such discrimination have been documented in work on health, agriculture, natural resources (energy, water, etc.), and environmental research (BAIDOTTI et al., 1994).

Third, sexist, racist, and imperialist and "orientalist" results of scientific research in biology and the social sciences have justified legal, economic, and social enforcement of women's second-class citizenship. While this kind of research began to flourish back in the Nineteenth Century, it is still doing well today in sociobiology, and mainstream social sciences (FAUSTO-STERLING, 1994). Especially powerful analyses have emerged from scholars and activitists working on issues of gender in Third World so-called development (BRAIDOTTI et al., 1994; SMITH, 1999; VISVANATHAN et al., 1997).

A fourth focus on science, math, and engineering curricula and pedagogy has succeeded in shifting attention from the reputed deficiencies of girls and women to the documented deficiencies of S&T curricula and pedagogy. Girls and women tend to have different learning styles, research styles, and interests in S&T than do their brothers. In the South, S&T literacy projects must also contend with women's higher illiteracy rates in some cultures and with the demand on girls and women for household services (HARDING et al., 1996; ROSSER, 1986).

Feminist epistemology and philosophies of science

Perhaps most potentially revolutionary have been criticisms of conventional philosophies of science. These philosophies articulate the "logic" of what they identify as the most desirable scientific practices based on their understandings of the history of science. Feminists asked how have the very standards for objectivity, rationality, good method, and good science disproportionately reflected the concerns of the institutions that use S&T as resources to make legal, health, educational, military, and economic policy? What would such standards look like if they were designed to respond also to women's interests, fears, and desires? What would S&T look like if women, South and North, were also their subjects rather than only their often mis-perceived objects? (BRAIDOTTI et al., 1994; HARDING, 1991; KELLER, 1984).

The most interesting feminist responses to such epistemological issues have carefully avoided unhelpful rejections of objectivity, rationality, good method, and science itself. Women need more objectivity, rationality, good method, and good science for projects that originate in the needs of their lives. They don't need the excessively narrow forms of these that have long been favored in philosophies of science.

To take one example, consider feminist concerns about standard ways of thinking about objectivity (HARDING, 1998). Maximizing objectivity has required maximizing value-neutrality. According to the conventional view, it is the scientific methods specified by research designs through which the social values and interests that researchers inevitably bring to their work can be identified and eliminated. This approach certainly has its virtues. Yet it is evident that it has only been able to achieve a weak form of objectivity since so many sexist and androcentric assumptions (not to mention assumptions shaped by class, religion, culture, national, racial and imperial interests and values) have managed, in what were claimed to be the most rigorous of scientific research projects, to shape the results of research in S&T, especially in biology and the social sciences. How adequate can the conventional standards of objectivity be if again and again they sanction accounts of women's biological and social inferiority?[3]

Critics identify three problems with this kind of standard for maximizing objectivity. First, important scientific processes occur before scientific methods begin and are not controlled by conventional notions of method. In this "context of discovery," problematic natural or social conditions are identified—for example, poverty. Just what is problematic about them is conceptualized: "too many mouths to feed". Concepts

and hypotheses to guide research are formulated: "overpopulation;" "population control;" "if women's reproduction is controlled, there will be fewer mouths to feed". Then research is designed to test hypotheses. In the case considered here, today even the United Nations recognizes (since the 1995 Cairo U.N. conference on population) that such purportedly objective research has failed to identify the sexist, racist, and class-based assumptions that have shaped many decades of research on population control issues. It is poverty that causes population growth in the first place, not the reverse. Poor families need children's labor and wages in order to survive, and children must provide the care for smaller children and, when they grow up, for the elderly that governments, incomes, and inherited wealth provide for middle and upper classes. Increasing women's education and thus their income potential turns out to be the single most effective way to decrease fertility.

Thus feminist approaches have demanded systematic critical scrutiny of the "context of discovery" as well as of the "context of justifiction." Starting off research from women's lives instead of from the conceptual frameworks of the dominant social institutions and the research disciplines that service them can generate questions about "the conceptual practices of power" that are not available from the perspective of powerful institutions and their research agendas (SMITH, 1990).

A second criticism of weak objectivity is that its way of identifying social values and interests is to repeat observations by different individuals or groups of them; the methods of obtaining scientific results must be replicable. While this requirement is effective at identifying values and interests that differ between individual observers or research teams, it will not identify those that they all share. Sexist and racist beliefs are not the inventions of individuals or research teams; they are widely-held institutional and societal assumptions that, prior to the emergence of feminisms and anti-racisms, have seemed perfectly natural to almost everyone.

In the case of these kinds of deep and widespread assumptions, it takes more than the exercise of standard notions of "good method" to identify distorting values and interests. In these cases, it has taken collective political criticism to bring into general visibility the social values and interests shaping sexist and racist assumptions. Again, starting off research from outside dominant conceptual frameworks brings fresh perspectives to bear on a culture's common assumptions. Of course no one can ever get completely outside their culture. Yet even just a small liberation from prevailing assumptions can provide a valuable critical perspective, as social scientists have emphasized in reporting the increased objectivity available to the stranger to a culture.

This brings us to a third problem with weak objectivity. It cannot distinguish between those kinds of values and interests that advance and those that retard the growth of knowledge. As long as maximizing value-neutrality has been assumed the only and always reasonable way to try to maximize objectivity, it has seemed counter-intuitive even to consider raising the question of whether and how some social values and interests might sometimes in fact advance objectivity. Jumping ahead for the moment to my final topic, we can note that here is an important challenge to be addressed by researchers who are interested in the social responsibility of S&T. A central part of the challenge is to conceptualize how what researchers observe is always both given by nature and constructed by culture—that is, to avoid both absolute naturalism and absolute relativism. To put the point another way, a kind of virtual reality is all that the sciences have ever charted for us or ever could chart.

As a start in responding to this challenge, we can think how anti-democratic values and interests block the growth of knowledge in the ways that they silence the most vigorous critical perspectives on anti-democratic and other dominant ways of thinking. Pro-democratic values and interests bring such perspectives into general visibility and so enlarge opportunities for maximizing the objectivity of research processes. Yet this perception is indeed just a beginning here, for we need to think further about what in particular we mean by democratic values and interests (do we mean those evident in the current tendencies toward global "democratization", where economic inequality is ignored and even sometimes intentionally advanced? See ROBINSON (1996) and about specifically how scientific and technological research processes advance or retard them.

Many feminisms, many S&T interests

The preceding account may seem to suggest that there is one and only one feminist position on epistemology and philosophy of science issues. Yet this could not be and is not the case. Distinctive "public agenda" feminisms have emerged during the last two centuries in Europe and the U.S.. These have been shaped by the political philosophies—Liberalism, Marxism, etc.— through which women and men have made feminist demands on governments. Mary Wollstonecraft and John Stuart Mill started off their thought from the women's lives with which they were most familiar. these were the lives of women in the educated classes whose interests have remained central in more than two centuries of Liberal Feminism. Of course today, when state-mandated education continually increases the population of the "educated classes," one could argue that Liberal Feminism both has vastly expanded its concerns and that its adherents come from a far broader economic and political spectrum than was the case in the Eighteenth Century. Liberal feminists have had different concerns about S&T than have other feminist groups such as the Marxist and Socialist Feminisms that arose in the Nineteenth Century.

Thus it is not surprising to discover that thinking about S&T from the standpoint of the lives of racial and ethnic minorities in the North and of women in

the South also produces distinctive concerns and themes. The account above suggests just a few ways in which the concerns of this majority of the world's women have appeared within the critical categories constructed to account for large groups of Northern women's S&T interests. Yet, starting thought from outside these Liberal and Marxist philosophic frameworks also raises entirely new issues for Northern S&T, feminist or not (HARDING, 1993, 1998; HESS, 1995).

After all, the attempts to add women's concerns to the dominant conceptual frameworks of biology, sociology, anthropology, economics, political philosophy and other fields have consistently revealed that the frameworks themselves were resistant to such additive projects. Women's lives could not be objectively grasped within frameworks that had elaborated complex systems of assumptions and categories for conceptualizing women's biology as inferior and their contributions to history and social relations as minimal or even negative. But then, neither, could men's lives be objectively grasped within such frameworks. If women, their natures and activities are not in fact inferior but merely different, then neither are men, their natures and activities superior or deserving of the distinctive mark of the ideally human. The conceptual frameworks themselves have been challenged by the attempts merely to "add women and stir." Similarly, attempts to add the lives of the majority of the worlds' women to categorical schemes designed to explain the lives of relatively privileged minorities in the modern North have also shown the limitations of those Eurocentric frameworks for objectively accounting for anyone's lives.

My point here is that we now have available multiple illuminating feminist theoretical perspectives from which to ask questions about the history and practices of S&T. And the multicultural and postcolonial feminisms have raised a number of new issues that pose challenges to Northern feminist as well as conventional philosophies of S&T. Here I identify just three such issues.

Multicultural and postcolonial feminist philosophic issues[4]

First, we need new histories and geographies of the past and present distribution of human S&T knowledge. No longer is it reasonable to assume that Western modern science is uniquely capable of telling the one true story about nature's order. New histories show the richness of the older Chinese, Islamic and other South Asian S&T traditions and innovative practices in contemporary indigenous S&T traditions around the globe today. They show the continual appropriation of these other knowledge traditions into Northern S&T. Within the expanded sense of S&T that such new accounts provide, women's contributions to the history and present store of human knowledge emerge into visibility. Moreover, these accounts reveal that at the moments marked as progressive in the standard triumphalist histories of science, women, along with other subordinate groups, frequently have lost social status and resources.

In the second place, the multicultural and postcolonial science studies show how the standards for objectivity, rationality, good method, and even good science itself have been defined not only in terms of their distance from qualities and practices associated with the feminine, but also in terms of their distance from the primitive. The philosophic standards that guide modern Western S&T are also standards for certain forms of distinctively European (and North American) masculinity. They mark not inclusively human ideals, but only historically specific forms of masculinity. In both ways these standards undercut the ability of Western modern S&T both to detect valuable conceptual frameworks and practices that other cultures have developed and to achieve an objective assessment of the real strengths and limitations of Western modern S&T.

Women's and non-Western S&T traditions have been shunned by conventional philosophies of science on the grounds (among others) that the former are embedded in culturally local values and interests and therefore not trans-culturally disinterested and objective. Yet these S&T traditions have provided systematic knowledge about natural and social worlds that have enabled their cultures to survive and thrive. On the other hand, the disinterestedness of Western S&T has enabled its usefulness to the most powerful players in the inequality-increasing global political economy of today, not to mention to a long history of other militaristic, profiteering, and anti-democratic projects. Until we are ready to understand how ethics and politics shape good science and not just "bad science," we will not be effective at limiting the ways that S&T continue to serve the interests of political and economic power.

Finally, as the first two issues indicate, these feminist, multicultural and postcolonial S&T studies show how all knowledge systems, including Northern modern S&T, are historically distinctive, or "local", in important ways. These studies undercut standard triumphalist narratives of Western modern S&T's contributions to human progress. Insofar as different cultures, or women and men within a culture, are assigned different interactions with natural and social environments, have different interests, draw on different discursive resources, and organize differently the production of knowledge, they will tend to develop distinctive bodies of systematic knowledge and systematic ignorance. For example, those who are assigned infant care and those assigned care of motorcycles (to stick to stereotypes) will develop distinctive patterns of knowledge and of ignorance of nature and social relations. Thus women and men in every walk of life, and different cultures, everywhere in the world, insofar as they engage in distinctive kinds of activities, will develop and maintain distinctive patterns of knowledge (and of ignorance). Moreover, all of these are "modern sciences" insofar as they are continually

put to the test of enabling their users to interact effectively with changing environments and newly arriving information and ways of thinking from other peoples and cultures.

These issues challenge the remnants of the old unity of science thesis, which held that there is one world, one "truth" (true account) about it, and one and only one (historically distinctive, though trans-cultural) science capable in principle of providing that true account. Few who reflect on the immense diversity of ontologies, epistemologies, and methods that characterize the so-called modern sciences today, let alone on the multitude of other S&T traditions that have contributed to the storehouse of human knowledge, would admit to that unity of science thesis in its most restrictive forms (GALISON et al., 1996). Yet most of us retain unity assumptions that make it difficult to appreciate the scientific, philosophic, and pro-democratic opportunities feminist, multicultural and postcolonial S&T studies have made available. What could a theory of human knowledge look like that would build on the insights of these distinctive contemporary movements?

Notes

1. Many central terms in these discussions, such as Third World, postcolonialism, development, feminism, and even science itself are contested. They must remain so as the horizons of our understandings of how S&T function in local and global social relations continue to expand.

2. I have reviewed these issues in a number of places. See, e.g., HARDING (1991).

3. There is by now a large literature documenting these claims for biology and the social sciences. For biology, FAUSTO-STERLING (1994) is a good place to start.

4. Multicultural and postcolonial S&T studies and their diverse feminist components have emerged into international visibility since the mid-1980's. Sources of and central themes in this literature may be found in BRAIDOTTI et al., 1994; HARDING, 1998; and HESS, 1995.

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