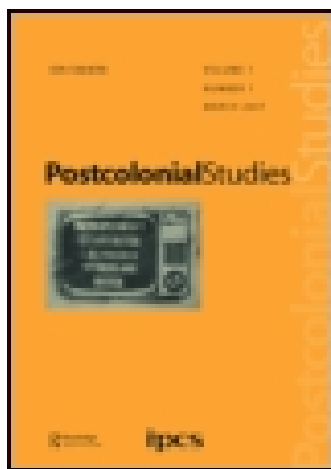


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# Postcolonial and feminist philosophies of science and technology: convergences and dissonances

SANDRA HARDING

Feminist and postcolonial science and technology studies (STS) both emerged in the third quarter of the last century, though each had important forerunners. The agendas of these two intellectual currents and their related social movements are similar in important respects and thus would seem to be complementary. Both argue that the perspectives and interests of their particular constituencies are not well served by modern Western science and technology philosophies, policies, or practices. The global social progress promised by modern Western philosophies of science has resulted in economic, political, social, and cultural regress for them. Both offer alternatives that they claim are better grounded in realistic understandings of knowledge production processes, more comprehensive, and better able to serve the peoples on behalf of whom each speaks. Thus each is politically as well as intellectually engaged.

Yet this kind of complementarity is too weak. Additional reasons for each to be interested in the projects of the other can come from recognition that their constituencies are overlapping and their discourses are interlocked. At least half of the ex-colonized and those still under the control of neo-colonialism and neo-imperialism are women and their dependants. And a majority of the world's women and their dependants are among ex-colonized peoples and those still controlled by neo-colonialism and neo-imperialism. Furthermore, the dominant discourses that these social movements criticize (as well as the ones that they use) are deeply imbricated or locked into each other: colonialism, imperialism, and male supremacy have persistently represented gender in racial or colonial terms and racial and colonial relations in gender terms. Gender and racial/colonial categories still co-constitute each other today. Because of their overlapping constituencies and interlocking discourses, it would seem that each of these science and technology movements will have to depend upon the successes of the other if it is to achieve its own professed goals. In this sense they are *strongly complementary*.

Some scholars in each field have made significant explorations into at least some part of the concerns of the other. Certainly such explorations have increased in recent years. Yet the results of these forays still feel scattered and undertheorized. They appear more as 'add ons' to the prevailing conceptual framework of each rather than as the transformations of these frameworks

necessary to fully engage with the full range of issues and the innovative insights of both postcolonial and feminist science and technology studies. To be sure, even such ‘add-ons’ are often difficult to do and produce illuminating results. To be able to see that one European woman, Maria Sibylla Merian, was among the great scientist-voyagers to the Americas (so far, the only one so identified) enlarges our understandings of women’s opportunities and risks in sciences of the era while providing additional evidence of the importance to European sciences of research done in the colonies.<sup>1</sup> But it does not fundamentally challenge the assumption that women played marginal roles in the development of European sciences of the era, in particular through the colonial and imperial ‘voyages of discovery.’ It does not challenge the opinion that the ones who did were entirely of European origin, and that European sciences owe no significant debts to knowledge of the natural world accumulated by indigenous peoples. Most scholars reporting on Merian’s entomology have not focused on how deeply her work depended on the accumulated knowledge of indigenous peoples, and especially indigenous women.<sup>2</sup>

Of course, each of these social movements, with its distinctive intellectual currents, is internally heterogeneous. The terms ‘feminist’ and ‘postcolonial’ are themselves highly contested *within* groups committed respectively to ending male-supremacy and Western-supremacy. Political, disciplinary, institutional, and regional cultural histories and commitments create strikingly different analyses and agendas for different groups within each social movement. Thus it can seem a futile project to try to get into productive coalitions such diverse and internally conflicted social movements and to integrate their conceptual frameworks in ways satisfactory to all. Nevertheless, I think it valuable to focus on several commonalities and dissonances in the ways these groups have conceptualized their projects. This can be a useful step toward creating intellectual and political spaces for the coalitions necessary for progressive social transformations.

Here I suggest that these two social and intellectual movements seem committed to conflicting understandings of the relevant social relations, the relevant sciences, and questions about who can and should be agents of the kinds of radical historical change for which each calls. (There are important exceptions to this charge, as we will see.) Under such circumstances, neither social movement can deliver the benefits it envisions to the majority of those to whom it has professed accountability. The intellectual and political projects of each must more deeply engage the insights and innovations of the other if each is to leave behind its still prevalent and self-damaging discriminatory assumptions and practices, intended or not. Section 2 delineates the conflicting conceptions of relevant social relations, sciences, and agents of progressive social transformation. Section 3 examines two literatures where such challenges have been met. Sections 4 and 5 identify unfamiliar logics of research and a couple of unresolved issues for these STS projects which nevertheless need not block coalitions between them. Philosophical issues are at stake here insofar as the three conflicting understandings and the two “logics of research” imply metaphysical, epistemological, and philosophy of science differences.

But first, what are feminist STS and postcolonial STS? I will presume readers are familiar with general outlines, at least, of the larger Western feminist social movements of the late twentieth century and the intellectual currents in which their STS are rooted. And that readers are familiar with one or another (at least) of the many different histories and geographies of postcolonialisms, their political struggles and intellectual currents. I leave until section 5 a brief discussion of this issue of the divergences in genealogies of postcolonialism since, in my view, while this diversity affects how various streams of postcolonial STS have developed, it does not seem to shape the issues that are the focus here, namely the disconnects between postcolonial and feminist conceptual frameworks.

Here I briefly identify for readers unfamiliar with one or the other of these two kinds of STS projects some of their central themes.

### **What are feminist and postcolonial STS?**

From their beginnings one can find in both the gender-focused and the postcolonial STS the understanding that scientific and technological projects are co-constituted with their social orders, as Northern science and technology studies came to put the point sometime later.<sup>3</sup> That is, no sciences and technologies are or could be autonomous and value-free, as the rhetoric of 1950s modernization theory and its science policy held.<sup>4</sup> Interests in particular kinds of scientific and technological projects are created as part of social transformations, while such social transformations are shaped and directed in part by the kinds of scientific and technological projects that can be put in service to their goals, explicit or implicit. To put this point another way, feminism and postcolonialism both argue in effect that how we live together both enables and limits what we can know, and vice versa. Thus when new kinds of persons 'step on the stage of history' to rearticulate how they see themselves and the world, new kinds of sciences, philosophies of science, and epistemologies are both generated and also relied on by their listeners. Of course this insight about the relation between what we do and what we can know is not far from an important conventional feature of scientific method: how one interacts with the world around us both enables and limits what one can know about it.<sup>5</sup>

It should be noted that both of these intellectual and social movements positioned themselves against the policies and practices of modern Western sciences as well as the dominant Western epistemologies and philosophies of science and technology that justified them. So neither began in any articulated relation to the other. Their strong complementarity could not be recognized within the androcentric world of early postcolonial STS and the Eurocentric world of early feminist STS. Furthermore, neither movement is contained by geographical location, citizenship, or the ethnic or gender identities of its participants: Western scholars have made important contributions to postcolonial STS, and men have made important contributions to feminist work in this field.

*Gender and science themes*

From its beginnings, gender and science projects in the West pursued five main research trajectories. These were often initiated by groups with different kinds of disciplinary, political, or institutional interests in scientific and technological research. (1) Where are (and have been) women in the social structures of modern Western sciences, and why have there been so few of them in the arenas of the design and management of scientific and technological research? (2) How and why have 'sexist sciences' taken on projects of providing empirical support for the claimed inferiority of women? (3) How have technologies and the applications of the results of scientific research been used against women's equality? Women's health, reproductive, and environmental concerns were among the earliest such focuses. (4) How do scientific and technological education—pedagogy and curricula—restrict women's development as scientists and engineers? (5) What is problematic about the epistemologies, methodologies, and philosophies of science that produce and support such sexist and androcentric practices?<sup>6</sup>

These issues all remain important almost four decades later—unfortunately. In some areas significant progress has been made—for example, in increasing access for women to scientific educations, publications, organizations, lab and classroom jobs, and at least token presences in policy contexts. Moreover, significant changes in health and reproductive policies have occurred for women in already advantaged groups. Yet the changes have been mostly for the worse for women in Africa, South Asia, and other places around the globe. Today it is widely recognized that Western and especially US economic and political policies have greatly contributed to the increased threats to environments, health, and life itself experienced by the vast majority of the world's citizens who are women, and their dependants (as well as adult men), around the globe. An important achievement of feminisms has been their development of epistemological and methodological approaches that deeply transform 'the logic of scientific inquiry' and its familiar regulative ideals. These approaches have been widely adopted in the social sciences and some fields of biology and medical research.<sup>7</sup> Nevertheless, such feminist work has been largely marginalized in the mainstream science studies movements in the North.<sup>8</sup> If they are not 'studying women,' these researchers seem to think that gender issues are irrelevant to both the worlds they examine and the assumptions guiding their own work.

These five areas of feminist work in the North were slower to gather steam among researchers and activists from other parts of the world. When they did address such issues, it was in contexts of scientific and technological practice that were often ignored in Western gender and science projects. For example, achieving science literacy for girls in many 'Third World' countries requires enlarged agendas when school fees restrict poor families' educational investments to sons, or when girls are needed to help out full-time in domestic work (for example, caring for smaller children, fetching water, tending livestock). Moreover the effects of the applications and technologies of Western sciences are different in the political economies of the developing world than in Europe and the US. Finally, in the upper classes in some

aristocratic societies, women will tend to get the same education as their brothers. Class, not gender, is the more salient enabler of education. This greater educational equity can also be the case in societies that enforce extreme gender segregation. In such cases girls will need to be trained as doctors, lawyers, and teachers for women and girls since interactions between the genders are severely restricted.<sup>9</sup>

*Colonialism, imperialism, science and technology*

In spite of its diversity, much of this work has focused on one or another of four themes.<sup>10</sup> One project has developed counter-histories of the achievements of modern Western sciences and technologies. For example, it asked if there were causal relations between the development of modern sciences in Europe and the 'voyages of discovery.' Here researchers have shown how the success of each in fact depended upon the success of the other. The voyagers needed an astronomy of the Southern hemisphere and better oceanography, climatology, and cartography to make their way to and from the Americas and Asia. They needed better knowledge of the flora, fauna, geography, geology and indigenes of the lands they encountered, as well as of the nature of and remedies for unfamiliar diseases. They needed what would come to be known as economic botany—the 'big science' of the seventeenth and eighteenth centuries—to make their voyages profitable. And the sciences, in turn, needed the economic and political support supplied by their assistance in the projects of the voyages. They also needed access to the world that became possible as European navies commanded the seas, enabling novel observations and comparisons of nature's order in different locations, as well as appropriation of indigenous knowledge for the advancement of modern Western sciences.<sup>11</sup> Indeed it has been suggested that increased focus on these kinds of European scientific projects would change what has traditionally been conceptualized as 'the Scientific Revolution'.<sup>12</sup>

A second topic has been a critical reevaluation of the legacies of traditional knowledge, many of which were eradicated and/or appropriated by the Western societies. Others have survived and continue to provide valuable resources to both societies too poor to access modern Western knowledge systems, and also societies that prefer to maintain elements of their traditional knowledge systems alongside, or integrated with, Western knowledge systems.<sup>13</sup> A third focus has been on the residues and resurrections of colonial and imperial science and technology relations since independence. This has occurred primarily through the carrots and sticks provided by First World financial and development policies and practices, but it is also due to the immense difficulty of escaping the ingrained habits, practices, and residual material conditions of those colonial and imperial relations, even when the perpetrators try to do so. One important focus here has been in critical modernity studies (see below). Finally, the postcolonial STS have persistently explored possible ways to move forward in their own science and technology projects yet within the difficult conditions set by global political and economic policies and circumstances, a point to which I return.

### Sites of dissonance

Three questions reveal conflicting understandings of the worlds in which these two STS projects are engaged.

#### *What are the relevant social relations?*

As historians pointed out some four decades ago, recognizing women to be fully human—as fully human as their brothers—undermines traditional historical methodological assumptions in three ways. First, chronologies grounded only in men's lives ignore the most significant changes in women's lives, and they ignore the effects that the conditions of women's lives have had on men's lives. Indeed, women's conditions have tended to regress at precisely the moments marked in conventional histories as highpoints of 'human progress.' Even worse, it was precisely because of the features identified as progressive that women's lives regressed. For example, women lost rights and opportunities in the Renaissance that they had earlier possessed; and in state formation in 1776 and evidently at every other time women have lost legal and political rights they possessed in earlier periods, including in the democratic revolutions of eighteenth-century Europe and recent independence movements of newly postcolonial states.<sup>14</sup> Second, sex/gender is one of the most significant determinants of a person's rights and responsibilities within any and every culture, though in different ways in different cultures. And, third, conventional theories of social change have failed to account for the transformations they intend to chart insofar as they ignore women's role and fate in such processes.<sup>15</sup>

Postcolonial STS tend to rely on traditional historical methodology in this respect with just such inadequate consequences for their accounts. With important exceptions, the relevant social relations for postcolonial STS are those of presumed gender-free imperialism, colonialism, nation-building, and the local apparently gender-free resistances to such processes under colonial and imperial rule, or under the neo-colonialism and neo-imperialism that have characterized global social relations since the independence of these new states. When gender issues do appear, it is as the need for attention to 'women's concerns,' but virtually never are the kinds of epistemological, methodological or philosophy of science issues identified above engaged. As long as only men are in view, these accounts assume that consideration of gender relations is irrelevant to understanding what is happening. Consequently, postcolonial theory cannot understand colonial, imperial, postcolonial, or today's neo-colonial and neo-imperial processes as long as its practitioners obscure the presence of women and the gendered characteristics of knowledge practices that align primarily with men's interests and desires.

Yet Western feminist STS only rarely see the social relations of colonialism and imperialism as having anything to do with women's experiences of Western scientific and technological work. These scholars seem to think that as long as they are focused only on Western women, social relations of colonialism and imperialism are irrelevant to the sciences and technologies

they observe. With important exceptions, they rarely attend to non-Western women's experiences of Western sciences and technologies, or such women's activities in their own knowledge production legacies. Such assumptions leave Western feminisms ignorant of both the history and practices of sciences and technologies around the globe, and of women's participation in and experiences of such histories and practices. To put the point another way, Western feminisms do not treat non-Westerners as fully human insofar as they ignore colonial and imperial social relations. Of course, neither do mainstream histories and philosophies of science.

*What are the relevant sciences?*

For Western feminists, the relevant sciences have been almost entirely modern Western ones. (See exceptions below.) Courageous and brilliant work has been accomplished here in addressing the gender dimensions even of the sciences thought least susceptible to social fingerprints, such as physics and chemistry.<sup>16</sup> Yet, with significant exceptions, the history of modern Western sciences and their practices today is only rarely set in the context of colonialism and imperialism or their contemporary residues and resurrections. And indigenous knowledge traditions, whether in the West or elsewhere, seem for the most part to be beyond the horizons of this work. Western feminist work largely is unaware of the counter-histories, the successes of indigenous knowledge, the arguments for a world of sciences, or the residues and resurrections of colonial and imperial science relations today. Consequently, the critical view of modern Western sciences and technologies that is specifically from the standpoint of non-Western societies is also missing.

For the postcolonial scholars, indigenous traditions, critical perspectives on modern Western sciences, and the design of science and technology policies and practices that integrate the best of both worlds are central projects. They have produced diverse accounts of possible future relations between indigenous and modern Western scientific knowledge systems.<sup>17</sup> Yet there has been almost no focus on women's domains of producing scientific and technological knowledge, or on the distortions in Western and non-Western projects originating in the absences of women from their design and management.

*Who can and should be the subjects of progressive historical transformation?*

Neither movement seems to think it necessary to center members of the other group in the design and management of its projects. Only a few women, such as Donna Haraway<sup>18</sup> and Vandana Shiva<sup>19</sup>, appear in the citations of contemporary postcolonial science studies scholars. On the other hand, postcolonial literature is virtually completely absent from Western feminist work. Each seems to consign the other's work to the horizons of its own spheres of interest. The other's voices are hardly ever heard except as 'special interests.' The others are never represented as at the forefront in conceptualizing goals and strategies that will benefit all, including but not limited to those purportedly 'special interest' groups themselves. Yet neither can deliver



social progress to its professed constituencies without attention to the full range of issues addressed by postcolonial and feminist science and technology studies. The two powerful conceptual frameworks must be conjoined.

### Conjoining conceptual frameworks

Two clusters of studies, at least, have conjoined feminist and postcolonial STS frameworks in different ways.<sup>20</sup> These studies escape the challenges of discriminatory conceptions of the relevant social relations, sciences, and desirable agents of historical change. One cluster charts effects of gender relations on the scientific and technological projects of colonialism and imperialism before the formal end of European colonial rule, and the other studies the effects of gender relations within the Third World 'development' policies and practices that began after World War II. Both kinds of work have raised new questions that go beyond the separate agendas of feminist and postcolonial STS.

#### *Effects of colonial and imperial gender relations on scientific and technological inquiry*

The absence of women in positions of funding, sponsoring, designing, and managing scientific and technological projects within Western colonial and imperial contexts has influenced the direction and content of scientific inquiry both 'at home' in Europe and North America and abroad. Since societies and their sciences co-constitute each other, it should not come as a surprise to discover that the gender relations of the societies sponsoring and conducting scientific and technological research in colonial and imperial contexts would shape the nature of the knowledge such inquiries produced. The absence of women in these kinds of directorial positions affected the selection of scientific problems, hypotheses to be tested, what constituted relevant data to be collected, how it was collected and interpreted, the dissemination and consequences of the results of research, and who was credited with the scientific and technological work. Three kinds of projects have been initiated.

First, indigenous women may have been the majority of 'native informants' about indigenous pharmacologies and economic uses of local botanies. As Harris points out, 'For most societies relying upon a mixture of hunting, gathering, and small-scale agriculture, women tended to be the chief custodians of botanical knowledge. In fact, we know that Joseph-Francois Lafitau's "discovery" of Canadian ginseng in 1716 was merely a matter of asking a Mohawk medicine woman to find the plant for him'.<sup>21</sup> Maria Sybylla Merian, whose meticulous depictions of caterpillars and other insects of Suriname (as well as of Europe) were cited appreciatively by Linneaus, said that she learned much about these insects and the plants on which they fed from the indigenous women who were her servants in Suriname, one of whom she brought back to Europe to assist her in accurately representing the

insects, plants, and their uses. Londa Schiebinger maps this procedure more generally in the Caribbean.<sup>22</sup>

Second, nature itself was perceived, categorized, and represented through gender stereotypes characteristic of particular eras. For example, notions of courtship and gendered sexual behaviors were attributed to flowering plants and to animals in the nineteenth century.<sup>23</sup> Third, racial distinctions were often gendered: ‘... certain physical and climatic features were associated with manly and martial races, others—particularly the tropics—with femininity. Such ideas served to legitimate and explain the imperial order’.<sup>24</sup>

Finally, once one recognizes that all male groups also have gender relations (that is, that it is not just when women appear that gender issues are relevant), a range of existing and possible masculinity studies come into focus. One question here is: how was the search for knowledge itself gendered as manly, and how did that gendering function to legitimate scientific work as it also delegitimated women’s participation in it? Canizares-Esguerra<sup>25</sup> points to the chivalric gendered values of imperial sciences in Spain, but also England and France, visible in the many depictions of the scientist/explorer as a knight (pp 67–69). Mary Terrall<sup>26</sup> has analyzed the seventeenth- and eighteenth-century similar British production of ‘Heroic Narratives of Quest and Discovery’; and Rhodes describes the rhetoric of masculinity within the missionary work of the Jesuits—their reports of trials of strength and endurance that made their work a masculine science.<sup>27</sup> Sharon Traweek has described the persistence of this hyper-masculinization of scientific work in late twentieth-century high-energy physics laboratories.<sup>28</sup> Donna Haraway has looked at the exercises in manly colonial game-hunting which provided animals for scientific study and museum display And she has looked at how meanings of manly competition and control of women and ‘lesser males’ shaped the primate experiments designed by the founder of modern primatology.<sup>29</sup> She also describes the very different kinds of national interests in primates, and different methodologies, characteristic of primatology enterprises in India and Japan.

Harris points to another question here.<sup>30</sup> Within the structure of all-male colonial and imperial projects, how was a gendered division of labor created—that is, between different groups of men—and what were its effects on the production of scientific knowledge and the careers of these men? The powerful public spaces of Jesuit activity ‘were occupied almost exclusively by university-educated, ordained, professed fathers,’ who accounted for ‘more than 95% of the entire Jesuit scientific corpus’ (p 78, n31). ‘The duties and spaces of lay brothers, by contrast, were almost exclusively domestic. They were accepted into the Society to tend to the “temporalities” of cooking, cleaning, caring for the sick, and generally minding the day-to-day business of Jesuit houses’ (p 78). One of the Jesuits’ most successful enterprises was the production of ‘catalogs of medicinal recipes and handbooks for the healing arts’ (p 78), and the consequent business that the ordained priests did in medical consultations with powerful figures in China, among other places. While it was the lay brothers, employed as apothecaries, who produced these catalogs and handbooks, they published little of interest in the scientific

circles of the day. They did 'what could be defined as the "women's work" of the Society' (p 78). Indigenes were among the lay brothers.

These studies situate their accounts at the point where gender and colonial/imperial relations are co-constituting each other. The sciences of interest are modern Western ones and the array of (other) regional ones, and the influences and exchanges between them. And the agents of scientific and technical change are not restricted to European men.

Meanwhile, studies of the masculinization of modernization theory, policy, and practices, and their articulation in post-World War II Third World development, reveal the co-constitution of masculine and both neo-liberal and some forms of left 'progressive' identities.

### *The masculinization of modernization and development*

Because men's criteria for social progress have so systematically ignored the contributions to such processes by women as well as the effects of such processes on them, it should come as no surprise that Western policies and practices of modernization and development have had socially regressive effects on women. Two literatures here are especially relevant to STS: gender and modernization theory and the women and development debates.

Modernization theory was articulated first by the founders of social science in the late nineteenth century and then updated in the 1950s to justify the Third World development projects of Northern states and the various international agencies they designed and directed. Four themes consistently linked social progress to the dissemination of the North's scientific rationality and technical expertise, to the constitution of new kinds of masculinities, and to the necessity of a public/private division of social domains. First, men must leave behind them loyalties to women, families, kin, households, and the nature that sustains them, as they leave for the metropolitan sites of modernity and urbanization. Their primary responsibilities cannot be to their birth-worlds, but must shift to the newly forming modern worlds. Second, economic and political activities, located in households and kin relations in pre-modernity, must be extracted from households to a 'public sphere,' leaving the 'private sphere' of the household severely politically and economically weakened. Third, scientific rationality and technological expertise function as one-way 'time machines' that transport men and all of the institutions of society except the family into the modern, public sphere. Finally, this kind of social transformation is presented in naturalizing, evolutionary terms; this is how the human species evolves from its childhood in tradition to its maturity in modern civilizations, according to modernization theory.<sup>31</sup>

The consequences of modernization theory often are not good for women anywhere or for non-Western men in traditional societies. Such peoples are positioned in the childhood of the species. Their activities and loyalties are located on the horizons of modernity, where they are barely intelligible to modern thought. The welfare of women and households is abandoned by public institutions as a condition of modernization. Women and households are identified as drags on economic growth and political progress, and as

'externals' to economies and their political systems, their welfare undeserving of serious consideration, sometimes deserving gracious handouts, but never positioned as active agents of social progress. Furthermore, male-supremacy and European/white-supremacy are used to metaphorize each other. Women are 'outside civilization,' non-European men are not really manly. Thus the oppression of each lives on as a natural fact inside representations of the oppression of other. Finally, this literature enables us to see that what has been called the epistemological crisis of the West is actually also the epistemological crisis of masculinity.<sup>32</sup>

To turn to a second literature, the mostly sad story of First World so-called development policies for the Third World provides a good illustration of what feminists object to in modernization theory and policy. Development was conceptualized from its origins as bringing social progress through the transfer to the Third World of First World scientific rationality and technical expertise. How have development projects affected women? Answers to this question were articulated first within the lively feminist theoretical debates of the 1970s and 1980s. The 'Women in Development' projects began with Ester Boserup's path-breaking account of *Women's Role in Economic Development*.<sup>33</sup> Boserup documented the bad consequences of development on women's lives. Her work stimulated liberal feminists' efforts to integrate women into development projects as workers. These feminist projects adhered to the tenets of modernization theory. But by the early 1980s, marxist feminists were arguing that this liberal framework was problematic in that it isolated gender inequality from the economic structural relations that made such inequality profitable. One of their influential 'Women and Development' focuses was on the exploitation of women by multinational corporations.

However, the socialist feminist 'gender and development' accounts, also emerging in the 1980s, stressed the importance of addressing the limitations of both approaches. It emphasized issues of women's inequality in both domestic and wage-labor spheres, and the interplay between them. And it also insisted on 'masculinity studies.' Gender studies must not be a matter only of 'studying women.' Gender is a relation, like class or race. Men's lives are deeply implicated in the conditions of women's lives, as whites' lives are in the lives of people of color, and the lives of the rich are in the lives of the poor. Moreover, by the end of the 1980s, a fully-articulated integration of feminist environmental issues into these analyses had produced the 'Women, Environment, and Sustainable Development' movement.<sup>34</sup> Yet to this day, the Boserup-inspired liberal approaches are still favored in those national and international development agencies that deign to pay any attention at all to 'women's issues.' This should come as no surprise since such approaches fit into the neo-liberal assumptions that have been directing these institutions in ways that more radical approaches do not.

One of the most striking analyses in the latest stage of this work appeared in a series of studies by Maria Mies and her colleagues.<sup>35</sup> Mies argued that it was the appropriation of women's and peasants' land rights and labor for export production that made a major contribution to the increased gross national productivity in newly developed societies (and a huge contribution

to increased wealth of Western-based multinational corporations and the First World-controlled global financial system). It was in the First World that 'reproduction' should be controlled, since the vast majority of Third World peoples were not permitted even to reproduce themselves. Rather, they and their children had to go hungry and die young in order to provide ever more goods for the already greedy and bloated over-advantaged groups in the First World. Mies here not only contested the liberal feminist accounts, but also turned the tables on the marxist analyses. She justified a critical attack on marxist-inspired accounts in a logic that originated in nineteenth-century marxism, as she placed women and peasants at the center of competent analyses of late twentieth-century global political economies in the way that Marx had placed industrial workers at the center of analyses of capitalism's political and economic relations.

These accounts of modernization and development theory and practice, while only rarely explicitly focused on science and technology issues as they appear in either the postcolonial or the Northern feminist accounts, nevertheless do address them. First, Western scientific rationality and technical expertise, from the conceptualization, direction, and management of which women have been excluded, are always positioned as the 'motor' that drives both modernization and development. So the failures of both projects raise questions about the adequacy of such sciences and technologies to advance social progress. These accounts challenge the 'triumphalism' of standard historical and philosophic accounts of Western sciences and technologies that justify the public support and huge expenditures that the latter require. Second, the conjoining of feminist environmentalism to socialist feminist analyses of the political economy raised the issue of the faulty concept of limitless natural resources assumed by Western philosophies of science.<sup>36</sup> Third, the feminist modernization and development criticisms started off thinking about the global political economy from the standpoint of the daily lives of women and peasants, who were the least visible actors in this political economy in the modernization theory that directed development policies. These inquiries undertook the standpoint methodological/epistemological strategy, to which I shortly turn.

In these criticisms of modernization and Third World development theories, policies, and practices, gender and colonial/imperial social relations co-constitute each other. The fates of 'traditional' knowledge and of Western scientific rationality and technical expertise are mapped together in relation to each other. And those who have borne most of the costs and received fewest of the benefits of these First World agendas are represented as actual and potential agents of valuable knowledge for everyone, and of progressive social transformations. Thus the conceptions here of relevant social relations, relevant sciences, and desirable agents of progressive social transformations integrate feminist and postcolonial standpoints.

### **Looking forward: engaging with 'strange logics' of research**

Especially challenging for each movement is to engage with what appears to be a strange 'logic of scientific inquiry' in the other movement. Strange to

postcolonial researchers and activists is to start out thinking about any and every issue—not just ‘women’s issues’—from the standpoint of the women affected by it. Strange for Northern feminist work is to think within a framework in which modern Western sciences are just one among many valuable scientific legacies.

### *Standpoint methodology*

The concept of an epistemological/methodological ‘standpoint’ arose first in Marxian writings about the importance of the ‘standpoint of the proletariat’ for revealing how the political economy of industrial capitalism actually worked to accumulate wealth in the lives of the already advantaged and misery in the lives of the workers, contrary to conventional accounts of economics of the day (and still of our day, alas). In feminist hands, the standpoint strategy directed researchers to start off thinking about their any and every project ‘from women’s lives’ instead of from the conceptual frameworks of their disciplines.<sup>37</sup> Those frameworks had been designed to answer questions for the dominant social institutions (including research disciplines), from the design and management of which women had been excluded. It was those institutions that sponsored, funded, and monitored natural and social science research. Thus it should not have been surprising to note that these dominant conceptual frameworks engaged in the ‘conceptual practices of power,’ in Dorothy Smith’s words.<sup>38</sup>

Standpoint projects ‘studied up’; that is, they started off thinking about a situation from the women’s lives involved, but attempted to explain the high-level institutional decisions and practices responsible for initiating and maintaining such situations. In this respect they differed from the ethnographies that were frequently parts of such projects, and with which they were often mistakenly conflated.<sup>39</sup> Standpoints are not to be conceptualized only as ‘perspectives’; they are intellectual and political achievements, not ascriptions. They require critical, scientific study to see beneath the everyday social relations in which all were forced to live, and political struggles to gain access to the sites (the board rooms, the command centers, the policy circles) where one could see how decisions were made that directed and maintained sexist and androcentric social relations. This was a project that strengthened the standards for ‘good method’ in the natural as well as the social sciences. Similarly it produced revisions of other regulative ideals of the sciences: ‘strong objectivity,’ ‘robust reflexivity,’ and expanded standards for rationality.

This epistemology and methodology has remained controversial throughout its more than three decades of development.<sup>40</sup> It is positioned at the convergence of central global intellectual and political quandaries for the West. Critics tend to try to assimilate it to some other positivist or anti-positivist position that they disparage, though its logic resists such assimilation. Its increasingly wide dissemination keeps its controversiality well-fueled, enabling, as one observer put the point, new polemics about relations between experience and knowledge.<sup>41</sup>

Largely influenced by this feminist work, standpoint methodologies have by now been adopted across the social sciences, such mixed social/natural sciences as environmental and health studies, many areas of biology, and technology studies. However, their strategy—their ‘logic of inquiry’—has an organic quality in that it seems to appear whenever a new group tries to rearticulate its own knowledge-needs against the practices of inquiry projects that serve powerful groups. Indeed, one could say that the field(s) of postcolonial studies is grounded in just such a methodology. In all of its diverse varieties, it starts off thinking about colonialism and imperialism from the situations of those who have borne most of the costs and received fewest of the benefits of such exploitative and violent institutional practices.

For postcolonial movements and their intellectual projects, however, the feminist version of standpoint theory violates their assumption that while the exploitation of women by colonialism and imperialism must be ended, it is men who do, will, and must lead the way to postcolonial futures. Indeed, rejections of feminism as just one more Western cultural imperialism—obscuring anti-male-supremacist organizing by women around the globe—often constitute an obstacle to this feminist methodological and epistemological project. Yet standpoint methodology/epistemology may be too Western to be fully useful elsewhere quite apart from this particular gender issue. After all, it is positioned against what are perceived as ‘positivist’ regulatory ideals and practices in Western-origin natural and social sciences. It was formulated initially within the Marxian and Enlightenment philosophic and methodological legacies, even as it protests significant aspects of them. Positivism is not one of the most problematic aspects of many Third World societies, as philosopher Uma Narayan pointed out about India several decades ago. Moreover, she noted that standpoint theory’s appeal to the value of women’s experience can lose its critical edge in societies that conceptualize sex/gender differences as fundamentally complementary rather than hierarchical (and regardless of whether such differences are in fact treated as hierarchical).<sup>42</sup> My point is that there are other ways to articulate research projects that can distribute their benefits more effectively to least advantaged groups. Yet postcolonial resistance to thinking from the standpoint of women’s lives, whatever the anti-male-supremacist conceptual framework within which such a project is located, remains an obstacle to the integration of postcolonial and feminist projects, and in my view this is a loss for both social movements.

### *Multiple sciences, multiple modernities*

The postcolonial perspectives enable us to see the nature and value of recognizing ‘a world of sciences’—that is, multiple scientific and technological traditions, each exquisitely adapted to regional needs and interests.

Here the central argument is that modernization is not identical to Westernization, contrary to Western exceptionalist and triumphalist assumptions. Rather, most—admittedly not all—peoples around the world now live in societies that have left feudalism or earlier economic/political forms. Moreover, the global reach of Western modernity’s environmental destruction, toxic

dumps, and arms industries, not to mention its production of pandemics and refugees, permeates even societies that have received no benefits from Western modernity. It would be reasonable to say that every society today lives in global modernity, even if only in the darkest corners of its effects.<sup>43</sup>

Thus modernity is not only disseminated from West to 'rest.' It is also independently produced within each and every society. Whether arriving from outside or inside a society—or, more likely, through negotiations between inside and outside—it must be 'sutured' into existing economic, political, cultural, psychic, and material worlds. Thus modernity will always take on distinctive local features in its multiple regional appearances. And it always tends to appropriate and reshape to its own ends the social hierarchies that exist. Feminist and postcolonial projects will always be multiple and distinctively local if they are to serve those escaping local male-supremacist and Western-supremacist histories. And such escapes require direct attention; they do not arrive either from modernization itself or from struggles against just one of the multiple social hierarchies within which most peoples around the globe live.<sup>44</sup> With important exceptions, feminist STS has tended to adopt either the universalist or relativist understandings of scientific and technological work that were the only alternatives offered in the older 'exceptionalist' positivist legacies. It, like the rest of Western STS, has not yet fully engaged with the reality that modern Western scientific traditions are just one of many viable and desirable ones around the globe, albeit the most powerful ones, at least to a significant extent because of the economic/political systems in which they live and travel.

### Unresolved issues

There are at least a couple of unresolved internal tensions which present problems for contemplated alliances between the two movements. I point to just three of them here: criticizing the Enlightenment conceptual framework while using it; the conflicts and tensions between divergent accounts of the genealogy of postcoloniality and postcolonial theory; and the difficulty of completely demarcating gender differences from sex differences.

At least some postcolonial theorists seem far more willing to commit themselves to abandoning the conventional regulative ideals of modern Western sciences than Western feminist scientists and scholars have been. While feminism has of course criticized androcentric alignments and agendas in these ideals and their uses, its concerns have been to revise and transform the existing regulative ideals for more intellectually and politically defensible scientific inquiries. Much Western feminist science work has focused on improving women's access to the kinds of knowledge that they need and want as they live within the modern West. Indeed, for many science studies scholars Western feminist accounts, especially standpoint approaches, are too firmly lodged within the offensive Enlightenment and its modern commitments to objectivity, rationality and 'good method,' or else they are criticized as committed to an epistemological relativism which fails to engage with global power relations. In either case, critics fail to grasp the third position, neither



objectivist nor relativist in conventional terms, that many feminist science scholars prefer.

Postcolonial critics appear much more ambivalent about the relation of their work to Enlightenment regulative ideals. There are three important positions here. One advocates that non-Western cultures in effect 'delink' from Western sciences and develop regional sciences out of the fertile ground of their own traditions.<sup>45</sup> At the opposite extreme, nationalist projects, including those inspired by dependencia theories, often enthusiastically adopt as their own goals the kind of scientific rationality and technical expertise hailed in the West.<sup>46</sup> So too do other kinds of scholars and policy makers convinced of the necessity of a kind of '*realpolitik*' that perceives Western sciences as too widely and deeply entrenched in global political economies to be disenfranchised or even transformed except by 'add-ons' from other knowledge systems.<sup>47</sup> A third position clearly recognizes that, on the one hand, one cannot simply abandon modern Western sciences and their philosophies. On the other hand, these can be radically transformed through integration with regional legacies so as to enable the flourishing of a multiplicity of knowledge-traditions and the societies that depend upon them.<sup>48</sup> Indeed, perhaps we should conclude that a main focus of postcolonial STS in perpetuity will remain the delicate task of undermining the Enlightenment notions of science and technology that have been so useful to colonial and imperial projects while advocating radically transformed versions of them on behalf of better sciences and technologies. This third position is much like the prevailing feminist one mentioned above. Perhaps this should come as no surprise since both in effect use standpoint strategies, whether or not they name them as such. They each start off from the concerns and lives of oppressed groups to explain those groups' and others' knowledge production processes in ways that reveal what the oppressed groups need to know about them. Neither the delinking nor the overt relativist positions are easy to find in feminist science and technology work.

A second internal problem in postcolonial theory is discerning just what should count as the legitimate genealogies of postcoloniality and postcolonialism.<sup>49</sup> This is related to disputes over what should count as relevant colonialities, and what are the relations between colonialism and imperialism. Four major kinds of sites of oppression seem to attract leading clusters of these disputes. Which geographic locations provide the models of colonialism being criticized? (Settler colonies, the Indian sub-continent, Africa, Latin America? What about Eastern Europe and China?) How far back in history can the roots of postcoloniality be found? (Only since the end of official Western rule since World War II? Or since successful Latin American independence struggles, or in struggles during colonial eras?) What are the disciplinary priorities of the account? (Cultural, economic, political, or epistemic?) What kinds of institutions, their cultures and practices, are the primary focus? (Universities, national, regional and international governmental agencies and projects, corporations, including the European trading corporations, the Jesuits?) And then there are the focuses on resistance to distinctive kinds of oppression at these various sites (class, gender and race

most notably). The accounts of political and intellectual resistance in each of these sites are so illuminating that I suggest that we should all feel obligated to assume that there is not and cannot be only one kind of right story here.

Several observations are relevant. The fact that groups invest in particular histories, geographies, disciplinary, and institutional accounts of anti-racism, anti-colonialism, anti-imperialism, and their more recent forms suggests that the term 'postcolonialism' will and always must be contested; such contestations are a productive process. Second, science and technology issues are rarely centered in such histories; they usually fail to make any appearance in them at all, though the broader Enlightenment epistemologies are usually contested. Moreover, the priorities of some of these histories are less welcoming than others to science and technology issues. For example, many cultural studies scholars including historians tend to conceptualize the Enlightenment and consequently also resistances to Western colonialism and imperialism as first and foremost political events about democratic governance; their exceptionalist and triumphalist attitudes toward Western sciences remain untouched by such concerns. Third, with the exception of the feminist postcolonial science and technology studies discussed in the section above on conjoining conceptual frameworks, these diverse accounts of the genealogy of postcolonialism are pretty much equally resistant to prioritizing women's issues. I take the three disconnects between assumptions about the relevant social relations, the relevant sciences, and the relevant historical actors to be applicable to most of these otherwise conflicting discussions of postcolonialism.

There is one challenge for feminisms that deserves mention. How come everywhere we look in history and culture we always find gender relations? Are they inside history or outside it, in nature? Let me distinguish this issue from a related one. It is a problem that Western feminists tend erroneously to generalize from their own situations to those of Third World women, and that Western feminists also tend to essentialize an 'average Third World Woman' who is poor, ignorant, completely a victim of local and global patriarchies, and whose purportedly miserable conditions consequently reveal the progressiveness of Western women.<sup>50</sup> These are serious problems which many feminists have addressed for some two decades, and yet which persist in blatant and less obvious forms in contemporary feminist accounts.

However, there is a kind of extreme form of this issue only occasionally glimpsed in such critiques: are the social relations of gender inside human history, or not? Do they come down to a matter of embroideries on biological difference? Of course this would be anathema to feminists, who have struggled for some four decades to document and analyze how women and men 'are made, not born' (in contrast to females and males, which are born in many species). Yet wherever one looks back in history and across cultures, one seems to find always already there women and men, femininity and masculinity, and their accompanying gender hierarchies. Is gender only a colonial imposition outside the West? Certainly Western ways of thinking about it and Western insistence on enforcing everywhere Western norms are such an imposition.<sup>51</sup> Yet another possibility is that gender differences are not

as separable from sex differences as feminists have assumed—for reasons different from those given in traditional biological reductionism.

The way out of this discouraging fate for hard-working and already beleaguered social determinists will probably be to put the issue another way: the insistence on the sex-difference vs. gender-difference distinction seems to reinstate the nature vs. culture, genes vs. environment binary that has been so vigorously criticized by scientists recently with respect to race as well as sex/gender,<sup>52</sup> and which has become indefensible in Western science studies. The solution cannot be to go back to the old biological determinist accounts of gender differences. However, a more complex and nuanced biology/history/sociology, in which nature and culture are always fundamentally inseparable, is not yet available. Of course wheresoever culture exists, it will on occasion be valuable to focus on one rather than the other.

### Conclusion

Both postcolonialisms and feminisms are theoretical and political projects on-the-move. They both do and must have transitional features in that they must still function as oppositional projects within the worlds that produced them while at the same time envisioning and acting to produce very different kinds of social, material, and intellectual worlds. Such attention to their powerful ‘others’ that generated them leaves limiting marks on their future-oriented theories and practices. Yet several literatures have begun to meet such challenges; they have conjoined feminist and postcolonial conceptual frameworks to produce analyses that illuminate issues of interest in both intellectual currents. Moreover, these schools of thought are and must remain permanently internally plural, and thus full of internal tensions and conflicts, since the still colonial, imperial and male-supremacist worlds they oppose take different forms in different times and places. The latter continually try to recuperate their losses to these emancipatory intellectual and political movements through new forms of resistance to and cooptation of their demands, as the former continually try to recuperate their original radical energies and visions in social worlds always already poised to contain them yet again. One could say that feminist and postcolonial movements expand the Copernican revolution as they decenter and parochialize dominant ways of thinking about the production of scientific and technological knowledge and their familiar philosophic assumptions.<sup>53</sup>

Recognition of these challenges points toward better futures. This is a particularly auspicious political moment in which to advance the radically progressive agendas developed in these two science and technology movements. Such projects contain the resources to develop more robust and productive dialogues and alliances.

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### Notes

<sup>1</sup> Ella Reitsma, *Maria Sibylla Merian & Daughters: Women of Art and Science*, Zwolle: Waanders Publishers, n.d. [2008].

- <sup>2</sup> See Londa Schiebinger, 'Prospecting for Drugs: European Naturalists in the West Indies,' in Londa Schiebinger and Caludia Swan (eds), *Colonial Botany*, Philadelphia: University of Pennsylvania Press, 2005.
- <sup>3</sup> Steven Shapin and Simon Schaffer, *Leviathan and the Air Pump*, Princeton: Princeton University Press, 1985; Sheila Jasanoff (ed), *States of Knowledge: The Co-Production of Science and Social Order*, New York: Routledge, 2004.
- <sup>4</sup> David Hollinger, *Science, Jews, and Secular Culture*, Princeton: Princeton University Press, 1996.
- <sup>5</sup> See, for example, Ian Hacking, *Representing and Intervening*, Cambridge: Cambridge University Press, 1983.
- <sup>6</sup> Examples of this relatively early work include: Boston Women's Health Collective, *Our Bodies, Ourselves*, Boston: New England Free Press, 1970 (later editions published by Random House); Anne Fausto-Sterling, *Myths of Gender: Biological Theories about Women and Men*, New York: Basic Books, 1994; Donna Haraway, *Primate Visions: Gender, Race, and Nature in the World of Modern Science*, New York: Routledge, 1989; Sandra Harding, *The Science Question in Feminism*, Ithaca, NY: Cornell University Press, 1986; Sandra Harding, *Whose Science? Whose Knowledge?* Ithaca, NY: Cornell University Press, 1991; Sandra Harding and Merrill Hintikka (eds), *Discovering Reality*, Dordrecht: Kluwer Academic Publishers, 2003; Ruth Hubbard, M S Henfin and Barbara Fried (eds), *Biological Woman: The Convenient Myth*, Cambridge, MA: Schenkman, 1982; Evelyn Fox Keller, *Reflections on Gender and Science*, New Haven, CT: Yale University Press, 1984; Helen Longino, *Science as Social Knowledge*, Princeton: Princeton University Press, 1990; Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution*, New York: Harper and Row, 1980; Margaret Rossiter, *Women Scientists in America*, vols 1 and 2, Baltimore: Johns Hopkins University Press, 1982/1995; Londa Schiebinger, *The Mind Has No Sex: Women in the Origins of Modern Science*, Cambridge, MA: Harvard University Press, 1989; Londa Schiebinger, *Nature's Body: Gender in the Making of Modern Science*, Boston: Beacon Press, 1993; Ethel Tobach and Betty Rosoff (eds), *Genes and Gender*, vols 1-4. New York: Gordian Press, 1978, 1979, 1981, 1984; Judy Wajcman, *Feminism Confronts Technology*, University Park: Penn State University Press, 1991. Of course the medical establishment's disparaging and often erroneous opinions about women's bodies were the object of much early gender and science work.
- <sup>7</sup> Sandra Harding 'Rethinking Standpoint Epistemology: What is 'Strong Objectivity'?', in L Alcoff and E Potter (eds), *Feminist Epistemologies*, New York: Routledge, 1992.
- <sup>8</sup> Mario Biagioli (ed), *The Science Studies Reader*, New York: Routledge, 1999.; Sheila Jasanoff, Gerald E Markle, James C Petersen and Trevor Pinch (eds), *Handbook of Science and Technology Studies*, Thousand Oaks, CA: Sage, 1995; Edward J Hackett, Olga Amsterdamska, Michael Lynch and Judy Wajcman, *The Handbook of Science and Technology Studies*, 3rd edn, Cambridge, MA: MIT Press, 2007. But see the greater attention to such issues in Sal Restivo (ed), *Science, Technology and Society: An Encyclopedia*, New York: Oxford, 2005.
- <sup>9</sup> Sandra Harding and Elizabeth McGregor, 'The Gender Dimension of Science and Technology,' in Howard J Moore (ed) *UNESCO World Science Report*, Paris: UNESCO, 1996.
- <sup>10</sup> Examples of relatively early work include: Michael Adas, *Machines as the Measure of Man*, Ithaca, NY: Cornell University Press, 1989; Lucille H Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanical Gardens*, New York: Academic Press, 1979; Susantha Goonatilake, *Aborted Discovery: Science and Creativity in the Third World*, London: Zed Books, 1984; Sandra Harding (ed), *The 'Racial' Economy of Science: Toward a Democratic Future*, Bloomington: Indiana University Press, 1993; Daniel R Headrick (ed), *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century*, New York: Oxford University Press, 1981; David Hess, *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts*, New York: Columbia University Press, 1995; James E McClellan, *Colonialism and Science: Saint Domingue in the Old Regime*, Baltimore: Johns Hopkins University Press, 1992; Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self under Colonialism*, Delhi: Oxford University Press, 1983; Joseph Needham, *Science and Civilization in China*, 7 vols, Cambridge: Cambridge University Press, 1956-2004; Ziauddin Sardar (ed), *The Revenge of Athena: Science, Exploitation, and the Third World*, London: Mansell, 1988; Helaine Selin (ed), *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*, 2 vols, Dordrecht: Springer, 2008; Vandana Shiva, *Staying Alive: Women, Ecology and Development*, London: Zed Books, 1989; Vandana Shiva, *Monocultures of the Mind: Perspectives on Biodiversity and Biotechnology*, New York and Penang: Zed Books and Third World Network, 1993; Third World Network, 'Modern Science in Crisis: A Third World Response,' in S Harding (ed), *The Racial Economy of Science*, Bloomington: Indiana University Press, 1993 (Penang, Malaysia: Third World Network and Consumers' Association of Penang, 1988). See also Warwick Anderson and Vincanne Adams, 'Praemoedya's Chickens: Postcolonial Studies of Technoscience', in Edward J. Hackett, Olga

- Amsterdamska, Michael Lynch and Judy Wajcman (eds), *The Handbook of Science and Technology Studies, Third Ed*, Cambridge, MA: Massachusetts Institute of Technology, 2007; Sandra Harding, *Is Science Multicultural? Postcolonialisms, Feminisms, and Epistemologies*, Bloomington: Indiana University Press, 1998; and Sandra Harding (ed), *Science and Technology Beyond Postcolonial Theory*, forthcoming.
- <sup>11</sup> David Hess, *Alternative Pathways in Science and Industry: Activism, Innovation, and the Environment in an Era of Globalization*, Cambridge, MA: MIT Press, 2007. Hess refers to this process as the 'primitive epistemic accumulation' of early modern Europe.
- <sup>12</sup> Steven J Harris, 'Long-Distance Corporations and the Geography of Natural Knowledge,' *Configurations*, 6(2), 1998, pp 269–304; J M Blaut, *The Colonizer's Model of the World: Geographical Diffusionism and Eurocentric History*, New York: Guilford Press, 1993.
- <sup>13</sup> Catherine A Odora Hoppers (ed), *Indigenous Knowledge and the Integration of Knowledge Systems*, Claremont, South Africa: New Africa Books, 2002; Selin, *Encyclopedia*.
- <sup>14</sup> Joan Kelly-Gadol, 'The Social Relations of the Sexes: Methodological Implications of a Women's History', *Signs: Journal of Women in Culture and Society*, 1(4), 1976, pp 810–823; Carole Pateman, *The Sexual Contract*, Palo Alto, CA: Stanford University Press, 1988.
- <sup>15</sup> Kelly-Gadol, 'The Social Relations'.
- <sup>16</sup> Keller, *Reflections on Gender*; Elizabeth Potter, *Gender and Boyle's Law of Gases*, Bloomington: Indiana University Press, 2001; Sharon Traweek, *Beamtimes and Life Times*, Cambridge, MA: MIT Press, 1988.
- <sup>17</sup> Susantha Goonatilake, *Toward a Global Science: Mining Civilizational Knowledge*, Bloomington: Indiana University Press, 1998; Hess, *Science and Technology*; Hess, *Alternative Pathways*; Hoppers, *Indigenous Knowledge*; Laura Nader (ed), *Naked Science: Anthropological Inquiry into Boundaries, Power, and Knowledge*, New York: Routledge, 1996; Third World Network, *Modern Science*.
- <sup>18</sup> Donna Haraway, *Primate Visions*; Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspectives,' in *Simians, Cyborgs, and Women*, New York: Routledge, 1991.
- <sup>19</sup> Vandana Shiva, *Staying Alive*; Vandana Shiva, *Monocultures of the Mind*.
- <sup>20</sup> I am focused here on existing literatures that engage feminist postcolonial science and technology issues. Another route into identifying such issues is to look at the literatures that do address feminist postcolonialism and tease out where the science and technology issues are hinted at or should appear. This kind of process is what led me to insist on the importance to feminist STS of the women in development literatures and their successors mentioned below. For three differently valuable attempts to construct either feminist genealogies of postcolonialism or genealogies of feminist postcolonialism, none of which directly address science and technology issues (though epistemological concerns are often visible), see Reina Lewis and Sara Mills (eds), *Feminist Postcolonial Theory: A Reader*, New York: Routledge, 2003; Rajeswari Sunder Rajan and You-me Park, 'Postcolonial Feminism/Postcolonialism and Feminism,' in Henry Schwarz and Sangeeta Ray (eds), *A Companion to Postcolonial Studies*, Oxford: Blackwell, 2000; Robert J C Young, *Postcolonialism: An Historical Introduction*, Oxford: Blackwell, 2001, Chapter 25.
- <sup>21</sup> Steven J Harris, 'Jesuit Scientific Activity in the Overseas Missions, 1540–1773', *Isis*, 96, 2005, pp 71–79, 77–78.
- <sup>22</sup> Schiebinger, 'Prospecting for Drugs'.
- <sup>23</sup> Schiebinger, *Nature's Body*.
- <sup>24</sup> Mark Harrison, 'Science and the British Empire', *Isis*, 96, 2005, pp 56–63, 59; Nancy Stepan, 'Race and Gender', *Isis*, 77, 1986, pp 261–277.
- <sup>25</sup> Jorge Canizares-Esguerra, 'Iberian Colonial Science', *Isis*, 96, 2005, pp 64–70.
- <sup>26</sup> Mary Terrall, 'Heroic Narratives of Quest and Discovery', *Configurations*, 6(2), 1998, pp 223–242.
- <sup>27</sup> Elizabeth Rhodes, 'Join the Jesuits, See the World: Early Modern Women in Spain and the Society of Jesus', in John W O'Malley, Gauvin Alexander Bailey, Steven J Harris and T Frank Kennedy (eds), *The Jesuits, II: Cultures, Sciences, and the Arts, 1540–1773*, Toronto: University of Toronto Press, 2005; reported in Harris, 'Jesuit Scientific Activity'.
- <sup>28</sup> Traweek, *Beamtimes and Life Times*.
- <sup>29</sup> Haraway, *Primate Visions*.
- <sup>30</sup> Harris, 'Jesuit Scientific Activity'.
- <sup>31</sup> Rita Felski, *The Gender of Modernity*, Cambridge, MA: Harvard University Press, 1995; Sandra Harding, *Sciences from Below: Feminisms, Postcolonialities, and Modernities*, Durham, NC: Duke University Press, 2008; Alice Jardine, *Gynesis: Configurations of Woman and Modernity*, Ithaca, NY: Cornell University Press, 1985; Catherine V Scott, *Gender and Development: Rethinking Modernization and Dependency Theory*, Boulder, CO: Lynne Rienner Publishers, 1995.

- <sup>32</sup> Felski, *The Gender of Modernity*; Harding, *Sciences from Below*; Jardine, *Gynesis*; Scott, *Gender and Development*.
- <sup>33</sup> Ester Boserup, *Women's Role in Economic Development*, New York: St Martin's Press, 1970.
- <sup>34</sup> Rosi Braidotti, Ewa Charkiewicz, Sabine Hausler and Saskia Wieringa, *Women, the Environment, and Sustainable Development*, Atlantic Highlands, NJ: Zed Books, 1994; Irene Tinker, 'The Making of a Field: Advocates, Practitioners and Scholars,' in Irene Tinker (ed), *Persistent Inequalities: Women and Development*, Oxford: Oxford University Press, 1990; Nalini Visvanathan, Lynn Duggan, Laurie Nisonoff and Nan Wiegiersma (eds), *The Women, Gender and Development Reader*, London: Zed Books, 1997; see also Joni Seager, *Earth Follies: Coming to Feminist Terms with the Global Environmental Crisis*, New York: Routledge, 1993; Joni Seager, 'Rachel Carson Died of Breast Cancer: The Coming of Age of Feminist Environmentalism', *Signs: Journal of Women in Culture and Society*, 28(3), 2003, pp 945–972.
- <sup>35</sup> Maria Mies, *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labor*, Atlantic Highlands, NJ: Zed Books, 1986.
- <sup>36</sup> Braidotti, Charkiewicz, Hausler and Wieringa, *Women, the Environment, and Sustainable Development*; Seager, *Earth Follies*.
- <sup>37</sup> Sandra Harding (ed), *The Feminist Standpoint Theory Reader*, New York: Routledge, 2004.
- <sup>38</sup> Dorothy E Smith, *The Conceptual Practices of Power: A Feminist Sociology of Knowledge*, Boston: Northeastern University Press, 1990; Dorothy E Smith, *Institutional Ethnography: A Sociology for People*, Lanham, MD: Rowman and Littlefield, 2005.
- <sup>39</sup> But see Smith, *Institutional Ethnography* for a critical ethnography.
- <sup>40</sup> Sandra Harding, 'Introduction: Standpoint Theory as a Site of Political, Philosophic, and Scientific Debate', in Sandra Harding (ed), *The Feminist Standpoint Theory Reader*, New York: Routledge, 2004.
- <sup>41</sup> Fredric Jameson, 'History and Class Consciousness as an "Unfinished Project"', *Rethinking Marxism*, 1(1), 1988, pp 49–72; Harding, *The Feminist Standpoint*.
- <sup>42</sup> Uma Narayan, 'The Project of a Feminist Epistemology: Perspectives from a Non-western Feminist', in Susan Bordo and Alison Jaggar (eds), *Gender/Body/Knowledge*, New Brunswick, NJ: Rutgers University Press, 1989; Walter D Mignolo, *The Darker Side of the Renaissance: Literacy, Territoriality and Colonization*, Ann Arbor: University of Michigan Press, 1995; Walter D Mignolo, *Local Histories/Global Designs*, Princeton: Princeton University Press, 2000.
- <sup>43</sup> S N Eisenstadt and Wolfgang Schluchter (eds), 'Early Modernities', Special Issue, *Daedalus*, 127(3), 1998; S N Eisenstadt (ed), 'Multiple Modernities,' Special Issue, *Daedalus* 129(1), 2000, see especially 'Multiple Modernities,' pp 1–30; Third World Network, 'Modern Science in Crisis'.
- <sup>44</sup> Sandra Harding, *Sciences From Below*, Durham: Duke University Press, 2008.
- <sup>45</sup> Samir Amin, *Delinking: Towards a Polycentric World*, New York: Zed Books, 1990. Third World Network, 'Modern Science in Crisis'.
- <sup>46</sup> Catherine V Scott, *Gender and Development*.
- <sup>47</sup> (Goonatilake, *Toward a Global Science*.
- <sup>48</sup> Dipesh Chakrabarty, *Provincializing Europe: Postcolonial Thought and Historical Difference*, Princeton: Princeton University Press, 2000; Mignolo, *Local Histories*.
- <sup>49</sup> There are dozens of collections of essays seeking to establish the legitimacy of some particular kind of genealogy of postcolonialism. For a comprehensive collection containing excerpts from many of the 'classic' analyses, see the five volumes of Diana Brydon (ed), *Postcolonialism: Critical Concepts in Literary and Cultural Studies*, vols I–V, New York: Routledge, 2000. There are also many anthologies and review essays debating the origins, nature, and future of such debates and tensions. For three sources of the many illuminating discussions about the usefulness and desirable domains of the concept of postcolonialism, see David Theo Goldberg and Ato Quayson (eds), *Relocating Postcolonialism*, New York: Blackwell, 2002; Ania Loomba, Suvir Kaul, Antoinette Burton and Jed Esty (eds), *Postcolonial Studies and Beyond*, Durham, NC: Duke University Press, 2005; and early issues of *Postcolonial Studies* (1998ff).
- <sup>50</sup> Chandra Talpade Mohanty, 'Under Western Eyes: Feminist Scholarship and Colonial Discourses,' in Chandra Talpade Mohanty, Ann Russo and Lourdes Torres (eds), *Third World Women and the Politics of Feminism*, Bloomington: Indiana University Press, 1991; Gayatri Spivak, 'French Feminism in an International Frame', in her *In Other Worlds*, New York: Routledge, 1987.
- <sup>51</sup> Oyeronke Oyewumi, *The Invention of Women: Making an African Sense of Western Gender Discourses*, Minneapolis: University of Minnesota Press, 1997.
- <sup>52</sup> See, for example, Anne Fausto-Sterling, 'The Bare Bones of Sex: Sex and Gender', *Signs: Journal of Women in Culture and Society*, 30(2), 2005, pp 1491–1528; Evelyn Fox Keller, *The Mirage of a Space between Nature and Nurture*, Durham: Duke University Press, 2009.
- <sup>53</sup> Chakrabarty, *Provincializing Europe*.