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# FEMINISM CONFRONTS THE SCIENCES: SCIENCE FOR ALL THE PEOPLE

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## Introduction: Science, Gender Relations and Democracy

For the last fifteen years, I have been involved in the exploration of the gender relations of science and technology. Recently, when I picked up a relatively new volume in this field – the work of a well-established American (now living in Canada) historian of technology, I was reminded of what a striking social phenomena it is with which I have been concerned. David Noble has called his book on the history of gender relations in Western Science – *A World Without Women* (1992). Speaking with the fervour of the converted who have recently "seen the light", Noble is passionate in his assessment of the social phenomena he has recently confronted and begun to study. He writes:

> For the male identity of science is no mere artifact of sexist history; throughout most of its evolution, the culture of science has not simply excluded women, it has been defined in defiance of women and in their absence... an alien world for women, and a hostile one, a world where women are not merely marginalized but anathematized, where they face not just discrimination but dread. (1992: xiv)

This is strong stuff! Describing "the curious culture which spawned Western science"(p. xv) Noble explains that: "a world without women emerged: a society composed exclusively of men, forged in flight from women, and intent upon remaking the world in it[s] own half-image." (1992: xvi). These reflections show an accomplished male scholar registering the magnitude and significance of the social

pattern he has explored and which he proposes to continue to investigate in a second volume.

Noble's astonishment is a reminder that until fairly recently, one of the most striking social patterns of the modern world was little investigated. When I think back to my own education, I now find it remarkable that I had studied the history and philosophy of science in both undergraduate and graduate degree programmes in the 1970s without this pattern ever being drawn to my attention. Moreover, it was not through academic work, but through my involvement with the then emerging women's movement that I first began to reflect on the gender relations of science.

In another way, Noble's astonishment seems almost disingenuous for anyone who has studied Western societies and their science and technology. Part of me wants to shout: what do you expect? Why should David Noble or anyone else expect the epitome of Western culture to distance itself from the main values of that culture – to break, in this case, from fairly ubiquitous patterns of gender divisions and gender inequality. Furthermore, Noble's striking observation is a reminder that questions of democracy have taken something of a back-seat in considerations of the moral dimensions of science. Evelyn Fox Keller dates the disappearance of such concerns specifically: "by the late seventies and early eighties, earlier ambitions to reclaim science 'for the people' seemed to have largely vanished" (1992: 87) but I would suggest that this tendency has been more long-term.

In reflecting on the absence of democracy within Western science in terms of its gender relations, I want explore three avenues in this paper. First, I want to consider the various ways in which this has been documented since the 1970s. Second, I will explore some changes in this field of study in recent years (since approximately the mid-1980s). Finally, I want to take a more analytic approach and consider some of the conceptual and political issues about science and democracy that have emerged within recent work in this field.

**Discovering That Science is Not For All the People**

There are many potential ways of mapping or labelling the avenues through which the gender relations of science have been charted. For my purposes, I have grouped these under three simplified labels, which will be considered in turn:

a) Excluding women

b) Inventing or defining women

c) Conceptualising "Mother Nature" and building "Masculine Science".

*Excluding women*

Noble's reflection can be placed alongside another comparable assessment of science by Sandra Harding: "Women have been more systematically excluded from doing serious science than from performing any other social activity except, perhaps, frontline warfare" (Harding 1986: 31). Noble's description and book and Harding's evaluation are addressed to what Harding calls "equity" issues in science. This is perhaps the most long-term tradition of approaching the gender relations of science. In the struggles over medical education during the second half of the nineteenth century, in Virginia Woolf's observations of the processions of men in *Three Guineas* (published in 1938), and in recent projects to involve women in computer education we see the examples of the acknowledgement of and protest against women's lack of access to science (as education, vocation or employment). The research on and struggles over access to scientific education and employment have involved confrontations with barriers to democracy within the sciences. These have sometimes taken the form of formal barriers, but psychological and social mechanisms have also been analysed and tackled.

There is much that could be said of equity studies and movements around science. One notable feature of such studies is that they have shown professionalization as a crucial process which has shaped the patterns of access to science. Margaret Rossiter's (1982) study of the "defeminization of science in the wake of professionalization" in the USA in 1880s and 1890s has amply demonstrated this. David Noble (1992) has offered his own thesis on the clerical roots of scientific practice, going back to the fourth century and linking this to the professionalization of the sciences.

*"Inventing or defining women"*

A second cluster of protest and scholarship has been around the role of the biological sciences and human sciences in "inventing or defining women" (see Kirkup and Keller 1992; McDowell and Pringle 1992). I chose to so label this dimension of gender relations to underscore that the sciences construct acceptable versions of being a woman.

Sandra Harding sees a further bifurcation in this field, distinguishing between those who see in the biological and human sciences instances of "bad science". Others would maintain that "good science" or indeed, that all science is implicated in this process. Reflecting on my own work, when I first began to teach about the gender relations of science, technology and medicine in the late 1970s, my case-studies were often illustrations of gender bias – early work on sex differences (on brain differences, etc.), on aspects of gynaecological science, etc. However, from these case-studies what seemed to linger was a firm impression about the extensive involvement of the sciences and medicine in shaping women's lives, in constructing their/our world. Hence it is hard to see this as a matter of bias, or to fail to notice the pro-active role of science in shaping women's lives.

This has been, perhaps, the most extensive and proliferating area of research concerned with the gender relations of science. The recent flourish of publications in this field began with two widely circulated pamphlets from the Women's Health Movement in the USA, Barbara Ehrenreich's and Deirdre English's *Complaints and Disorders: The Sexual Politics of Sickness* (1973a). At that moment it was impossible to separate equity issues from the investigation of medical and scientific knowledge of women's bodies. Thus, there was an accompanying pamphlet titled, *Witches, Midwives and Nurses: A History of Women Healers* (1973b).

The study of the role of medicine, of the biological and the human sciences in constructing norms of femininity and of their preoccupation with the female body has become increasingly sophisticated. Feminist biologists, historians of biology, philosophers of science (including Ruth Hubbard, Lydna Birke, Anne Fausto-Sterling, Helen Longino, Londa Schiebinger and many others) have charted these fields, including some notable explorations of the scientific preoccupation with sex differences. They have been joined by those working in psychology and other

human sciences in projects which investigate this constructivist role of the sciences in contributing to gender divisions, gendered identities, and norms and expectations about women's (and concomitantly men's) behaviour.

*Conceptualising "Mother Nature" and building "Masculine Science'*

My provocative signalling of this dimension of gender studies of science does not indicate any belief in the essential gendering of either nature or science. This is a short-hand way of alluding to the investigation of the gender imaging which has shaped and propelled the natural sciences. As I have indicated, the strands of analysis which emerged in the blossoming of gender studies of science since the 1970s have been very much intertwined. The work on equity issues and on the social regulation of reproduction brought some fresh insights about the form and nature of both the Scientific Revolution and the scientific method. This was signalled in the early pamphlet previously mentioned by Ehrenreich and English (1973b). However, it was particularly the research of Brian Easlea and Carolyn Merchant (*Witch-Hunting, Magic and the New Philosophy* (1980) and *The Death of Nature* (1980)) that suggested that gender relations, indeed, women's oppression, was perhaps at the very heart of Western science.

The history of science was, for some, a "World Turned Upside Down", through Easlea's and Merchant's work. The attention given to the linking of women and nature in the Western world, increasing sensitivity to gendered imagery in the writings of scientists and to the sexual connotations of the desire to "dominate nature" and "extract her secrets" blew open the history and philosophy of science.

Of course it is important not to exaggerate the extent of this revolution. Much of the philosophy, history and sociology of science remained and, to this day, remains remarkably untouched by what I characterise as a revolution. Even though I was involved in this explosion and convinced that studying the gender relations of science was crucial to understanding the beast, it took some time before I made this the focus of my own academic work in the history and sociology of science.

Nevertheless, from the 1980s onwards, terms like "patriarchal" or "masculinist" science could be heard in some hallowed and not-so-hallowed halls. The key shift was that gender relations were no longer on the agenda only when women

knocked on the doors of the academy or the professions. Nor were gender relations seen as focused only on the moment when women became the object of the scientific gaze. The suggestion was that the scientific gaze may be constitutionally – in some fundamental sense gendered. This meant that every field of science was a potential domain for investigation – all the sciences could be explored by those interested in studying this facet of the social relations of science. In this sense, the project of democratising science – of making it for all women had become a much more complex and multi-dimensional project than had previously been imagined.

My categories of excluding women, inventing or defining women and conceptualizing "Mother Nature" through "Masculine Science" are deliberately idiosyncratic and provocative. However, they also indicate something of a sequence in the emergence of concerns around gender relations. These different avenues of investigation involved the extension of questioning about the democratic nature of science. A simplified way of summarising this work might be to say that by the early 1980s there was increasing evidence that there have been and continue to be severe restrictions on who did and who does science, on what it does and how it does it, and for whom. Furthermore, in all these respects it had become apparent that science is not fully opened to, or representative of, the interests of approximately half of the human race.

I summarise these developments somewhat crudely and starkly to highlight how important this work and the social and political movement from which it has taken much of its inspiration have been in raising questions about democracy within the sciences. This could be expressed as the discovery and documentation that science was not for all people. I shall now consider some key features of how the analysis of the gender relations of science has changed since the early 1980s.

**Recent Developments in the Study of the Gender Relations of the Sciences**

Since the early 1980s, research in this field has proliferated and become more sophisticated. There has been considerably more detailed historical work which has fleshed out the picture of gender relations associated with modern science. Partly because of this detailed work, terms like "patriarchal" or "masculinist" science are less likely to be invoked by researchers in this field now. In fact, two main changes in this field in recent years rather shatter the monolithic, uniform

picture of male oppressors and of female victimisation which could be associated with some earlier work. (However, in my opinion at least, even in the earlier period, the best work was not of this sort.)

The two shifts within the history and social studies of gender relations of science since the mid-1980s which I consider crucial are:

a) more acknowledgement of women's agency in these patterns

b) more attention to diversity amongst women – some challenging of presumptions about the uniformity and unity of the category "woman".

There are many examples which might be cited to illustrate these developments. Two exemplar studies which could be cited are: Judith Waltz Leavitt's *Brought to Bed: A History of Childbirth in America, 1750-1950* (1986) and Emily Martin's *The Woman in the Body: A Cultural Analysis of Reproduction* (1987). The first was an historical study, while the second is contemporary in orientation. The subtlety and detail of this work is indicative of the refinement of research in this field. Both authors were concerned with scientific medical knowledge and practice. Yet they do not see women as the passive victims of patriarchal science and medicine. Instead, they show their subjects actively generating their own knowledge of their bodies, and actively negotiating with the knowledge and services which the doctors and scientists of their period and setting offered.

In addition, Leavitt and Martin do not treat their subjects as a uniform or homogenous group. Their studies are localized and specific. Leavitt studied the medical profession in the USA particularly as it dealt with urbanization and immigration in the first half of this century. Martin chose a highly specific sample – a cross-section of women in the urban centre of Baltimore. Furthermore, they differentiate amongst women: in Leavitt's case, through the consideration of class differences, and, in Martin's, through attention to race and class diversity.

Social studies of science and technology in these two respects have been in line with broader patterns within women's and gender studies. Moreover, pressures outside of the academy have been crucial in these shifts, as other social and political movements have called feminists to task. In addition, some theoretical

developments linked to poststructuralism and postmodernism have encouraged the abandonment of monolithic terms of analysis.

For many of those who undertook examinations of the gender relations of science, the need to consider other key social relations became an increasingly important imperative. Awareness of the dimensions of the neglect of democratic principles within science was intensified and so investigations became more complex. Here the contrast between Sandra Harding's first book, *The Science Question in Feminism* (1986) and her later text, *Whose Science? Whose Knowledge?* (1991) is indicative. Those interested in gender relations or democratic science could not work with a simple binary opposition. As Harding herself explained: "Increasingly replacing the focus on male supremacy that preoccupied much feminist writing of the 1970s are new analyses of gender relations as they have historically been constructed through imperialism, class exploitation, and the control of sexuality" (1991: x).

**Towards More Democratic Sciences**

The earlier sections of this paper have traced the emergence of analyses of the gender relations of science. Considering this phenomenon more analytically raises further questions. What have the investigations of gender relations taught us about science and about democratic aspirations in relation to it? What significant insights can be gleaned from the feminist confrontation with the sciences?

I shall briefly highlight three issues emerging from recent feminist work which I consider to be crucial and intriguing. These concern:

a) value neutrality

b) representation

c) community

*Value-neutrality*

It may be appropriate to begin with Donna Haraway's reflection that "science has been utopian and visionary from the start; that is one reason why 'we' need it" (1991: 192). This evaluation may surprise those who are more familiar with

Haraway's critical stance on science and technology. The problem with science, in Haraway's opinion (and this is also my view), is not that it lacks utopian aspirations.

Extrapolating from this acknowledgement, it becomes crucial to understand this utopian moment within modern science. I would make two arguments about the utopian aspirations of science. In the first instance, it could be proposed that these aspirations have been channelled into: 1) expectations about the quality or usefulness of the knowledge of the natural world which science yields or 2) into value neutrality. Evelyn Fox Keller (1992) argues from the first point, that science works well, but that we do not ask what it works well at or, I might add, for whom. The second argument involves the proposal that all the utopian potential of science is focused on claims to value-neutrality. In this respect, democratic ideals have always taken a back seat. Another argument might be that the democratic aspirations within science have been channelled through expectations regarding value-neutrality. Value-neutrality, in this respect, has been cited as the key mechanism for safeguarding the democratic potential of science.

In recent years, some doubt has been cast on value-neutrality as a desirable guiding principle for the sciences. For much of the modern experiment which has constituted Western science, its democratic dimension has been subsumed under conventions about value-neutrality. In effect, some feminist scholars and others have challenged this experiment. As they see it, the problem with the sciences is not so much that there have been conscious distortions or biases. Rather, the problem is that most practitioners have put their faith in the conventions of value-neutrality within laboratory practices, in the way scientific papers are written, and so on, as the way of guarding against inappropriate social influences and/or interests. Harding calls this "the view from nowhere" (Harding 1991: 311). Sharon Traweek, mocks a particular instance of this in an indictment of the practices of many social, as well, as natural scientists: "It is only in the introductory pictures that physicists and anthropologists intimate that they were involved in the production of the news to follow" (1992: 429).

There are some interesting fresh perspectives being offered by feminist scholars and others on these issues, which I shall briefly introduce.

a) Harding insists that we must distinguish between objectivity and value-neutrality. In her opinion the latter--value neutrality – or as she calls it, "the view from nowhere" (Harding 1991: 311) – has been an inadequate goal for realising objectivity. For this reason, she advocates more reflexivity within the sciences.

b) Helen Longino's explores the social (rather than the individual) character of scientific knowledge. In Longino's framework, it is this "social character of scientific knowledge" which both "protects it from and renders it vulnerable to social and political interests and values" (1990: 6).

c) Lorraine Daston maintains that claims to objectivity within science should not be seen as a flight from moral stances, but rather that they do embody a crucial moral dimension. She comments that: "There is also some justice in the accusation that in so burying their individual identities in the impersonal collectivity, scientists actually aggrandize rather than surrender their social and intellectual authority" (1992: 614).

My own work on the social relations of science has convinced me that faith in the purifying mechanism of value-neutrality blinkers scientists more than it guides them. This faith is also crucial in marginalising questions about democracy within scientific practice. The questions scientists most often neglect because of this orientation include: Who is this for? Whose interests are being served by my work? So, the question that is now being posed is: Is value-neutrality an adequate guiding principle for scientific practice?

*Representation*

The second key area of questioning that has emerged from the study of the gender relations of science concerns representations. In part, the word play and variety of associations of the term representations have facilitated this.

Postmodernist analysts and others have approached the study of the natural sciences as studies of regimes of representation of the natural world. I would propose two notable recent openings by feminist philosophers and historians of science as meriting attention.

a) Helen Longino stresses the variety in the ways in which the natural world could be represented and makes the radical proposal that "we might want to abandon our obsession with truth and representation" (1990: 9) as the touchstones of science. Longino suggests instead that democracy should be the key and central animating principle of science. She argues that the main issue is not whether the natural sciences represent the natural world, but rather in whose benefits and interests they do so.

b) Drawing on sociological and anthropological research on science, Donna Haraway (1992) argues against "a politics of representation". She detects a distancing at the heart of dreams of representation. Citing instances from recent struggles over ecology and reproductive politics, she considers the ways in which representation claims may disempower those who are closest to the non-represented "natural" object. For example – those who speak on behalf of the fetus or of endangered species. Such claims to representation, can for example, render the pregnant woman into "the maternal environment". Haraway is particularly concerned about the ways in which scientists speak as if they were the mouthpieces for speechless objects. Both Longino and Haraway use the analysis of representation as a way of highlighting the limits of democracy within science and of proposing more democratic reorientations within science.

*Community*

My third suggestion is that the study of the gender relations of science has highlighted important issues around the nature of the scientific community. It is striking that in much recent feminist work the tone is not antagonistic. Haraway, for example, does not want women to stand outside of science. Longino wishes to rejuvenate science, in part through transformative criticism and Harding argues that feminist science is by no means a contradiction in terms: she even claims that it already exists in some forms. Also there is far more emphasis being placed on women in science. Donna Haraway's (1989) work on primatology is paradigmatic in this respect, indicating the shaping and forming influence of women (and even feminists) within this field of science.

Some feminist scholars have also led the way in redefining scientific community. Breaking down barriers in the study of science: they have begun to posit that science is made not just in the laboratory, but in films, advertising, and many other social sites. For example Ludmilla Jordanova (1989) and Donna Haraway (1989; 1991; 1992) bring together analyses of medical texts and films, of scientific theories and advertising. In my own work on reproductive science and technologies, I have found it important to study both scientific journals and popular films, for example. In an important footnote Helen Longino commented about the scientific community, that: "If it includes those interested in and affected by scientific inquiry, then it is much broader than the class of those professionally engaged in scientific research" (1990: 69, fn.10).

My observations about what has been occurring within feminist social studies of science around the concept of community are very preliminary but I sense something complicated, messy, but important here related to the utopian dimensions of science. I can only express what I think is happening here in terms of feminists calling the utopian bluffs of the sciences. In the Western world there has been a long-standing, mythical expectation that science was for all the people. It is this myth which keeps science going: it animates so much of our daily encounters with it – in medicine, in running homes, in businesses, and in teaching. Moreover, the more or less explicit claim that science is the touchstone of Western culture is the formal seal on this promise. If this is the case, then science can not possibly be made only in the laboratories; it can not be only what scientists write or say. So, this is what I mean by saying that feminists are calling some bluffs: looking at the pervasiveness of science within popular culture and claiming that it is made in many different sites and by many different agents.

Yet, this shift is also calling Western feminists' bluffs as well. It is forcing us to acknowledge that there are no pure positions – that we are implicated in science insofar as we are immersed in that culture. This makes work in this field much messier: we have to understand more about our entanglements with science, about how we are implicated in it, how we benefit from it, and about its emotive, as well as cognitive, power.

**Conclusion**

My own sense is that dealing with the complexity of community is crucial to the prospects for changing science. Women in the Western world are part of the scientific community, yet for many there have been severe restrictions on their positive agency within that world. In this sense, it is crucial to put issues of democracy at the centre of the sciences. Helen Longino expresses a similar sentiment in theoretical terms and indicates that this is no small matter:

> That theory which is the product of the most inclusive scientific community is better, other things being equal than that which is the product of the most exclusive. It is better not as measured against some independently accessible reality but better as measured against the cognitive needs of a genuinely democratic community. This suggests that the problem of developing a new science is the problem of creating a new social and political reality (Longino 1990: 214).

The utopian project of science seems a long way off at this moment. Nevertheless, for me and for a number of feminist scholars and some others, struggling towards it remains a central concern.

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