Strategies for Feminist Critique of Science: An Evaluation

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ABSTRACT

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In my thesis, I mainly argue for two claims: i) that feminist critique of science is a legitimate philosophical agenda in that its philosophical grounds are not refuted or completely discredited as its critics sometimes claim, and ii) that the best way to handle the existing androcentric bias in science is to have some kind of political guidance throughout scientific research, along with the usual epistemic norms. In order to argue for these claims, I provide a discussion concerning the thesis of underdetermination of theories by data. I argue that the thesis of underdetermination has neither been shown to be true nor been refuted conclusively, and thus the feminist agenda that rests on it is philosophically legitimate. I argue that if underdetermination is true, as all feminist critics of science accept in one form or another, then social assumptions that may systematically slip into scientific inquiry constitute a serious problem both epistemologically and politically. If scientific inquiry is a political one to some extent, then it must be a politically correct one. In this sense, bringing in women's perspective, which has been ignored for a long time, will be a political asset.

KISA ÖZET

Bilimin Feminist Eleştirisi için Stratejiler: Bir Değerlendirme

Ayşegül Sezener

Tezimde iki temel iddia öne sürüyorum: i) Bilimin feminist eleştirisi felsefi olarak meşru bir yaklaşımdır; felsefi dayanakları, aldığı bazı eleştirilerde öne sürüldüğü gibi, itibardan düşmüş veya çürütülmüş değildir. ii) Bilimde var olan erkek-merkezci temayül ile en iyi şekilde başa çıkmak için mutat epistemik normlara ilaveten bilimsel araştırmalara bir tür politik kılavuzluk sağlanmalıdır. Bu iddiaları savunabilmek için bilimsel kuramların yalnızca ampirik verilerle belirlenemeyeceği tezini tartışıyorum. Bu tezin ne çürütülebildiğini ne de doğruluğunun gösterilebildiğini, bu nedenle bu teze dayanan feminist yaklaşımın felsefi olarak meşru olduğunu öne sürüyorum. Bilimin feminist eleştirisinde hemen her zaman kullanılan bu tez doğru ise sistematik olarak bilimsel araştırmalara sızan sosyal önyargıların hem epistemolojik hem de politik açıdan ciddi bir sorun teşkil ettiği ortaya çıkıyor. Sosyal önyargıların bu etkisi bilimsel araştırmayı bir ölçüde politik bir sürece dönüştürüyor. Bu bağlamda epeydir önem verilmemiş olan kadın perpektifinin bilim için taşıdığı politik değer anlaşılıyor.

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Introduction

Until the second half of the twentieth century, science has usually been thought to be exclusively a matter of logical relations between empirical data and hypotheses. Philosophers of science have been interested in issues such as the structure and language of scientific theories, or the kind and the degree of support that evidence gives to hypotheses, and so on. Starting with Thomas Kuhn's *The Structure of Scientific Revolutions*, philosophers have begun to emphasize the social aspects of scientific inquiry not just as an interesting side issue but as essential to understanding its very nature. Some of them have drawn attention to subjective factors in the choice of scientific theories, whereas others have pointed to the influences of the social and political context on scientific knowledge, and vice versa. Inspired by the feminist movement in the 1970s, some philosophers of science have begun to investigate the relation between science and gender.

These philosophers, namely the proponents of the *feminist critique of science,* share the core idea that scientific inquiry is infected with sexism, a bias against women, and they aim to reveal and eliminate that sexist bias in science. However, they differ in the aspects of scientific research that they focus upon. Some of them just point to the inequalities between men and women in the institution of science. They draw attention to facts such as that most natural scientists are men, or that women face difficulties in their employment or reception of grants. They complain that women have been

systematically excluded from the scientific community, and still face discouragement of various sorts.

Others claim that the male bias in science is found not only in such institutional matters, but also in scientific research itself. They point out that the choice of scientific problems and research areas often reflects a bias in favor of men and against women. Many times, they claim, scientific research has been directed to areas that serve men whereas those that serve women have been largely neglected. A typical case that shows that such a bias exists concerns the research of contraceptive techniques. Feminist critics of science claim that although research concerning the contraceptive techniques is crucial for women in that it has the potential to improve the lives of women substantially, it has not drawn enough scientific attention. And when it has, the research has mostly been directed to contraceptive techniques that are to be used by women. According to these philosophers, this shows that scientific research has often been carried out in a way that favors men and ignores women's needs.

Note that such critiques of science do not challenge the conventional conception of scientific inquiry as producing knowledge that is neutral and objective. What their claims imply is only that due to the male bias we come to have more knowledge of the issues that are usually used to serve men. There is no challenge regarding the neutrality of the very product, scientific knowledge itself. The scientific questions asked, and thus the areas where progress is made, may reflect a male bias, but that does not mean that the answers found by such scientific inquiry are male biased.

A third group challenges exactly that. They claim that the very content of what is considered to be scientific knowledge is infected by sexism. According to these

feminists, sexist assumptions play a role in the collection of empirical data, in the design of the experiments, in the interpretation of the outcomes, and thus in the choice of the theories that are proposed in order to explain them. Thus, they claim, certain scientific theories, especially those of the social sciences and biology, are often male biased. The subject matter in those sciences is often described in ways that reflect sexist assumptions concerning women, such as that they are inferior to men, or that only certain kinds of behaviour are appropriate for them. And as feminists point out, this is a problem not only because such theories sound disturbing, but also because the theories that assume or reflect a bias against women are often used in order to justify social and legal inequalities between men and women.

The feminists who believe that the very product of scientific inquiry itself is infected by sexism roughly fall into two groups according to the way they interpret the problem and the remedy they offer. The feminists who are usually called the 'feminist empiricists' think that male biased science is an instance of "bad science", which results from research that falls short of scientific rigor. Therefore, they suggest, what needs to be done in order to solve the problem is just to follow the scientific method more rigorously.

The proponents of what is called the 'standpoint epistemology', on the other hand, claim that the diagnosis and the remedy provided by the feminist empiricists are not satisfactory. According to them, the problem of sexist bias in science cannot be handled effectively by just sticking to the scientific norms, no matter how rigorously we do that. The problem as they see it is rather that male biased science reflects the social assumptions and value judgments of a particular kind, namely those that favor men over

women. The remedy for the standpoint epistemologists, therefore, is to bring in the assumptions of all sides. Since women's side has been ignored for centuries, they argue, it is natural now to start with the women's perspective.

As we see, the critique of the feminist empiricists and the standpoint epistemologists concern the product of scientific inquiry. A final branch of the feminist critique of science, the post-modern critique, goes even further. According to the post-modern feminists, the problem with scientific inquiry involves more than the inequalities between men and women within the institution of science, the choice of resarch problems and the end product of such inquiry. They claim that the very standards, methods, and norms that are definitive of scientific inquiry are male biased. According to them, the kind of rationality that is promoted in science is oppressive for women. Thus, they believe that what needs to be done is to abandon the whole scientific inquiry as it is carried out now.

In my thesis I will leave aside the post-modern critique. A defense of the scientific inquiry as a whole is well beyond the scope of this thesis. In any case, that is not what I am most interested here. Moreover, although they are obviously of great importance, I will not deal with the feminist critique of science that concerns institutional inequalities between women and men or the one that concerns the bias in the choice of the research problems either.

The question I will be interested here rather concerns the male bias in the very content of scientific knowledge. My primary aim will be to evaluate the two approaches to the problem, namely feminist empiricism, which suggests that the solution is simply to follow the standard scientific norms more rigorously than before, and standpoint

epistemology, which insists that scientific research must be carried out with a political guidance in addition to the usual epistemic norms. I will argue that although it has its difficulties, promoting a politically-guided research, such as the one that the standpoint epistemologists propose, is the best strategy for the feminist critics.

I will proceed as follows. In the first chapter, I will present the cases, which are claimed by the feminist critics to reflect a sexist (androcentric) bias in some scientific theories. Then, in the second chapter, I will discuss the question what exactly these cases imply about social factors in theory choice. In particular, I will consider the issue as to whether there is reason to believe that social factors do not merely happen to be congruent with the accepted theories at times, but that they may have a causal role in the theory choice. In the third chapter, I will present and discuss in some detail the two approaches in question, namely feminist empiricism and standpoint epistemology. And finally in the last chapter, I will evaluate the two with respect to the solutions they offer. While I will recognize the problems of standpoint epistemology, I will argue that it is more promising than its rivals in important aspects.

So let me start by some standard examples from the feminist literature, which are claimed by the feminists to reflect the androcentric bias in science.

I. Male Bias in Science

Cases that the feminist critics of science consider as reflecting a male bias in science are those in which scientific hypotheses seem to be chosen at least partly due to certain social prejudices concerning women (and men). In order to argue that such a bias against women plays a role in the choice of scientific hypotheses, feminists usually point to the fact that there is a curious congruence between the accepted hypotheses and the social assumptions of the context in which they are proposed. In this chapter I will first provide some standard cases that are claimed by the feminists to indicate such a relation. However, it is often argued that the cases in question show only that there is a "temporal coincidence" (Pinnick, 1994, 652) between the social assumptions and the accepted hypotheses, and not that the former have a *causal* role in the choice of the latter. Since the claim that social prejudices against women sometimes play a (causal) role in the choice of scientific theories is central for the feminist critique of science, I will also present and discuss the more general argument that feminists rely on, namely the argument from underdetermination. But to get a general idea of the kind of congruence that feminists have in mind, let us start with some examples.

The feminist literature contains a number of them, which range from those in the social sciences to others in hard core natural sciences like physics. As one might expect, it is much easier to detect a social bias in the social sciences than in natural sciences. But it is also less interesting. I believe that the best examples that show an interesting and convincing bias belong to biology. It is a life science that purports to provide

natural facts, a discipline whose theories are constrained by empirical data. Moreover, the relation between hypotheses and social assumptions in biology seems to be fairly direct (unlike those in physics, for instance). Hence, although I will mention some cases that belong to other sciences at the end of this chapter, my main focus will be biology. The first one concerns a favorite, Darwin's Evolutionary Theory.

I. i. Darwin's Evolutionary Theory

The principal elements of the Darwinian theory of evolution are variation in the population, natural selection and the resulting survival of the fittest. In a given population, individuals have a variety of properties. Some of those properties are advantageous to living and reproducing in the environment in which the population is located, others are not. Those individuals who bear the properties that are beneficial to survival and reproduction survive and keep reproducing, that is, they are naturally selected. Others that do not have those beneficial properties die out. Since the first group manages to produce more offsprings than the latter, eventually the beneficial property takes over in the population. In other words, the population evolves into one which consists of individuals having the beneficial property.

It has often been pointed out that Darwin's theory of evolution fits surprisingly well into the general social and political context of nineteenth century Britain:

> The similar fortunes of liberalism and natural selection are significant. Darwin's matter was as English as his method. Terrestrial history turned out to be strangely like Victorian

> history writ large. Bertrand Russell and others have remarked that Darwin's theory was mainly 'an extension to the animal and vegetable world of laissez faire economics.' As a matter of fact, the conceptions of utility, pressure of population, marginal fertility, barriers in restraint of trade, the division of labor, progress and adjustment by competition, and the spread of technological improvements can all be paralleled in *The Origin of Species*. But so, alas, can some of the doctrines of English political conservatism. In revealing the importance of time and hereditary past, in emphasizing the persistence of vestigial structures, the minuteness of variation and the slowness of evolution, Darwin was adding Hooker and Burke to Bentham and Adam Smith. The constitution of the universe exhibited many of the virtues of the English constitution. (Irvine, 1972, 98)

As early as 1862, Karl Marx noted that

> It is remarkable how Darwin recognizes among beasts and plants his English society with its division of labor, competition, opening up new markets, 'inventions,' and the Malthusian 'struggle for existence'[1].

Ruth Hubbard claims that such a congruence with the social and political thoughts of the time is probably partly responsible for the wide acceptance of the Darwinian theory,

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[1]From a letter to Friedrich Engels, quoted in Marshall Sahlins, *The Use and Abuse of Biology.*

because "its intrinsic optimism—its notion of progressive development of the species, one from another—...fit[s] well into the meritocratic ideology encouraged by the early success of British mercantilism, industrial capitalism and imperialism" (Hubbard, 2002, 157).

Moreover, when it comes to sexual selection, Darwinian theory draws a Victorian picture of the relationships between the sexes and of the roles that males and females play in the evolution. Needless to say, the feminist critique becomes relevant here, for the Victorian bias is obviously androcentric. In the Victorian picture, the male is the active, pursuing sex, whereas the female is the passive. Darwin thinks along similar lines:

> [sexual] selection depends, not on a struggle for existence in relation to other organic beings or external conditions, but on a struggle of individuals of one sex, generally males, for the possession of the other sex...
>
> Generally, the most vigorous males, those which are fitted for their places in nature, will leave most progeny. But in many cases, victory depends not so much on general vigor, as on having special weapons confined to the male sex...
>
> the males of certain hymenopterous insects have been frequently seen by that inimitable observer, M. Fabre, fighting for a particular female who sits by, an apparently unconcerned

> beholder of the struggle, and then retires with the conqueror. (Darwin, 1859, 69)

The conception of the female as waiting to be "conquered" by some heroic male is already disturbing. However, it does not end there. Recall that competition is an essential element in the Darwinian theory. If the males are in constant competition with one another for the "possession" of females, then it has to have consequences:

> With animals which have their sexes separated, the males necessarily differ from the females in their organs of reproduction; and these are the primary sexual characters. But the sexes differ in what Hunter has called secondary sexual characters, which are not directly connected with the act of reproduction; for instance, the male possesses certain organs of sense or locomation, of which the female is quite destitute, ors has them more highly developed, in order that he may readily find or reach her; or again the male has special organs of prehension for holding her securely. (Darwin, 1859, 567)

In a similar way, he explains the differences between the sexes regarding their mental dispositions:

> The chief distinction in the intellectual powers of the two sexes is shown by man's attaining to a higher eminence, in whatever he takes up, than can women—whether requiring deep thought, reason, or imagination, or merely the use of the senses and hands. If two lists were made of the most eminent men and

> women in poetry, painting, sculpture, music (inclusive both of composition and performance), history, science, and philosophy, with half a dozen names under each subject, the two lists would not bear comparison. We may also infer...that if men are capable of a decided pre-eminence over women in many subjects, the average of mental power in man must be above that of woman...[Men have had] to defend their females, as well as their young, from enemies of all kinds, and to hunt for their joint subsistence. But to avoid enemies or to attack them with success to capture wild animals, and to fashion weapons, requires the aid of the higher mental faculties, namely, observation, reason, invention, or imagination. These various faculties will thus have been continually put to the test and selected during manhood. (Darwin, 1859, 873)

The result, for Darwin, is that "man has ultimately become superior to woman". But women have their consolation. Although they do not develop those high mental powers (since sitting there waiting to be conquered does not require much of a mental activity), they are fortunate because they inherit the brains from their fathers. Moreover, lack of competition allows them to remain "tender" and less selfish. But make no mistake, for Darwin, 'tender' means being behind in evolution; for progress consists in developing those competitive skills.

Leaving aside possible internal inconsistencies in the theory (for it is not our purpose here to evaluate it with respect to that), the account of the roles of males and females and their relationships is as follows. Men compete with one another for the

possession of females, whereas females sit and wait to be conquered. Men defend females and the offsprings from enemies of all sorts, hence they develop those high mental powers, from tool making to philosophy, from poetry to mathematics. Men are competitive and ambitious, whereas women are tender. Men, endowed with greater passion, constantly pursue females, whereas females wait to be pursued. Certainly we have some congruence with the Victorian ideas.

The congruence becomes more interesting when we consider the alternative accounts that were available (and even explicitly proposed), but that did not fit into the general social background, and were not accepted. Monogamy and marriage provide a good example for such a contrast. According to the Darwinian account, for instance, monogamy and marriage result from our biological nature. Of course, he is talking about the Victorian marriage. And of course, he is not claiming that *men* are naturally monogamous. Quite the contrary. He says "from what we know of the habits of animals...the male is generally eager to pair with any female" (Darwin, 1859, 582). It is Victorian marriage that we are talking about, which practically means the monogamy of women only. For Darwin, marriage (or monogamy of women) results from our biology because "from the strength of the feeling of jealousy [of men] all through the animal kingdom...I cannot believe that absolutely promiscuous intercourse prevailed in times past" (Darwin, 1859, 895).

Engels, on the other hand, denies such a biological basis for the institution of marriage of the Victorian kind. Engels explains the emergence of marriage (or monogamy of women) as follows:

> Monogamy arose from the concentration of considerable wealth in the hands of a single individual—a man—and from the need to bequeath this wealth to the children of that man and of no other. For this purpose, the monogamy of the woman was required, not that of the man, so this monogamy of the woman did not in any way interfere with open or concealed polygamy on the part of the man. (Engels, 1972, 138)

So here we have two thinkers, Darwin and Engels. Both work with more or less the same anthropological sources (Hubbard, 2002, 161). They both attempt to explain the emergence of marriage, or monogamy of women. Darwin claims that it has to come from our biological nature, because strong feelings of jealousy of men exist "all through the animal kingdom" (how *he* knows this is a question to be asked, as Hubbard points out). Engels, on the other hand, claims that it is not biological, but a result of an economical arrangement that serves wealthy men. The Victorian perspective sees the Victorian marriage self-evident and natural. Darwin claims that it is biologically based. Darwin's account is the accepted one. It is something to note.

This case also instantiates a grand strategy that the feminists often draw attention to when they discuss the androcentric bias in science. As they point out, in many cases we see that a scientist's political and social beliefs (especially about what should never be compromised or traded off) and his beliefs concerning what is natural seem to coincide. It seems that in many cases when a scientist (or any person for that matter) thinks that a certain aspect of the social or political structure should not even be challenged, he tries to come up with a theory explaining how that aspect is naturally (often biologically) based.

Almost all the other cases I will present will reflect such a putative relation. In our current case, given the difference between the explanations proposed by Darwin and Engels, it is not hard to guess who favors the Victorian institution of marriage and who challenges it. It is not easy to support the Victorian code of behaviour and at the same time claim that it has only resulted from some economical arrangement that serves wealthy men. It would be easier if it were a result of our biological nature.

So much for the case of the Darwinian theory. Another case where the social (androcentric) prejudices seem to be congruent with the accepted theory concerns contemporary literature on human evolution. Now we turn to that.

I. ii. Contemporary Theories of Evolution

As Hubbard and other feminists note, the contemporary literature on human evolution is generally based on the myth of Man the Hunter. According to the evolution theorists, what has distinguished humans from apes is (man's) inventing tools and the social organization for hunting big animals, requiring him to develop conceptual thinking for coping with varied circumstances. Sometimes the theorist goes so far that he describes, with "a remarkable feat of clairvoyance to see in such detail what happened some 250000 years in pre-history" (Hubbard, 2002, 165), how the primitive hunter makes "an implement in a particular fashion largely because he watch[es] his father at work" (Oakley, 1972, 81).

However, leaving aside such romantic details, the main framework of the evolutionary studies relies largely on the "classic division of labor between the sexes"

(Howells, 1973, 88), where "males go off together to hunt large animals while females stay at home to nurture their young" (Longino, Doell, 1996, 84). As the feminist critics point out, such a picture fits well into the picture of "the contemporary Western middle-class social life in which men engage in public and women in domestic affairs" (Longino, Doell, 1996, 84).

Even when, as a result of recent feminist critiques, a few male anthropologists take into account Woman the Gatherer, the explanation cannot escape ancient stereotyping. As Hubbard quotes from Howells, for instance, the explanation then turns into one in which stone age men roam great distances "on behalf of the whole economic group, while the women were restricted to within the radius of a fraction of a day's walk from camp" (Howells, 1973). It seems that the feminist critics will have to fight for every meter away from the camp.

As I have said before, such a congruence between the social perspective and the accepted theories becomes even more curious when we think of other easily conceivable explanations. First of all, as Hubbard claims,

> One can equally well assume that the responsibilities of providing food and nurturing young were widely dispersed through the group that needed to cooperate and devise many and varied strategies for survival. Nor is it obvious why tasks needed to have been differentiated by sex. It makes sense that the gatherers would have known how to hunt the animals they came across; that the hunters gathered when there was nothing to catch, and that men and women did some of each, though both of them probably did a great deal more gathering than

> hunting. After all, the important thing was to get the day's food, not to define sex roles. (Hubbard, 2002, 166).

The important thing for the standard evolution theorist, on the other hand, seems to be precisely that (that is, defining the sex roles). Once again we see the strategy that feminists often draw attention to. The standard theorist seems to try to establish firmly the sex roles that he is comfortable with, and he does this by declaring those roles to be natural or biological. The critic who is uncomfortable with such roles, on the other hand, denies that they are natural. As the feminists often point out, this is a curious coincidence again, between what a scientist thinks as an aspect of society or human life that should be untouchable, and what he declares to be grounded on natural facts.

This is especially interesting in cases in which certain parts of the scientific explanation look quite out of place and arbitrary unless we consider the function that they have, namely legitimizing and reinforcing a particular social bias. The following cases concern some of the scientific accounts which contain such out of place elements whose sole function, the feminists argue, seem to be reinforcing the view that (yes, once again) females are passive receivers.

I. iii. The Algae and the Sheep Next Door

No, not the algae, you might think, but not even the algae are immune from Victorian stereotyping. As Hubbard notes, the works of Wolfgang Wickler, who is a

contemporary ethologist investigating sexual behaviour patterns, constitute a good example of wild androcentrism. Let's start with his jewels concerning the algae:

> Even among very simple organisms such as algae, which have threadlike rows of cells one behind the other, one can observe that during copulation the cells of one thread act as males with regard to the cells of a second thread, but as females with regard to the cells of a third thread. *The mark of male behaviour is that the cell actively crawls or swims over to the other; the female cell remains passive.* (Wickler, 1973, 23, my italics)

Some of us get confused here. During copulation, the cells of one thread sometimes move towards the cells of another thread, and sometimes they remain passive. So far so good. But what are 'male' or 'female' doing there? What exactly is the point of describing them as males or females depending on whether they are active or passive? Does it add anything significant to the description?

Well, it does, the feminists claim, *if* you think that the conception of male as active and female as passive is so great (and untouchable) that it must be a natural fact. If you think that females are made to be passive receivers (waiting to be "conquered"), then it helps to see that even the female algae are passive. But some feminists have been active enough to see the obvious circularity in the reasoning. Hubbard states, for instance,

> The circle is simple to construct: one starts with the Victorian stereotype of the active male and the passive female, then looks at animals, algae, bacteria, people, and calls all passive

> behaviour feminine, active or goal-oriented behaviour masculine. And it works! The Victorian stereotype is biologically determined: even algae behave that way. (Hubbard, 2002, 162)

Hubbard argues that unless the scientist is trying to base the Victorian stereotypes on biology, and thereby to reinforce them, such a circle attributing femininity and masculinity to the threads of algae (!) looks quite out of place.

Valerius Geist's description of mountain sheep is no better in this respect. Here is a passage describing a certain interaction between two rams:

> Matched rams, usually strangers, begin to treat each other like females and clash until one acts like a female. This is the loser in the fight. The rams confront each other with displays, kick each other, threat jump, and clash till one turns and accepts the kicks, displays, and occasional mounts of the larger without aggressive displays. The loser is not chased away. The point of the fight is not to kill, maim, or even drive the rival off, but to treat him like a female. (Geist, 1971, 190)

All observational evidence is a bunch of rams jumping, clashing, kicking. Why is the ram seen as acting like a female when he accepts the kicks, displays and mounts? How does Geist know that one of the rams is treating the other like a female when he does these?

As Hubbard notes,

> This description would be quite different if the interaction were interpreted as something other than a fight, say as a homosexual encounter, a game or a ritual dance. The fact is that it contains none of the elements that we commonly associate with fighting. (Hubbard, 2002, 162)

But, feminists note, take Geist's social prejudices into account, and you get his description. (Geist may be thinking:) Homosexuality is not acceptable, therefore it cannot be naturally/biologically based. Thus, here we see two rams mounting, but obviously this cannot be a homosexual encounter. Since these are two males, it must be a fight. Moreover, since it ends when one begins to accept the kicks etc., the point of the "fight" must be "to treat him like a female", for this is (accepting the kicks etc.) appropriate behaviour for a female.

This is the familiar theme appealed to by feminists once again. When a scientist thinks that an aspect of social life should not even be challenged, he tries to establish it as a natural fact. By the same token, when he thinks an aspect is unacceptable, he tries his best not to see it in nature. So, when Geist sees a ram accepting the kicks etc., he sees it as acting like a female. When he sees two rams mounting, he sees it as a fight. According to the feminists, this strategy of providing naturalistic justification for the aspects of social context that are dear to one is too common. The next example involves a romance: the "scientific fairy tale" of the egg and the sperm.

I. iv. Once upon a time...

The putative androcentric bias in the descriptions of the interaction between the egg and the sperm is largely due to the imagery implanted on their representations. As Emily Martin explains,

> It is remarkable how 'femininely' the egg behaves and how 'masculinely' the sperm. The egg is seen as large and passive. It does not move or journey, but passively 'is transported,' 'is swept,' or even 'drifts' along the fallopian tube. In utter contrast, sperm are small, 'streamlined,' and invariably active. They 'deliver' their genes to the egg, 'activate the developmental program of the egg,' and have a 'velocity' that is often remarked upon. Their tails are 'strong' and efficiently powered....with a 'whiplashlike motion and strong lurches' they can 'burrow through the egg coat' and 'penetrate' it.
>
> At its extreme, the age-old relationship of the egg and the sperm takes on a royal or religious patina. The egg coat, its protective barrier, is sometimes called its 'vestments,' a term usually reserved for sacred, religious dress. ..The egg is also passive, which means it must depend on sperm for rescue. Gerald Schatten and Helen Schatten liken the egg's role to that of Sleeping Beauty: 'a dormant bride awaiting her mate's magic kiss, which insills the spirit that brings her to life'. Sperm, by

> contrast, have a 'mission,' which is to 'move through the female genital tract in quest of the ovum'. (Martin, 1996, 327-328)

As Martin notes, in the more contemporary accounts of the encounter of the egg and the sperm, the imagery has been revised. A research group at Johns Hopkins University, has discovered that the forward thrust of the sperm is extremely weak, and that "its strongest tendency, by tenfold, is to *escape* by attempting to pry itself off the egg" (Martin, 1996, 330, my italics). As Martin points out, however,

> Although this new version of the saga of the egg and the sperm broke through cultural expectations, the researchers who made the discovery continued to write papers and abstracts as if the sperm were the active party who attacks, binds, penetrates, and enters the egg. The only difference was that sperm were now seen as performing these actions weakly. (Martin, 1996, 331)

A similar research that has challenged the traditional view of the egg-sperm interaction is Schatten and Schatten's. The Schatten-Schatten research has suggested "the almost heretical view that sperm and egg are mutually active partners" (Schatten and Schatten, 1984, 51). However, as Martin notes, Schatten-Schatten cannot help conforming to the aggressive-sperm metaphor:

> They describe how 'the sperm and egg first touch when, from the tip of the sperm's triangular head, a long, thin filament shoots out and harpoons the egg'...why not call this 'making a bridge' or 'throwing out a line' rather than firing a harpoon?

> Harpoons pierce prey and injure and kill them, while filament only sticks. (Martin, 1996, 332)

In the above case of the scientific descriptions of the egg-sperm encounter, what the feminist critics find objectable seems to be the language. In fact, Martin grants this in the beginning of her discussion of the issue (Martin, 1996, 324). However, she claims, it does not become a less significant matter for that reason. As feminists often point out, science is not a discourse among many; it is often used in order to justify certain social phenomena. Martin makes the same point here:

> The models that biologists use to describe their data can have important social effects...Once the *Origin [of Species]* stood as a description of the natural world, complete with competition and market struggles, it could be reimported into social science as social Darwinism, in order to justify the social order of the time. What we are seeing now is similar: the importation of cultural ideas about passive females and heroic males into the 'personalities' of gametes. This amounts to the 'implanting of social imagery on representations of nature so as to lay a firm basis for reimporting exactly that same imagery as natural explanations of social phenomena. (Martin, 1996, 338)

So the feminist critics insist that androcentric bias should be taken seriously even when it seems to be just a matter of language. In fact, as they often take the pains to explain, it is never just a matter of language.

So much for the particular cases. Let me turn to the discussion about what they indicate.

II. Bias or Coincidence?

As I have said in the beginning, there is a dispute concerning what the above cases of congruence between social prejudices and the accepted theories actually show. Feminists, of course, think of these cases as reflecting the androcentric bias in science. According to them, in these cases the social prejudices and the accepted hypotheses are congruent because the former are partly responsible for the latter. However, such a conclusion is denied by some philosophers. According to Cassandra Pinnick, for instance, the cases appealed to by feminists show only that there is a "temporal coincidence" between the social prejudices and the accepted scientific hypotheses, and not that there is a "*causal* connection" between the two (Pinnick, 1994, 652, her emphasis).

It is true that each case, taken individually, merely shows that sometimes the social prejudices and the accepted hypotheses are congruent, and not that the former have a causal role in the acceptance of the latter. However, as the number of such instances increases, denying such a causal relation may become harder, for it is often on the basis of regularities that we infer causal connections. Hence, although no single case of congruence between social assumptions and the accepted hypotheses indicates the existence of a causal link between them, and although even the cases as a whole do not *imply* that there is such a causal link, when the instances of such a congruence are enough many, it is hard to take them to be mere "temporal coincidence"s.

Nevertheless, the claim that there is a causal link between the social assumptions and the acceptance of theories is too vague and needs much clarification and elaboration in order to be justified. It is not clear, for instance, whether the putative causal link is between a particular social assumption and the acceptance of a particular theory, or whether it is between the social assumptions and theory acceptance in general. These clarifications will certainly have a bearing on the justification of the claim in question. If the putative causal link is between a particular social assumption such as that females are passive and the acceptance of a particular hypothesis such as that women have had no influence on the evolution of human beings, then the regularity that can be used to justify that causal claim is the one between that particular assumption and the acceptance of that particular hypothesis. One needs to show that in many cases the hypothesis that women had no influence on our evolution has been accepted by people who believe that women are passive. Clearly, it is hard to point to such a regularity. Particular hypotheses are not usually accepted more than once. Thus, it is not clear how one can make a case to show that (mostly) whenever a certain social assumption has been accepted, a particular theory has been chosen. The acceptance of a particular hypothesis or theory is not repeated in the history of science.

The strongest kind of argument that the feminists offer for the existence of a causal link between a particular social assumption and the acceptance of a particular theory seems to be the following[2]. Take a particular social assumption, say the assumption that females are passive, and a particular hypothesis, say, that women have

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[2]I will use the following assumption and hypothesis for the sake of argument. Here I only want to present the *kind* of argument that can be proposed for the existence of a causal link between a particular assumption and the acceptance of a particular hypothesis.

had no influence on the evolution of human beings. We see in the history of science that in the societies where it is assumed that women are passive, the hypothesis that women had no influence on evolution has been accepted, whereas in the societies where that assumption is rejected, the hypothesis in question has been rejected. Therefore, we have some reason to suspect that there is a causal link between the acceptance of that assumption and the acceptance of that hypothesis[3].

However, as I have said, when it is a particular hypothesis that is in question, the data that can support a causal claim between the acceptance of the hypothesis and of a certain social assumption are very limited since particular hypotheses are not usually accepted more than once in the history of science. Therefore, if feminists claim that there is a causal link between particular social assumptions and hypotheses (for instance, between the assumption that women are passive and the hypothesis that women have played no role in our evolution), then they will not be able to point to a sufficient amount of data to support that claim.

This is why, I think, the causal link that they argue for should be between the acceptances of social assumptions and hypotheses *in general*. More precisely, they must be arguing that the social assumptions of the person(s), whatever they are, (sometimes) causally influence her choice of hypothesis. Note that in this case the congruence between particular assumptions and hypotheses can be used to support the putative causal claim, but in a slightly different way. The congruence between the assumption

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[3] More sophisticated (in so far as the cases are concerned) arguments of this type have been proposed by the feminists. See, for instance, Donna Haraway's "The Biopolitics of a Multicultural Field" for the claim that certain hypotheses in primatology have been accepted in the Western societies with certain assumptions, whereas they have been denied in some Eastern societies where such assumptions are not present.

that women are passive and the hypothesis that women have no influence on our evolution, for instance, will demonstrate *one instance* where the social assumptions and hypotheses in general are congruent. Similarly, the congruence between other particular assumptions and hypotheses will support the general claim concerning the congruence of social assumptions and hypotheses in general.

If we understand the feminists' causal claim in this way, clearly, the data that can be pointed to in order to support that claim will be abundant. However, due to its extreme generality, in the sense that it concerns a relation between social assumptions and theory acceptance in general, the causal claim in question will also be quite vague. Here I do not intend to suggest a solution to this problem or to argue that it cannot be solved. I only want to draw attention to the fact that the feminists' causal claim concerning the social assumptions and the acceptance of theories is not easy to defend. If it is too specific (in that it concerns particular assumptions and hypotheses), then the data that can support it will be too little; if it is too general (in that it concerns social assumptions and theories in general), then it is too vague.

Note that the above argument is based on the putative regularities between social assumptions and the acceptance of theories, and its difficulty concerns the question of how the cases from history of science should be interpreted (more or less generally). However, feminists have another argument for their claim that it is plausible to think that sometimes social prejudices play a causal role in the choice of the scientific hypotheses, an argument that is not based on particular cases. The argument is based on the thesis of underdetermination of theory by evidence. The general idea of underdetermination is that "a given body of data can always be accounted for by more than one distinct

theory—the data are incapable, in principle, of singling out a unique theory" (Okasha, 2000, 285). On the basis of such an underdetermination, many thinkers, including the feminists, have argued that it is plausible to think that social factors sometimes play a role in the acceptance of theories. For, if the evidence does not single out a theory uniquely, then the scientists cannot have chosen the theories on the basis of evidence alone; other factors such as social prejudices may have been partly responsible. This, if true, would explain the congruence between the social assumptions and the accepted theories as well. If there is room for social bias in the choice of the theories, then it is not surprising that often the accepted theory fits into the social context quite well.

However, we must examine the thesis of underdetermination in this context more carefully. First of all, the argument from underdetermination for the existence of social bias can be understood in two ways. The argument may be seen as establishing, on the basis of the premise that theories are underdetermined by evidence, either the conclusion that social factors *must* have been influential, or the conclusion that they *may* have been so. Clearly, the latter is the more modest understanding of the argument. As philosophers have pointed out[4], the more ambitious interpretation is harder to defend. Moreover, as I will argue later in my thesis, all that the feminists (even those such as Harding, who suggests that some kind of political action needs to be taken to eliminate social bias) need is the more modest claim that social factors *may* have been partly responsible in the choice of theories. As I will argue later, the remedies they offer will make sense once we recognize that there just is room for social bias in science; it does not need to be the case that social factors are always influential. Thus, from now on, as

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[4] See Samir Okasha, 2000, for instance.

many other writers do (Okasha, 2000, 285), I will understand the argument from underdetermination in the modest way.

Moreover, it is worth pointing out that someone arguing that social factors may have played a role in the acceptance of scientific theories need not be concerned with all possible data; that the theories are not determined by the actual (finite) data available to the scientists at the time is enough. The fact that the data available to the scientists who choose the theory do not determine that theory uniquely is enough to suspect that social factors may have been partly responsible for that choice. Since we are interested in the question on what basis the scientists have chosen the theories, the data that are not available to the scientists are irrelevant (Okasha, 2000, 286). In short, for the purposes of the feminists, the argument from underdetermination should be understood as underdetermination of theories by actual data available to the scientists.

The more crucial clarification, however, concerns the notion of *underdetermination* itself. As it has been often pointed out, the significance and strength of the argument from underdetermination depend on how this notion is understood. Roughly speaking, there are two alternatives. We can understand the thesis of underdetermination either as the claim that the data are *logically compatible* with more than one theory, or that the data equally *support* more than one theory (Okasha, 2000, 286). These two variants of the thesis are respectively called 'deductive underdetermination' and 'ampliative underdetermination' by Larry Laudan (Okasha, 2000, 291).

As Samir Okasha notes, the thesis of underdetermination, understood in the first (deductive) sense, becomes a truth of logic:

> For if the actual data consists of a finite set of singular sentences, and a theory consists of a set of sentences at least one of which is universal, then it is true on a point of logic that any amount of actual data will be compatible with more than one theory...The existence of "underdetermination" in th[is] sense simply reflects the fact that theories outstrip the data on which they are based—the inference from data to theoretical hypothesis is always deductively invalid. (Okasha, 2000, 286-7)

However, as Okasha points out, if underdetermination is understood in this way, then, although it becomes a truth of logic, it loses much of its impact on the claim that social factors may sometimes play a role in the choice of theories. For, unless we accept a "naïve deductive-nomological account of explanation and confirmation" (Okasha, 2000, 287), which reduce explanation and confirmation to relations of entailment, the fact that the data are logically compatible with more than one theory does not imply that we cannot have other good epistemic reasons (concerning simplicity, efficiency, scope, etc.) to prefer one theory over another. In other words, that theories are underdetermined by data in this sense does not quite motivate the search for social factors in the choice of theories; there are other epistemic reasons that can fill the gap.

As Okasha states, in order for the thesis of underdetermination to motivate a search for social factors in theory choice, it must be understood in the "ampliative" sense. That is, only if it is true that data equally support more than one theory (and not just are logically compatible with them), do we have motivation to search for other non-epistemic (such as social) factors in theory choice. As Okasha argues, if the data equally support more than one theory, then this means that the scientists choosing one particular

theory among equally supported alternatives do not have an epistemic reason to do so; thus it is plausible to think that other, perhaps social, factors may have played a partial role.

However, as Okasha argues, once we understand underdetermination in this "ampliative" sense, then it ceases to be a simple point of logic, and thus we have no immediate guarantee for its truth. In order to show that in some cases the data equally support more than one theory, he claims, one needs first to "articulate a theory of confirmation,..., i.e., an account of the conditions under which a theory is supported by a given body of data", and then to "show that, given such an account, the relation between data and best-supported theory is non-unique" (Okasha, 2000, 294). And as he states, it has not been done yet.

However, as Okasha also notes, this does not mean that it cannot be done. Underdetermination in the ampliative sense may be a significant phenomenon in science, it has just not been shown to be so yet. As Okasha claims, the answer largely depends on the theory of confirmation we accept, and that is a big question itself. The moral is that it is an open question. Contrary to Pinnick's self-confidence, for instance, the thesis of underdetermination has neither been shown to be false, nor has been abondoned by the philosophers of science as an outdated idea. Pinnick refers to Laudan's arguments against underdetermination, for instance, and there certainly are others who propose similar arguments (see, for instance, J. R. Brown, 1989), but there are other philosophers who argue against those objections to underdetermination.

Okasha, in his paper, for instance, argues that both Laudan's and Brown's arguments against underdetermination fail[5].

Once again, the moral is that (ampliative) underdetermination is still an open question, and as Okasha notes, the answer calls for a big discussion about the best theory of confirmation, which definitely lies beyond the scope of my thesis. Admittedly, that the feminist agenda rests on such a contested thesis weakens the feminist position. However, since it has not been refuted either, a philosophical position based on it is not necessarily bankrupt; it is a view that can be defended rationally. This is all I want to argue for here. The feminist critique is not based on sufficiently strong philosophical grounds, but it is a legitimate philosophical position. Thus, the question as to what strategy the feminists should adopt is an interesting question. In the rest of my thesis, I will be dealing with that question.

There are very roughly two proposals on the table, namely the one defended by the feminist empiricists, and feminist standpoint epistemology suggested by Sandra Harding. Let me now turn to them.

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[5] See also A. Kukla's "Laudan, Leplin, Empirical Equivalence and Underdetermination" for a defense of underdetermination against Laudan's objections.

III. The Proposals: Feminist Empiricism and Standpoint Epistemology

The two approaches in question are basically distinguished from each other with respect to the remedy they offer. Recall from last chapter that for the purposes of my thesis I am assuming that there is indeed a problem of social bias (androcentric bias, in particular) sometimes playing a role in theory choice. As I have said, there are many cases in which the social assumptions and the accepted hypotheses are congruent, and this makes it somewhat plausible to think that social factors have been partly responsible for hypothesis choice. However, unless the general argument from (ampliative) underdetermination (or some similar argument) works, we have no guarantee for that. It simply is an open question whether or not social factors play a role in theory choice. Nevertheless, as I have said, the purpose of my thesis is to determine the best strategy for the feminists, all of whom accept a significant existence of social bias in science. Thus, I will not question the presence of social bias in science from this point on, and try to see which feminist proposal fares better *given* such social (androcentric) bias.

III. i. Feminist Empiricism

The first proposal is the feminist empiricists'. Feminist empiricists claim that the problem with (male) biased science is that it is "bad science", that is, it is science that does not quite meet the scientific norms and standards. Thus,

according to them, the solution or the remedy to the problem is simply to follow those norms and standards more rigorously.

Note that the distinctive feature of feminist empiricism is that male biased science does not raise any doubt concerning the status of scientific inquiry, its norms and method. Feminist empiricism have no quarrel with the conventional conception of scientific inquiry; they agree that scientific theories should and can be value-neutral, unaffected by social factors. They grant that some theories, such as androcentric theories in biology, have not been value-neutral in that they reflect certain social prejudices and value judgments. However, according to them, this just shows that some theories have failed to measure up to the scientific standards, and not that there is something wrong with the scientific standards themselves. That is why feminist empiricism is not a challenge to the scientific norms and method. For them, science should proceed as always, and scientists should exercise more caution in their work.

As Sandra Harding (who is not a feminist empiricist herself) puts it, what feminist empiricists are arguing is "in effect, that mainstream inquiry has not adhered rigorously enough to its own norms" (Harding, 1991, 113), and, as we might add, the remedy for them is simply that it should. In short, for them, bad science may exist, but it can be eliminated by scientific means.

Some feminist critics of science disagree with the feminist empiricists. They claim that it is misleading to interpret the problem with male biased science as "bad science", and naïve to think that it can be dealt with scientifically, by merely reinforcing the existing scientific norms. They argue that the solution to

the problem requires employing other (in particular, political) norms in addition to the scientific ones. The best such proposal on the table is Sandra Harding's standpoint epistemology.

III. ii. Feminist Standpoint Epistemology

The slogan of the feminist standpoint epistemology is to start out from the perspective of women's lives in order to eliminate the androcentric bias in science (Harding, 1991, 147)[6]. Confronted with such a formulation, one may think that these feminists are claiming that there is a distinct perspective peculiar to all and only women and that this perspective is intrinsically epistemologically superior to others. One may suppose that the proponents of the standpoint epistemology have given up objectivity as a desideratum and that they are promoting one perspective among many as desirable, once and for all. Feminist standpoint epistemology is none of these[7].

Some kind of historical or empirical relativism has been recognized by both feminist empiricists and standpoint theorists. Both parties accept, as a matter of empirical fact, that scientific theories proposed in a certain historical context reflect, to some extent, the social and cultural assumptions of that context. As I have said before, feminist empiricists view these biases as instances of bad science, but as nothing to worry about, since a more rigorous application of the scientific norms, more effort for being value-neutral, can and will eliminate them.

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[6] Dorothy Smith, Nancy Hartsock, and Hilary Rose are some other defenders of a feminist standpoint epistemology.

[7] That is why the label is highly misleading.

Proponents of standpoint epistemology agree that scientific norms will help eliminate these biases. However, they insist that, given the factual situation that existing theories are biased (to some extent), promoting value-neutrality is not the best way to achieve objectivity. Instead, they claim, we must make use of our recognition of this *de facto* situation. To put it differently, according to them, value-neutrality in a biased situation does not provide the desired objectivity[8]. What we need to do, they argue, is to use this *de facto* bias (Harding, 1991, 153, 161, 163).

This is where women's perspective becomes relevant. As I have said, the proponents of the standpoint epistemology do not claim that there is something special in women's perspective in itself; they do not argue that it is intrinsically superior, and so forth. The significance of women's perspective is rather relative (or due) to the place of women in the current societies. It is fact, feminists claim, that women have been oppressed. They have not been (included in) the dominant group. They have been outsiders or "strangers to the social order" (Harding, 1991, 148). Their experiences or lives have been devalued and neglected and have not been properly represented in the background social beliefs. The current social beliefs and assumptions have been formed with "excessive reliance on distinctively masculine lives" (Harding, 1991, 147).

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[8] Although standpoint theorists such as Harding criticize the feminist empiricists for promoting a weak objectivity, they do not provide a clear account of objectivity themselves. In certain passages, Harding seems to equate objectivity with value-neutrality and argue that promoting value-neutrality is not the best way to achieve it in a biased situation. In other places, she seems to challenge the notion of objectivity as value-neutrality by arguing that such a notion of objectivity is too weak. I think that her objection to the feminist empiricists is stronger if her point is that value- neutrality in a biased situation is not the best strategy to eliminate bias. The notion of objectivity as value-neutrality that she ascribes to the empiricists is too weak to be defended by anyone including the empiricists. Thus, attributing an obviously too weak notion of objectivity to the empiricists, and then criticizing them for that, is not fair. Since Harding does not have a clear notion of objectivity, I will avoid appealing to this notion in the rest of my thesis, for it will only obscure the discussion.

These facts, Harding argues, make women's lives valuable especially in detecting biases in scientific knowledge. The social biases in science are of those who proposed them (nobody puts someone else's prejudices in the theory he formulates). That is, scientific theories, when they reflect social bias, reflect the bias of the dominant group. Moreover, the dominant group has consisted of (among other things) men (and not women). Thus, women's perspective is an important source for the elimination of social prejudices, in that it is the perspective of the non-dominant group. Harding claims that, as the oppressed group, they are the ones who are most likely to be disturbed by the prejudices of the dominant group, and thus to detect those biases. As the oppressed group, they have less to lose in case such biases are eliminated; therefore, they are less likely to resist (Harding, 1991, 146-152).

According to Harding, these considerations make a politically-guided scientific research plausible. That is, if the perspective of oppressed groups constitutes a valuable resource for eliminating bias, then we have reason to take into account political factors such as who are being oppressed, when we carry out scientific research. A politically-guided research in the sense Harding suggests will encourage resarch from the perspective of the oppressed. What this exactly means is not clear in Harding's works. Presumably, encouragement of these perspectives will consist in promoting research concerning the oppressed groups themselves or what they find interesting or problematic, and perhaps encouragement of the oppressed to participate in scientific inquiry themselves[9]. To be sure, there are serious questions concerning the application

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[9] Given such suggestions, one can question whether there is anything peculiar to feminist standpoint epistemology. One can point to the fact that the feminist empiricists will also agree, for instance, that women should be encouraged to participate in scientific inquiry; that the number of women scientists

of Harding's suggestion of a politically-guided research. Possible answers to these questions are beyond the scope of this thesis. Thus, I will deal with Harding's suggestion as a very rough claim that political factors such as who are oppressed must be taken into account in scientific inquiry (more specifically, the perspective of the oppressed must be promoted in some sense as the ones suggested above).

Note that in the argument standpoint theorists provide, the peculiarity of the women's perspective is wholly relational. There is no intrinsic superiority in women's perspective that makes it epistemologically preferable. It is women's being oppressed in the society that matters, and not their biology, or a different kind of "intution" ("women's intuition"). A man, if he is oppressed in a similar way, is as good as a woman, as a source for eliminating the bias of the dominant group with respect to the nature of opression (Harding, 1991, 147). To repeat (since this is so often terribly misunderstood) what matters is that women are oppressed, and not that they have a certain biology. For Harding, it is the life of the oppressed that we should start with, and the lives of most women meet that criterion.

The basic line of reasoning that the standpoint theorists provide is not specific to the sexist bias and thus to women's perspective. Women's perspective is valuable for

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should be increased, and so forth. If that is the ultimate suggestion of standpoint theorists, then, one can argue, there is nothing novel in feminist standpoint epistemology. However, such an objection will miss an important point. It is true the proponents of feminist empiricism may also agree that women should be encouraged to become scientists. However, we are concerned here not with what the proponents of feminist empiricism generally think about women, but with what the position feminist empiricism implies. Feminist empiricism and standpoint epistemology are both about male bias in the *content* of science; according to the former it can be handled epistemically whereas according to the latter political guidance is necessary. That most of the proponents of the former also believe that women must be encouraged to become scientists for some other reason is irrelevant when we compare the positions themselves.

eliminating bias, just in the way workers' or the blacks' perspectives are valuable[10]. The idea is that in a situation where there is, as a matter of fact, bias, neutrality is not the best means to eliminate bias. The idea is that when there is bias, and when we are aware of the dominant group who (not necessarily intentionally of course) is responsible for that, there is more that we can do than merely relying on the scientific norms and standards. We can appeal to the perspectives of the oppressed groups who suffer from such biases. These groups, it is argued, are most likely to detect those biases and to insist that they should be eliminated.

I will consider the objections to the feminist standpoint epistemology in the next chapter and provide a general evaluation of it. I will argue that although it suffers from certain difficulties, it is a more promising approach than its rivals.

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[10] This is not surprising, for feminist standpoint epistemology often claims connection to Marxist standpoint theorists. See Harding 1991, p.152 for instance. To be sure, that the standpoint epistemologists relate their positions to Marxist theorists does not guarantee that there is a significant analogy between the two views. In fact, it has been argued in the literature that there are important differences between the conditions of women and the workers. See, for instance, Bat-Ami Bar On's "Marginality and Epistemic Privilege" in *Feminist Epistemologies* eds. L. Alcoff and E. Potter, New York and London: Routledge, 1993, 83-101.

IV. Evaluation

Let me start with the main objection to Harding's view. For the sake of clarity, let me construct Harding's argument in a more compact way. First of all, according to her, theories are underdetermined (in the ampliative sense) by evidence. Data at hand often equally support (in the rich sense of evidential support, which may include factors like simplicity, fruitfulness, scope, and so on) more than one theory. Thus, there is often room for social factors in the choice of theories. Secondly, for her, it is obvious that whoever makes the theory choice fills in the gap (between the accepted theory and the data at hand) with his or her (in fact, *their*, since it is the scientific community who makes the ultimate choice) social assumptions. Thirdly, as a matter of fact, we know that science has long been done by males, or by people who have had biases against women. In other words, the dominant group in the scientific institutions has largely consisted of those who are biased against women.

This, the argument goes, gives us some reason to believe that the scientific theories chosen have been heavily biased against women. If there has been a gap that can be filled by social bias, and if the ones who have had that opportunity have been often biased against women, then it seems plausible to think that the accepted scientific theories have been biased against women (as feminists have been noticing in the last decades).

Moreover, Harding's argument goes, it is plausible to think that whoever suffers from a bias or prejudice is more likely to detect it and is less resistant to its

abondonment. And since women (among others who have been oppressed) have suffered from biases against them, they are more likely to detect those biases. Of course, as she recognizes, this does not mean that all women will be equally good at that, or that they will always be better than men in detecting such biases. A man who suffers from biases against women will be equally good in detecting biases. However, if the heavy bias against women is a result of the neglect of women's perspective, then it seems plausible to think that promoting women's perspective for a while may be the way to eliminate it.

As we have seen, whether or not theories are underdetermined by evidence is an open question. So naturally, that part of Harding's argument draws many objections. But we have considered the core of such objections in the earlier chapters. The main objection that is specific to Harding's position is her claim that whoever suffers from a bias is more likely to detect it. Pinnick, for instance, states that Harding's claim in question is a good empirical claim which is even intuitive, but that there are no empirical data to support it (Pinnick, 1994, 653-655). Moreover, she claims, Harding's claim is a variant of the claim (made by Thomas Kuhn) that older scientists are less likely to switch to the new scientific paradigm than the younger ones (since they have more to lose), and that claim has been discredited by some studies (Pinnick, 1994, 654).

However, Pinnick's main objection to Harding's claim is that there is no empirical data to support it. And we know for sure that Harding never refers to such empirical data. She definitely does not talk about studies concerning the relation being oppressed and the ability to detect biases of the dominant group.

But one can find historical episodes that support Harding's conjecture. As we know, the discussion about an androcentric bias has occurred only after some feminists (who have been mostly women) have been disturbed by that bias (and have had the opportunity to speak loudly about it). Similarly, Harding states that biases on behalf of bourgeoisie or white men have been made visible only by those who have been disturbed by those biases, and only once a conflict between the parties (between bourgeoisie and proletariat,for instance) has emerged (Harding, 1991, 152).

Admittedly, a few cases will not suffice to prove her general claim, no matter how plausible they are. However, I think this much is certain. A bias against women has not been easily detectable from the exclusively male perspective. For, science has been done so far exclusively by men (who are not much disturbed by such social prejudices), and nobody before the feminists has drawn attention to the androcentric bias. Thus, unless we assume that scientists have consciously kept the biases although they have been well aware of them, it is plausible to infer that they have not been able to detect them. This gives us reason to believe that women (or feminists in general) are more likely to detect those biases.

Note that Harding's argument so far has been an epistemological one. The claim she has argued for is that women's perspective (or the oppressed's in general) is a good source to detect social biases. Up to now, we have been considering her claim that we will have a better chance of *eliminating social bias* from science, if we promote women's perspective. As Pinnick notes, however, such a claim has not been shown to be supported by empirical data. It has not been shown to be false, either. I think it is a

very plausible claim that has been suggested by some historical cases. But it is no more than that.

I think that the real merit of Harding's suggestion is political. But it relies on the argument from underdetermination. Once again, whether theories are often underdetermined (in the ampliative sense) by data or not is an open question. However, as I have said before, underdetermination in some form is assumed by almost all feminist critics, for without it all cases of bias against women turn out to be gross mistakes by scientists. If a theory is always uniquely determined by the data at hand (in the sense of definitely supporting one more than all others), then there really is no room for social factors to play a role. If a hypothesis is chosen in virtue of its social implications, then this must be done at the expense of overwhelming (determining) epistemic force on behalf of its rival; the former must be chosen because of its social impact, although its rival is determined by the data available. Clearly, for feminist critics who claim that hypotheses are often chosen on the basis of social factors, this means that scientists too often are irrational, that that they override determining epistemic force by some social interest.

On the other hand, if some kind of an underdetermination is true, then scientific theories reflecting social bias cease to suggest irrationality on scientists' part. If the data at hand do not determine any theory uniquely, then it is only natural that sometimes theories are chosen in virtue of their social implications. If there is (at least sometimes) a gap that *can* be filled with social assumptions, then it is no wonder that sometimes it is filled with social assumptions. For this reason, for any feminist critic who does not

claim that scientists are often irrational, and that we can only hope that they will not be in the future, underdetermination in some form must hold.

So suppose that underdetermination is true, that it is a significant phenomenon in science (in the sense that there is more than one or two odd instances of it). Then, I think, we will see at least the *political* merits of a politically-guided research that is suggested by Harding, if not the epistemological one (of detecting biases more easily). For, if theories are sometimes underdetermined by the available data, and thus there is room for social biases, then, for the sake of political purposes, we should do something to control and balance the biases. If social biases cannot be eliminated completely, then they must be balanced.

Here is what I mean. In political matters such as the construction of institutions and the administration of social reality, we appeal to our political judgments. For instance, we think that different points of view must be represented in the decision-making procedures and that such procedures must not be biased against some people. Thus, we aim to balance political judgments in a way that will be fair to all parties. Now, such a political concern to balance such judgments (political because it is based on the political judgment that it is not fair to have a decision-making system that is biased against some people) is only natural since the matter is political. The question of what types of institutions or governments are fair is a political question calling for political judgments.

Now, if social bias inevitably exists in scientific inquiry, then the question as to how scientific inquiry must be carried out is to some extent a political one. That is, if underdetermination is true and thus epistemic factors leave a gap for social factors to

influence theory choices systematically, then these social factors must be handled in the light of our political judgments. If social and political judgments play a significant role in the way scientific inquiry is carried out, then we must balance those biases to some extent. It will not be fair to let the gap be filled only by the biases of a certain group against another.

To be sure, scientific research that is heavily political will be nothing but a failure; science is above all an empirical inquiry, and not an arena for political disputes. That is why the conventional scientific norms and values such as empirical adequacy, simplicity, efficiency and so on, are always essential to scientific inquiry. However, what Harding suggests, and what I find plausible is only that these norms must be supplemented by some political ones. If the gap between the accepted theories and the available data have been filled with a heavy bias against women, then we must do something to balance and control that bias.

I think if we take underdetermination seriously, we also see why it is not the best strategy to first accept the scientific theories as they are and *then* try to change it according to our political values, as suggested by some philosophers. Helena Cronin, for instance, criticizes the feminists for failing to use evolutionary science for their purposes. She states:

> Well, how could one be a feminist and not a Darwinian? If feminists want to change the world, they need first to understand it. And when it comes to sex differences, Darwinian science provides the authoritative understanding. (Cronin, 2005, 15)

However, although it certainly is a pretty bad idea to reject Darwinian theory completely (for it has no alternatives at the moment), it clearly is not a good strategy for the feminists to accept all claims of the Darwinian theory as providing an accurate understanding of the subject matter[11]. If, as underdetermination implies, even our best theory may contain social biases, then it would be a really bad strategy to first accept it (wholly) as providing the facts about the matter, and *then* try to change the world understood in that biased way. How could one first accept the possibly biased account as a completely *accurate* description of the subject matter, and then try to eliminate the bias?[12]

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[11] More precisely, Cronin argues that feminists should first accept the Darwinian claims that certain differences between the sexes are natural, that women are disadvantaged partly because of evolutionary reasons, and then use these facts to improve the condition of women.

[12] For a similar reason, if underdetermination is true, then feminists are not really forced to choose between truth and politics. It is not that the sexist theories are the unquestionable truths and feminists have political problems with them. The feminists may insist (to a reasonable degree of course) that such theories are not accurate descriptions of the world because they are infected by certain biases. In other words, with the motivation that underdetermination provides, feminists can challenge the sexist theories from the beginning by trying to point to the possible biases they may contain. For instance, they do not immediately face the dilemma of ignoring the truth about the sexes (which Darwinian theory is supposed to provide) or abondoning the feminist principles. It may be a consequence of Darwinian theory that women are less talented in mathematics than men, but given underdetermination, there is always the doubt that such a claim results from a social prejudice. Thus, when feminists are challenging the Darwinian claim, they are not necessarily being ignorant.

Conclusion

In my thesis, I have mainly argued for two claims: i) that feminist critique of science is a legitimate philosophical agenda in that its philosophical grounds are not refuted or completely discredited as its critics sometimes claim, and ii) that the best way to handle the existing androcentric bias in science is to have some kind of political guidance throughout scientific research, along with the usual epistemic norms. In order to argue for (i), I have provided a discussion concerning the thesis of underdetermination of theories by data, on which the whole motivation to search for social factors in theory choice rests. I have argued that the thesis of underdetermination has neither been shown to be true nor been refuted conclusively, and thus the feminist agenda that rests on it is philosophically legitimate, not, as some critics claim, bankrupt.

For (ii), I have argued that if underdetermination is true, as all feminist critics of science accept in one form or another, then social assumptions that may systematically slip into scientific inquiry constitute a serious problem both epistemologically and politically. Epistemologically speaking, we want our theories to be as free from social prejudices as possible. Politically speaking, we aim at equality among people. If, as Harding claims, bringing in women's perspective will help us detect biases against women, then such a political guidance (promoting women's perspective because it is the perspective of the oppressed group) will be an epistemological asset. Moreover, if social prejudices systematically enter scientific inquiry, then it is a requirement of equality that such prejudices must not be overwhelmingly those of one (and the dominant) group. If,

as the thesis of underdetermination implies, scientific inquiry will be a political one to some extent, then it must be a politically correct one. In this sense, bringing in women's perspective, which has been ignored for a long time, will be a political asset.

As I have recognized, however, there are many questions about a politically-guided scientific inquiry. One big question is how exactly this political guidance is supposed to be carried out. I take Harding's suggestion, for instance, to include women's perspective into science as a very rough starter. What women's perspective is, and what starting from that perspective will exactly mean, are no doubt serious questions. Whether, and if so, how bringing women and their perspective in scientific inquiry will add to our ability to eliminate male bias are issues that need to be settled by empirical investigations. Moreover, in order for the feminist agenda to constitute a stronger challenge to the conventional understanding of scientific research, the thesis of underdetermination must be elaborated further and other arguments in its favor must be provided.

These issues are all subjects for further research. In my thesis I have only tried to show that the feminist critique of science is a philosophically legitimate agenda and that it must insist on a politically-guided scientific research to be more effective. The difficulties we foresee in the project of a politically-guided resarch indicate the need for much work to be done by the feminists. As any other political issue, that will no doubt be a difficult task. But if scientific inquiry is a partly political one, then we must keep a political eye on it, one way or another.

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