The Feminist Critique of Science and Educational Inquiry

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The feminist critique of mainstream science has been developing over several decades now, and feminist theorists have proposed various ways in which the mainstream ideal of science ought to be modified. But these proposals have been scattered and some of them have been easy targets for mainstream philosophers of science to criticize. In a recent article, Helen Longino has attempted to synthesize, clarify, and defend the proposals for a feminist theory of science, as well as to deflect the most common criticisms.[1] We are all in Longino's debt for bringing together in one place not only a comprehensive vision of feminist science, but a vision that is supported by plausible arguments. After summarizing its main features, I will try to assess her position. Since educational research is one site where the feminist critique of science is being seriously debated, illustrations will come from that arena.

Summary and Interpretation

Longino contrasts the cognitive virtues proposed by mainstream theorists with an alternative set of feminist theoretical virtues. The former list includes internal consistency, external consistency, simplicity, breadth of scope, and fruitfulness. To this list, Longino counterposes feminist virtues: novelty, ontological heterogeneity, mutuality of interaction, applicability to current human needs, and diffusion of power; the last two are designated "pragmatic" virtues. One additional item, empirical adequacy, is found on both lists: A scientific theory that accurately predicts facts is better than one that fails to do so. Longino contends that regardless of the bundle of virtues proposed, these virtues "require further interpretation to be applied in a given research context, they are not simultaneously maximally satisfiable, and they are not subject to hierarchical ordering or algorithmic application" (*Cognitive*, 49).

What does Longino mean by theoretical *virtues*? She intends them to be virtues of *theories*, not of individual scientists. They should be thought of as explicating how a valuable scientific theory is to be characterized. At the same time, these virtues articulate the grounds for preferring, in prospect or in retrospect, one theory over another. What does Longino mean by labeling these virtues "feminist?" She does not mean that they are more likely to be valued by women *qua* women, nor by women *qua* marginal members of the scientific community. Rather, the idea is this: "If the context is gendered (in the sense of being structured by gendered power asymmetries), inquiry guided by these virtues is more likely to reveal it or less likely to preserve its invisibility than the traditional virtues" (*Cognitive*, 50).

Before proceeding, two questions of interpretation merit consideration. 1. Do any of the feminist virtues have special standing, or are they of equal importance? In particular, can empirical adequacy be traded off against the other desiderata? The answer is not clear. On the one hand, Longino claims that these virtues are *not* subject to "hierarchical ordering." I take that to mean that empirical adequacy has no unique standing among the virtues. On the other hand, Longino does not suggest, much less

claim, that feminist theory puts less importance on empirical adequacy than its mainstream counterpart. Longino says,

> Empirical adequacy is valued for, among other things, its power when guiding inquiry to reveal both gender in the phenomena and gender bias in the accounting of them....Failure to meet the standard in a strong sense, i.e. the generation of statements about what will or has been observed that are incompatible with what has actually been observed, is grounds for rejection of the hypothesis or theory in question. In practice, most research communities reserve judgment when one of their central theories is shown to fail the test of empirical adequacy, unless the failure can be made overwhelming and an alternative theory is available to perform much of the same work." (*Cognitive*, 45).

The second interpretive question is this: Are the various criteria applicable at every stage of research? In particular, are the criteria relevant to decisions concerning which theories are justified given all the evidence, or only to decisions concerning which theories are worthy of consideration? On this question, Longino is somewhat equivocal. Speaking of the pragmatic criteria, she says that they are "*more* relevant to decisions about what theories or theoretical frameworks to work on than to decisions about plausibility" (*Cognitive*, 48. emphasis added). These (pragmatic) criteria concern the effects of theory adoption rather than theoretical content. Now, if this means that potential for improving the lives of women ought to be a consideration when a feminist decides what investigations to pursue (for example, should she work with theories of cancer etiology that apply primarily to breast cancer or with theories that apply primarily to prostate cancer), then feminist theory is not really controversial, not even a departure from the received view. If the feminist criteria (including to *any* degree the "pragmatic" criteria) are intended to apply to the question of whether a theory is *justified*, the position is, indeed, controversial. It is the second, far more provocative interpretation that merits serious scrutiny.

Even a cursory look at some of the "virtues" that Longino proposes is likely to elicit the oft-made objection to feminist theory of science — that Longino has illegitimately smuggled social values into the desiderata of an enterprise that ought to remain purely cognitive. To rebut this criticism, Longino argues that the line between cognitive and social values is *not* an absolute one, that some of the ostensibly neutral "cognitive" values can in *specific* research contexts "have a demonstrably political valence" (*Cognitive*, 54).

Anthropologist John Ogbu's influential theory of minority success and failure in school can serve to illustrate her point.[2] Ogbu attempts to explain differential levels of school achievement among different minority groups in the United States. The explanation is based on a contrast between "immigrant" and "subordinate" minorities. The former, drawing on their experience of contrast between the old and new countries, have faith that success in school will lead to economic success; the latter, based on their own observations of prejudice and discrimination, are skeptical of the connection between school success and economic success. They adopt an oppositional stance which virtually embraces school failure.

Since the theory makes no mention of gender, despite abundant evidence that boys and girls are treated differently both at home and in school, Ogbu's theory could be said to play a role in perpetuating the *invisibility* of *gendered* power asymmetries.

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This need not mean that Ogbu intended the result or was even aware of gender asymmetry as an issue in schools. Nor does it mean that every theorist, or even every educational theorist, is obliged to study gender, but from Longino's feminist perspective, when a highly visible theory serves to frame the issue of differential school success in such a way that gender is ignored, it is far from neutral — *from the feminist point of view*.

The reason Longino favors the feminist virtues is this: Since their mainstream counterparts have been employed by scientists whose theories failed to notice, much less challenge, the bases of gender oppression, those virtues cannot be counted on to support the goal of feminist science. There is, on the other hand, a much greater likelihood that the feminist virtues will lead to theories with a progressive "political valence."

Quine's Thesis

If mainstream and feminist accounts of science both place importance on the virtue of empirical adequacy, how do the other virtues come into play? In common with most feminist critiques of the received view in philosophy of science, Longino's critique of the standard bundle of scientific virtues, as well as her alternative proposal, is based on a thesis generally (though probably mistakenly) associated with the philosopher W. V. Quine — that any scientific theory is "underdetermined" by the data that might be used to support it. This thesis implies that it is always possible for more than a single theory to "fit" the very same facts; hence additional criteria (that is, additional to empirical adequacy) of theory evaluation can come into play. Both mainstream philosophy of science and feminist philosophy of science tend to accept the idea, though its implications are hotly contested. The reason feminist theorists embrace the Quinean thesis is that if empirical adequacy is insufficient to discriminate among scientific theories, then this provides a space for additional criteria to enter into consideration, a space feminist theorists wish to fill with their somewhat distinctive virtues.

It is important to understand precisely what Quine's thesis asserts. It is *not* that any two actually competing theories *will* support identical predictions, but that *any* set of data will *always* be consistent with more than one theory, that is, no unique theory can be deduced from a finite set of observations.[3] For the feminist theorist to make use of Quine's thesis, she would need to begin with two theories that support *identical* predictions — a condition that she is unlikely to obtain.

To see why, take Ogbu's theory. It is simply silent on gender, although much evidence points to the fact that schools as well as many immigrant cultures are "structured by gendered power asymmetries." Imagine a theory which builds on Ogbu's but does take gender into account. The alternative theory might, for example, differentiate between cultural groups that do and those that do not nurture women's academic achievement. It is fairly obvious that this theory and Ogbu's will not support *identical* predictions, although some overlap is likely.

Let me illustrate: Suppose that egalitarian gender values are very weak in one "immigrant" minority group and very strong in one "subordinate" minority group.

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Then the "gender" theorist would predict that when just these two groups are compared, the *average* academic achievement of *all* students in the "subordinate" minority group will approach or even exceed that of the "immigrant" minority group. Taking no notice of gender as a significant factor, Ogbu would predict the opposite.

If the purpose of feminist science is to reveal gendered power asymmetries, asymmetries that earlier male investigators concealed, then it is virtually certain that feminist and mainstream theories will *not* support identical predictions. Does this mean that the feminist virtues can never come into play? Not necessarily. Suppose that Ogbu's theory and its more refined rival which includes gender as a significant variable support divergent predictions as indicated above. Suppose, also, that the evidence is equivocal, that is, it can be read as supporting either hypothesis. I should observe that this situation often occurs in the social sciences and, of course, in education; I will return to this point below. In such a case, Longino may say, commitment to the feminist virtues moves us to accept the version that addresses gender. But is Longino right about that?

Susan Haack, a vigorous critic of the idea of a feminist theory of science, argues that in the hypothetical case where two theories cannot be discriminated on the basis of current evidence, we are *not* obliged to accept *either* theory; if the evidence is inadequate, we can simply remain agnostic.[4] Perhaps, in some contexts, she acknowledges, we will have to *act as if* one (or the other) *were* true, but this is very different from deciding that one or the other *is* true on the basis of some additional set of virtues. If Haack is saying that there are situations in the sciences when the evidence is not clear enough to decide among alternative theories, situations in which the proper response is skepticism until additional data are collected, she is surely right. But if she is saying that the evidence always speaks for itself — no additional virtues need be applied — that is clearly too strong a statement. In the famous debate between the Copernican and Ptolemaic theories of planetary motion, the data were consistent with both theories. Simplicity favored the Copernican theory. This example appears to support Longino's view that empirical adequacy is insufficient, and yet if Longino rejects the virtue of simplicity, does that mean she also rejects Copernican astronomy, or prefers it for reasons not connected to the feminist agenda? Or might she propose one set of virtues for astronomy and another for sociology? The answers are far from clear, but a principled rejection of simplicity does appear to carry a price.

Feminist Virtues

Longino contends that adhering to the feminist virtues will enhance our understanding of gendered power asymmetries. Space does not permit discussion of all of these, so let me focus on two: ontological simplicity and diffusion of power. Why does Longino promote ontological heterogeneity? She is worried, first of all, that if we adopt "simplicity" as a virtue, we will not realize that individual differences are important, "not to be elided in abstractions or idealizations which smooth out heterogeneity." If we are committed to simplicity, we cannot be assured that our theory "captures the diversity of the experienced world" (*Cognitive*, 47).

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Longino's second reason for favoring heterogeneity is that a preference for simplicity in our theories is more likely to privilege one group as the standard, treating divergence from it as "a failure to fully meet the standard, rather than simply difference" (*Cognitive*, 47).

To assess this position, consider our example of attempts to explain differential school success. If we take the idea of "ontological heterogeneity" to its limit, it is doubtful that we would uncover *any* patterns of differences among groups at all, for some individuals in every group succeed and some fail for a myriad of reasons. To support any generalizations about differences in the ways boys and girls are treated in school, for example, differences among individual schools and teachers would *need to be* "elided in abstractions or idealizations." The objective of *feminist* science is, itself, undermined by a refusal to abstract and idealize.

Of course, if a simple theory such as Ogbu's fails to "capture the diversity of the experienced world," it *should* be rejected, but here the reason for the rejection would be the theory's failure to meet the standard of empirical adequacy, *not* its failure to embody the feminist virtue of heterogeneity. Imagine that we have two theories that fit all the known — and even the to-be-discovered — facts about differential school success, in other words two theories that support identical predictions and meet the test of empirical adequacy. Since they both presumably do capture the diversity of the experienced world, *including gender* diversity, why *not* adopt the simpler theory? The rationale for refusing to do so escapes me.

Consider now the virtue of diffusion of power. This virtue "gives preference to research programs that do not require arcane expertise, expensive equipment, or that otherwise limit access to utilization and participation" (*Cognitive*, 48). The hope here is that women and other less powerful and privileged groups would be more likely to understand and benefit from the scientific enterprise. What does this mean? If the virtue points to what ought to be the focus of *investigation*, for example, "procedures that empower the individual woman either to make decisions about her health or to retain control over her own body," rather than "high tech interventive measure(s) available only to the few," Longino's view raises no epistemic difficulties (*Cognitive*, 48-49). Again, if the idea is that fields like economics ought not require "mathematical achievement far beyond what is required," who could disagree? But if the contention is that feminist science — dedicated to illuminating issues of gender — must try to insure that those who are the subjects of study — primarily girls and women — be in a position to judge the validity of the scientific work itself, then it is extremely dubious. Of course, if one is going to say something about women's experiences, one will need to speak with them, and probably even check back with those interviewed or observed to insure that one is reporting their testimonies accurately.

But need the *explanations* of human behavior be understandable to those studied? This would make it impossible to study babies or young girls and boys, for example. Even when the subjects are adults, the condition appears excessively stringent; it would limit explanatory resources to the concepts available in the

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subjects' own life-world. The condition is particularly limiting if one is trying to reveal gender oppression because here, one almost certainly will want to go beyond subjects' explanations of their own actions. The idea of manufactured consent, false consciousness, or some equivalent will almost certainly need to be introduced, and these ideas may not be intelligible to all young people.

Suppose, for example, that feminist scientists are interested in the dearth of girls in advanced algebra classes. Would they want to limit their accounts to the girls' own explanations — that they just do not like math, are not good at it, think it is uncool, more suitable for boys, not needed for the careers they plan to pursue, and so on? Surely the feminist scientist will want to discover the *roots* of *those* beliefs and aspirations in the social structures and practices in which the women were socialized. Those practices, themselves, may require analysis in terms of even more fundamental structures and practices found, for example, in the division of labor, to say nothing of explanations that might at some level involve brain chemistry.

If Longino's position were accepted, the adequacy of an explanation could be controlled simply by manipulating the understanding of those who are the subjects of the explanation. From the feminist point of view, it might be desirable that the explanation be accessible to high school girls, but the *epistemic value* of the explanation should not be held hostage to that aspiration. There is little reason to think that the repertoire of concepts and procedures needed to understand girls and boys will be simpler than those needed to understand robins or clouds.

Cognitive and Social Virtues

Haack offers a powerful argument to challenge Longino's denial of the distinction between cognitive and social virtues, an argument that tries to show that Longino's thesis is, itself, a cognitive claim. Recall Longino's principal claim: "If the context is gendered (in the sense of being structured by gendered power asymmetries), inquiry guided by these [feminist] virtues is more likely to reveal it or less likely to preserve its invisibility than the traditional virtues" (*Cognitive*, 50). What evidence supports this claim? Longino could produce abundant evidence showing the resistance of generations of predominantly male research communities to confronting evidence revealing gender oppression and subordination. She could also point to substantial evidence showing that the male scientific establishment has abetted male domination by purported demonstrations of female inferiority. Although such evidence is telling, Haack could adduce contrary evidence showing that attempts to distinguish progressive and regressive theories often work to the detriment not just of science, but of society as well. In this context, she reminds us of the fate of Russian biology under communism, when Lysenko's theory was deemed to be more in tune with Marxist-Leninist values (*Cognitive*, 83). Haack could also be counted on to note that the feminist scholarly tradition arose out of the received tradition. Indeed, the visibility of gendered power asymmetries was never greater than it is today, and is greater precisely in those precincts where the *standard* view of science has been the most deeply entrenched. So, there is evidence on both sides of Longino's key empirical claim.

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Suppose neither Haack nor Longino finds the evidence overwhelming. Haack might argue that since *current* evidence is insufficient to decide the matter, the claim ought *neither* to be accepted *nor* rejected; even so, Haack would insist, decisive evidence is certainly conceivable, as the following thought experiment shows.

"Imagine," Haack might say, "that beginning now in the scientifically advanced countries, two separate scientific communities evolve — call one Cogland and the other Femland. The first adopts the standard cognitive virtues; the second adopts the feminist virtues for some sufficiently long period of time, say one hundred years. Now, according to Longino the 'aim of revealing gender and/or those gendered female' will be closer to realization in Femland than in Cogland — but *this* claim is surely a cognitive claim, and can only be settled on the basis of evidence collected and weighed according to the standard *cognitive* virtues. Therefore, feminist science theory is dependent for *its* vindication on the *distinction* between cognitive and social virtues."

Can Longino reply to such an argument? I believe she can. Longino could say, "Suppose after one hundred years, the evidence is still equivocal. Even suppose, just for the sake of argument, that the total evidence slightly favors Cogland. That does *not* settle the question definitively, because history shows that, as stated before, 'most research communities reserve judgment when one of their central theories is shown to fail the test of empirical adequacy, unless the failure can be made overwhelming and an alternative theory is available to perform much of the same work.' So long as the evidence is not overwhelming, I will cling to my hypothesis and prefer to live in Femland."

At this point, Haack would probably throw up her hands, claiming that Longino was describing not a scientific, but an ideological community, one that had forfeited its right to use of the label "scientific" — at least insofar as the scientific enterprise is identified with a search for truth.

Does this give Haack the last word? Not quite, for a disciple of feminist theory has a possible retort even here. (I do not want to attach Longino's name to it, because I have no idea if she would identify with the response.) "Of course this is no longer science as you knew it or as you defined it. Of course I am redefining science. If you insist, I will call it Fience — the bottom line is that it is better to be a woman in Femland than in Cogland — even if I cannot demonstrate that to *your* satisfaction, employing the criteria you and your mainstream colleagues favor."

It is doubtful that either Longino's imagined disciple or Haack would be persuaded by the other's argument, but pushing the imagined dialogue to its breaking point reveals what is ultimately at stake here — a faith in the value of the scientific enterprise as it has evolved over the last couple hundred years in the West, a faith that cannot be vindicated within science itself.[5] It may seem obvious to Haack that any path leading away from the traditional cognitive virtues is a path that women and feminists would embark on at their peril. How, Haack may ask rhetorically, can feminists challenge the traditional myths about women if the traditional virtues are abandoned? This question is not really rhetorical as Haack thinks, for no one can know now what science might reveal about gender in the future.

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Possible Convergence

Despite the seeming inability of either Haack or Longino to persuade the other, there is an area on which their views may converge more than one might think, one that has special salience for educators. Neither Longino nor Haack would, I believe, contest a point I mentioned in passing above, namely that in the social domain *decisive* evidence is often *un*available, if for no other reason than that many experiments needed from the cognitive point of view are impermissible from the moral point of view. In such cases, Haack admits that while remaining agnostic, we may have to act *as if* one or another hypothesis is true.

Is it legitimate *here* to consider *social* consequences in deciding which hypothesis *to act on*? Longino certainly believes it is, as do I. Haack is silent on this, but her answer might also be affirmative. Consider a simple case: Jennifer is experiencing difficulty in eighth grade mathematics. She undergoes a battery of diagnostic tests to determine if she has sufficient mathematical background and ability to be placed into algebra in high school. Suppose the evidence is equivocal. Suppose, moreover, that abundant evidence shows those who have not taken algebra in high school face a barrier to subsequent entry into many prestigious occupations. May that *social* consequence be weighed in deciding which hypothesis to *act on* in Jenny's case? I believe that it not only may, but *ought to*. If the risks of not placing Jenny in algebra are substantial, and the risks of an algebra placement slight, how can this be ignored? The same point applies, it seems to me, to controversial questions such as those concerning the existence or sources of differences in the behavior and performance of men and women. In the absence of decisive evidence, it is legitimate to consider social consequences when deciding which hypothesis *to act on*.

May we push this reasoning one step further? In cases where a hypothesis has fateful consequences for individuals or groups, is it legitimate to raise the threshold of evidence required to claim that the hypothesis is warranted? This is a temptation we should resist: It is better to keep the warrantability of a hypothesis separate from the risks of action based on its acceptance, for this maximizes flexibility. Consider, for example, the hypothesis that men are, on average, less nurturing than women, and suppose we agree that nurturing is a desirable trait. We men might say that since the hypothesis is demeaning to us, unless the evidence is totally beyond challenge, we should not accept it. But with equal legitimacy, we could say that a preponderance of evidence ought to be sufficient, because acceptance of the hypothesis may encourage the design of interventions to overcome the discrepancy. When people allow their social values to influence their cognitive standards, their biases remain hidden. Fruitful debate about appropriate responses to disparities or inequities is facilitated when parties share the same cognitive standards.

To summarize: First, empirical adequacy is not sufficient to decide the worth of scientific theories, but there are costs to rejecting the mainstream virtues, costs that Longino does not sufficiently weigh. Second, it is far from clear that Longino's feminist virtues provide effective means of reaching the goals of feminist science. Third, Longino's thesis relating the feminist virtues to the goal of feminist science

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is either a causal empirical thesis to be judged by the standard virtues or, interpreted more radically, it challenges and subverts the scientific enterprise in a more radical way than Longino, herself, may wish to do. Finally, in cases where decisive evidence is unavailable, social consequences of acting on a hypothesis *ought* to be taken into account. Nevertheless, the warrantability of a hypothesis should remain independent of the benefits and risks of acting on it.

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1. Helen Longino, "Cognitive and Non-Cognitive Values in Science: Rethinking the Dichotomy," in *Feminism, Science, and the Philosophy of Science*, ed. Lynn Hankinson Nelson and Jack Nelson (Dordrecht: Kluwer Academic Publishers, 1996). This book will be cited as *Cognitive* with page numbers in the text for all subsequent references.

2. John U. Ogbu, *The Next Generation: An Ethnography of Education in an Urban Neighborhood* (New York: Academic Press, 1974).

3. W.V.O. Quine, *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969).

4. Susan Haack, "Science as Social — Yes and No" in Nelson and Nelson, *Feminism, Science, and The Philosophy of Science*, 79-93.

5. Ernest Gellner, *Plough, Sword and Book: The Structure of Human History* (Chicago: University of Chicago Press, 1988).

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