Philosophy of Science: Analytic Feminist Approaches

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Abstract: Feminist philosophy of science in the analytic tradition converges towards feminist empiricism that comes in three types: critical contextual empiricism, radical empiricism, and standpoint empiricism. Each type of feminist empiricism provides important resources for feminist philosophers of science especially when we seek to solve the bias paradox. The bias paradox arises when we aim to criticize some biases as epistemically harmful while at the same time acknowledge that some other biases are epistemically beneficial. The challenge is to understand how pernicious bias can be distinguished from innocuous one.

Introduction

What does it mean to do philosophy of science as a feminist? For many feminist philosophers, it means that one prevents gender from being disappeared in an analysis of scientific knowledge and practice (Longino 1992, 339). It means also that one engages the work of feminist scientists and science studies scholars (Nelson 2002, 317). In the 1980s, feminist philosophy of science gained momentum by exploring the implications of feminist science criticism for philosophy of science (Harding and Hintikka 1983; Harding 1986; Tuana 1989). Feminist historians of science had documented the underrepresentation of women and some other social groups at the ranks of professional scientists as well as their less powerful positions in the social organization of science (Rossiter 1982). Historical studies urged feminist philosophers to ask to what extent the underrepresentation of women (and some other social groups) had influenced what research problems had been pursued and how these problems had been framed. Feminist philosophers investigated also how increased social diversity in science can improve scientific research (Fehr 2011; Intemann 2009; Wylie 2011). Moreover, feminist scientists had examined the influence of gender ideologies on the content of science. Such influence was manifested, for example, in the use of gender metaphors to characterize the object of inquiry or the presence of gender bias in research design (Bleier 1984; Keller 1985; Keller and Longino 1996; Spanier 1995). These studies urged feminist philosophers to ask how gender bias was to be conceptualized and whether it was aptly characterized as bad science (Harding 1991; Lloyd 2005; Longino 1990; Nelson 1990; Richardson 2013). Feminist philosophers examined also how scientific practice was to be conceptualized so that the potential influence of gender ideologies on the physical sciences could be analyzed (Harrell 2016; Potter 2001; Rolin 1999).

For feminist philosophers in the analytic tradition, doing-philosophy-of-science-as-a-feminist involves both a critical and constructive mission. The critical mission is to understand

when gender bias is epistemically harmful and what antidotes are needed to counter the harms. The constructive mission is to understand how objectivity is to be conceptualized, when feminist values can improve scientific research, and how epistemic communities should function. Ultimately, the constructive mission is to rethink the criteria of good scientific knowledge and practice so that goodness has a moral-political dimension in addition to an epistemic one. However, the pursuit of both critical and constructive projects is not without tensions (Richardson 2010). One tension is what Louise Antony (1993) calls the bias paradox: How is it possible to criticize gender bias as epistemically harmful while at the same time hold the view that all scientific knowledge is socially situated and partial in some ways (Intemann 2017; Intemann and de Melo-Martín 2016; see also Antony in this volume)?

In this essay, I discuss three strategies to respond to the bias paradox: critical contextual empiricism, feminist radical empiricism, and feminist standpoint empiricism. Each one of the three strategies acknowledge the socially situated and partial nature of scientific knowledge. By empiricism feminist empiricists mean the view that empirical adequacy is the most important criterion in the epistemic justification and evaluation of scientific theories and hypotheses even though it is not the only criterion. The empiricism of feminist empiricists is non-foundationalist in the sense that empirical evidence is not perceived as an independent and infallible foundation of scientific knowledge. The three versions of feminist empiricism also share the view that biases are not inherently epistemically bad, neutral or good. In order to distinguish epistemically harmful from harmless biases (or beneficial ones), feminist empiricists inquire whether they impede (or promote) the epistemic goals of science, including significant truth (Anderson 1995) and empirical success (Solomon 2001).

The three versions of feminist empiricism differ in how they qualify empiricism in order to distinguish it from what Sandra Harding calls spontaneous feminist empiricism, the view that good science is bias-free science that can be achieved by following conventional empirical

methods more rigorously (1993, 51). Whereas critical contextual empiricism emphasizes the importance of developing norms for scientific communities, feminist radical empiricism stresses the significance of feminist values in guiding scientific research, and feminist standpoint empiricism the necessity of developing feminist standpoints. I argue that each type of feminist empiricism provides feminist philosophers of science with valuable resources that enable us to both criticize gender bias and explain how feminist values can improve scientific research.

Feminist criticism of the value-free ideal

Helen Longino (1990) proposes that feminist criticism of gender bias is framed as part of a broader philosophical controversy concerning the proper roles of constitutive and contextual values in science. Whereas constitutive values are values that promote the epistemic goals of science, contextual values originate in the social and cultural environment of science (1990, 4). Like many other feminist philosophers, Longino rejects the value-free ideal of science, the view that contextual values are not allowed to play any roles in the practices where knowledge claims are justified and evaluated epistemically. Yet, she refrains from drawing a sharp distinction between constitutive and contextual values. One reason for this is that constitutive values are not always purely epistemic. Values that are perceived as constitutive - such as empirical adequacy, novelty, and external consistency - may promote also moral and social goals, and sometimes this is a reason to treat them as theoretical virtues (Longino 1995). Another reason to acknowledge a "borderlands area" between constitutive and contextual values is that sometimes contextual values promote the epistemic goals of science even though they are not intrinsically truth-conducive (Rooney 2017).

Longino (1995) argues that in many cases the value-free ideal is not attainable because contextual values can legitimately influence the way constitutive values are interpreted and weighed as long as they do not replace constitutive values. Moreover, contextual values can

legitimately have an impact on the choice of background assumptions used in evidential reasoning as long as no-one has challenged these assumptions (Longino 1990; see also Anderson 2004). That contextual values give rise to socially situated and partial perspectives on the subject matter of inquiry is not a problem as long as scientific communities include a diversity of perspectives (Longino 1990; see also Solomon 2001).

Most importantly, Longino (1990) argues that even in those cases in which the value-free ideal is feasible in principle, it is not a criterion of good scientific research. Value-freedom is not desirable because contextual values can play epistemically beneficial roles in science. Longino and other feminist philosophers have identified three ways in which feminist values can be epistemically fruitful and productive. First, feminist values can engender criticism that helps scientists identify and correct false beliefs or biased accounts of the subject matter of inquiry. This is because scientists are more likely to detect value-laden assumptions in research when the assumptions in question are at odds with their own moral and social values (Longino 1990). Second, feminist values are a source of scientific creativity. They can lead scientists to pursue new lines of inquiry, search for new types of evidence, propose new hypotheses and theories, and develop new methods of inquiry (Anderson 2004; Fausto-Sterling 2000). Third, feminist values can improve the ways scientific communities are organized as well as the relations between scientific and lay communities (Grasswick 2010; Scheman 2001).

In sum, feminist philosophers of science reject the value-free ideal as either unfeasible or undesirable. This means also that gender bias in scientific research is not always diagnosed as a sign of bad science. Insofar as gender bias gives rise to bad science, it is because it leads to error or unjustified conclusions. While feminist philosophers of science have abandoned the ideal of value-free science, they have not given up the ideal of objectivity. In the next section, I explain how objectivity is understood in critical contextual empiricism.

Critical contextual empiricism

According to Longino's (2002) critical contextual empiricism, the bias paradox is solved by norms applicable to scientific communities. The best way to identify and eliminate epistemically harmful biases is to subject all scientific research to the deliberation of a scientific community that is socially diverse and responsive to criticism. The term 'contextual' refers to three notions of context, the context of particular background assumptions, the context of scientific communities, and the social and cultural context of science. The first notion of context is implicit in the thesis that epistemic justification is relative to background assumptions that are needed to establish the relevance of empirical evidence to a hypothesis or a theory (Longino 1990, 43). The second notion of context is implicit in the thesis that the objectivity of scientific knowledge is a function of a community's practice (1990, 74). The third notion of context is implicit in the thesis that values originating in the social and cultural context of science can legitimately play a role in the justification and evaluation of hypotheses and theories via background assumptions (1990, 83). The three notions of context come together in the argument that we should adopt a social account of objectivity because values belonging to the social and cultural context of science can legitimately have an impact on the background assumptions scientists rely on in evidential reasoning. A social account of objectivity is the view that scientific knowledge is objective to the degree that a relevant scientific community satisfies the four criteria of publicly recognized venues, uptake of criticism, shared standards, and tempered equality of intellectual authority (2002, 129-131).

Critical contextual empiricism is a form of empiricism in that the requirement of empirical adequacy is included in the shared standards criterion. Yet, it goes beyond spontaneous feminist empiricism in demanding that scientific communities satisfy the three other criteria. The fourth criterion is especially interesting because it introduces a feminist equity perspective into philosophy of science. The tempered equality criterion requires that a community be inclusive of

scientists independently of their race, ethnic identity, nationality, gender, age, and sexual orientation. Equality of intellectual authority is "tempered" only insofar as human beings differ in domain specific expertise (Longino 2002, 132-133). As Longino explains, the fourth criterion facilitates transformative criticism in two ways, by disqualifying those communities where certain perspectives dominate because of the political, social, or economic power of their adherents (1990, 78), and by making room for a diversity of perspectives which is likely to generate criticism, alternative hypotheses, and novel questions (2002, 131).

While critical contextual empiricism has been well received among feminist philosophers of science (Anderson 1995; Borgerson 2011; Brister 2017), feminist philosophers have raised two concerns. One concern is that the account of epistemically ideal communities is not helpful for those feminist scientists who find themselves in less-than-ideal scientific communities (Bluhm 2016; Goldenberg 2015). For example, Maya Goldenberg argues that feminist philosophers should not assume tacitly that community arbitration is the only way to distinguish epistemically harmful biases from harmless or beneficial ones (2015, 26). Another concern is that even when scientific communities come close to realizing the epistemic ideal, they are not sufficiently effective in eliminating morally and politically problematic values, such as sexist or racist views (Hicks 2011; Intemann 2017; Kourany 2010). While Longino's intention is to ensure that scientific communities are inclusive of women and other social groups who have historically been excluded from scientific education and profession, her account can be abused by sexists and racists to demand attention and resources for their research programs (Borgerson 2011, 445). Insofar as scientists with sexist or racist beliefs are a minority within a scientific community, they can appeal to their minority status and demand that, for the sake of greater objectivity, their views deserve uptake in the community (Hicks 2011, 337).

While some feminist philosophers think that critical contextual empiricism can respond to the two worries (Rolin 2017), some others call for an alternative way of distinguishing

acceptable values and biases from unacceptable ones. Besides Goldenberg (2015), Elizabeth Anderson (2004), Robyn Bluhm (2016), and Sharyn Clough (2012) propose a more *naturalized* approach to values in science suggesting that values are subjected to empirical testing. Miriam Solomon (2012b) calls this approach "feminist radical empiricism." As she explains, what is radical is the empiricism, not the feminism. Matthew Brown (2017), Daniel Hicks (2011), Kristen Intemann (2017), and Janet Kourany (2010) propose a more *political* approach to distinguishing legitimate from illegitimate values and biases. For example, Kourany puts forward the ideal of socially responsible science, the view that "sound social values as well as sound epistemic values must control every aspect of the research process, from the choice of research questions to the communication and application of results" (2010, 106). Brown challenges the epistemic priority thesis, the view that social values may only influence science, if, in doing so, they respect basic epistemic standards, or criteria for what counts as adequate science (2017, 63). Both Kourany and Brown emphasize that while epistemic constraints are important in scientific inquiry, scientific knowledge has value only insofar as it serves human flourishing and social justice. There is no epistemic goodness that is independent of moral-political goodness.

In the rest of the essay, I discuss feminist radical empiricism and standpoint empiricism. Whereas feminist radical empiricism is a naturalized approach to values in science, feminist standpoint empiricism is a combination of naturalized and political approaches. Radical and standpoint empiricists share the view that feminist values can increase the empirical adequacy of scientific research. Yet, they have different understanding of how feminist values can and should interact with empirical evidence in scientific inquiry.

Feminist radical empiricism

The core ideas of feminist radical empiricism can be captured in two theses. One thesis states that empirical evidence, background assumptions, and values are integrated into a web of belief that can be tested empirically (Anderson 2004, 22). To use a term introduced by Solomon, I call this the "web of valief" thesis. As Solomon explains, "web of valief" refers to an "all-encompassing network of beliefs and values that is described by feminist empiricist in the Quinean tradition" (2012b, 435). Another thesis is an empirical hypothesis suggesting that in some cases feminist values increase the empirical adequacy of scientific research (Clough 2012, 408-409). I call this the "empirical success of feminism" thesis.

According to Anderson, we should accept the "web of valief" thesis because value judgments are not "science-free" (2004, 6). This means that factual judgments can support or undermine value judgments; it does not mean that factual judgments entail value judgments (2004, 5). For example, emotional experiences, that is, "affectively colored experiences of persons, things, events, or states of the world" are capable of functioning as evidence for value judgments (2004, 10). An implication of this view is that value judgments are not inherently dogmatic (2004, 9). They are open to revision in light of experience (2004, 19). Also, the value-laden nature of scientific inquiry is not a problem in and by itself; it becomes a problem when it gives rise to dogmatism, thereby rendering scientific inquiry immune to empirical evidence (2004, 3). In Anderson's view, contextual values play a legitimate role in scientific inquiry when they "do not operate to drive inquiry to a predetermined conclusion" (2004, 11).

Anderson defends the "empirical success of feminism" thesis by arguing that feminist values do not necessarily lead to wishful thinking. When feminist scientists value social and political goals such as freedom from sexual violence, they are interested in evidence showing the extent to which such goals are or are not realized; they do not have an interest in thinking wishfully that the social and political goals have already been achieved when they are not (2004, 7-8). In Anderson's view, feminist values can guide researchers to look for certain kind of evidence but they

cannot guarantee that such evidence will be found (2004, 14). This means also that feminist values can be assessed on the basis of whether they are epistemically fruitful. As Anderson explains, a value judgment is epistemically more fruitful than another, relative to a controversy, if it guides a research program toward discovering a wider range of evidence that could potentially support or undermine any (or more) sides of a controversy (2004, 20).

Clough argues that we should accept the "web of valief" thesis because values have empirical content that can be evaluated by means of empirical methods (2012, 422). Value judgments are not radically different from factual judgements because both types of judgments get their semantic content from their relationship to the world (2012, 424). To defend the "empirical success of feminism" thesis, Clough introduces a case study of the hygiene hypothesis that is meant to explain a correlation between increased hygiene and sanitation, on the one hand, and increased incidence of allergies, asthma, and auto-immune disorders, on the other hand. Clough argues that the hypothesis will be strengthened empirically if scientists pay attention to feminist research on the gender role socialization of small children. The upshot is that feminist values can increase the empirical adequacy of scientific research by drawing attention to new sources of evidence and opening up further avenues for study (2012, 417).

In sum, feminist radical empiricism attempts to solve the bias paradox by proposing that biases and values are subjected to empirical testing. As a constructive critic of feminist radical empiricism, Solomon reminds us that when biases and values are tested empirically, they are tested for their epistemic fruitfulness and not for their moral correctness (2012b, 443). In her view, feminist radical empiricists should recognize that epistemic and moral-political goodness do not always go hand-in-hand. Sometimes morally bad values are causally responsible for producing epistemically good science and morally good values are causally responsible for producing epistemically bad science (2012a, 334). Another constructive critic Audrey Yap (2016) is concerned that feminist radical empiricists are too optimistic about the ability of scientific research to

influence people's deeply held values. In her view, feminist radical empiricists should pay attention to empirical studies that explain why social identity stereotypes and prejudiced value judgments sometimes persist in the face of contrary evidence.

Feminist standpoint empiricism

Like radical empiricists, standpoint empiricists believe that feminist values can be epistemically productive. The term "feminist standpoint empiricism" is introduced by Intemann (2010) to recognize that recent developments in feminist standpoint theory are in agreement with feminist empiricism. Standpoint empiricism can be summarized in three theses: the situated knowledge thesis, the thesis of epistemic advantage, and the achievement thesis. The situated knowledge thesis is the view that all scientific knowledge is socially situated and partial (Haraway 1991, 187; Harding 2004, 7; Wylie 2003, 31). However, not all social locations are of epistemic interest in all research projects. Feminist standpoint empiricists are interested in those social locations that track systemic relations of power and social inequalities. An "essentialist" understanding of social groups and socially grounded perspectives can be avoided by recognizing that it is a matter of empirical inquiry to find out which social locations are epistemically significant and how these locations shape experiences in particular contexts (Wylie 2003, 32).

The thesis of epistemic advantage is the view that those who are unprivileged with respect to their social locations may have an advantage when it comes to gaining knowledge of some aspects of social reality. For example, the "outsiders within" can draw on their social experiences as an epistemic resource not available for those in dominant positions in the society (Collins 2004). As Alison Wylie (2003) explains, the thesis of epistemic advantage should not be construed as an attribution of automatic or comprehensive epistemic privilege to members of subdominant social groups.

The achievement thesis is the view that insofar as unprivileged or marginal social locations are a source of epistemic advantage, the advantage is a collective achievement. Sharon Crasnow (2014) argues that developing a standpoint is a political project that involves community building. Standpoint communities can be understood as scientific-intellectual movements, that is, collective efforts to pursue research programs or projects for thought in the face of resistance from others in the scientific or intellectual community. Such movements are epistemically productive when they make it possible for scientists to generate evidence under social circumstances where relations of power tend to undermine their attempts to do so, or when they provide scientists with an epistemic community where they can receive fruitful criticism for research which may be ignored in the larger scientific community (Rolin 2016).

Like feminist radical empiricism, feminist standpoint empiricism attempts to solve the bias paradox by subjecting biases and values to empirical testing. However, in feminist standpoint empiricism the production of novel evidence is understood to be a matter of feminist activism and not merely a matter of applying empirical methods. The generation of novel evidence proceeds hand-in-hand with community building and the empowerment of disadvantaged social groups. This is why feminist standpoint empiricism is both a naturalized and a political approach to values in science.

Conclusion

As feminist philosophy of science aims to improve the practices and products of scientific inquiry, it is socially relevant philosophy of science (Richardson 2010) and applied philosophy of science (Daukas 2016). Critical contextual empiricists emphasize that feminist values can increase the empirical adequacy of scientific research by identifying epistemically harmful biases and generating novel perspectives. Radical empiricists emphasize that feminist values can

improve scientific research by leading scientists to consider new sources of evidence. Standpoint empiricists stress the importance of building scientific-intellectual movements that provide scientists with novel epistemic communities and help them generate evidence despite relations of power.

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