Chapter 7
What Is in It for Me? The Benefits of Diversity in Scientific Communities

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Abstract I investigate the reciprocal relationship between social accounts of knowledge production and efforts to increase the representation of women and some minorities in the academy. In particular, I consider the extent to which feminist social epistemologies such as Helen Longino's critical contextual empiricism can be employed to argue that it is in researchers' epistemic interest to take active steps to increase gender diversity. As it stands, critical contextual empiricism does not provide enough resources to succeed at this task. However, considering this view through an employment equity lens highlights areas where such theories need to be further developed. I argue that views such as Longino's ought to attend to nuances of community structure and cultural features that inhibit critical social interactions, if we are to maximize the epistemic as well as the ethical improvements associated with a social approach to knowing. These developments advance these epistemic theories for their own sake. They also help develop these theories into a tool that can be used by those calling for increased diversity in the academy.

7.1 What Is in It for Me?

A while ago I gave a lecture to science faculty members and university administrators regarding the underrepresentation of women and minorities in science, technology, engineering and mathematics (STEM) fields.[1] After my talk, an administrator, with

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[1] In this paper I am primarily focusing on gender diversity. By doing so it is not my intention to minimize the epistemological and ethical concerns relating to the underrepresentation of members of other marginalized groups.

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demonstrated good will, gave me a 'tip.' He told me that if I 'wanted to get traction' when I was addressing the problem of the underrepresentation of women in STEM, I needed to 'answer the question that was in most of "these guys" minds – what is in it for me?' I was taken aback because the statistical data I presented painted a blunt and grim picture. While women have made up at least half of the undergraduate student body since the 1980s, these gains have not translated into corresponding increases in the proportion of women in the professoriate. Since the 1970s the number of women earning doctorates has tripled while the number of women who are full-time faculty has only increased by 1.5 times (West and Curtis 2006). At every stage of professional development a higher proportion of women faculty than men faculty leave the academy (NAS 2007; West and Curtis 2006). This is often referred to as the leaky pipeline.

Women faculty members tend to be concentrated in less prestigious institutions, at lower ranks and in less secure positions. According the National Academy of Sciences, at top research institutions, only 15.4% of the full professors in the social and behavioral sciences and 14.8% in the life sciences are women. The authors go on to write, 'these are the only fields in science and engineering where the proportion of women reaches into the double digits. Women from minority racial and ethnic backgrounds are virtually absent from the nation's leading science and engineering departments' (NAS 2007, S-2). Currently, 30% of women faculty members are in non-tenure track jobs, while only 18% of men faculty members hold these positions (West and Curtis 2006). At doctoral granting institutions, full time women faculty members are only half as likely to be tenured as full time men faculty members (West and Curtis 2006).[2] The demographic data show that there is indeed a problem with the underrepresentation of women and minorities. But according this administrator, the data alone, even though striking, were insufficient to motivate discussions of institutional change. When arguing for employment equity, it would be useful if, in addition to justice or ethics based arguments, we could also marshal arguments regarding the epistemic benefits that both women and men can garner from increasing the proportion of women and minority STEM faculty.

In this paper I investigate the reciprocal relationship between social accounts of knowledge production and efforts to improve the representation of women and some minorities in the academy. In particular, I consider the extent to which feminist social epistemologies such as Helen Longino's critical contextual empiricism, can be employed to argue that it is in researchers' epistemic interest to take active steps to increase the diversity in their communities. As it stands, critical contextual empiricism does not provide enough resources to answer the administrator's question. However, considering epistemologies such as Longino's through an employment equity lens highlights areas where such theories can be further developed. I argue

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[2]I refer the reader to the following excellent sources of data on the representation of women and minorities in STEM and the academy more generally, and for summaries of social science research that shed light on the causes of these inequities: West and Curtis (2006), The National Academy of Sciences (2007), Wylie et al. (2007) and Xie and Shauman (2003).

that in order to answer the 'What is in it for me?' question, accounts such as Longino's require a more robust notion of community structure and more careful attention to the culture of our knowledge producing communities. The arguments provided here both advance the epistemic theory for its own sake and help develop the theory into a tool that can be used by those calling for increased diversity in the academy.[3]

7.2   An Example of 'Diversity Promotes Excellence' Theories

One possible response to the 'what is in it for me?' question arises out of work in feminist epistemology that points to communities rather than individuals as being the locus of knowledge production and argues that diverse communities have epistemic benefits that homogeneous communities lack (Longino 1990, 2002; Nelson 1990, 1993). Much of this feminist work can be represented by the catch phrase 'diversity promotes excellence.' The most developed diversity promotes excellence theory is Helen Longino's critical contextual empiricism. According to Longino, objectivity (1990) and justification (2002) require effective critical discourse within a diverse community. When a community is homogeneous with regard to the background assumptions, prejudices, and theoretical perspectives of its members, those assumptions, prejudices and perspectives can go unnoted and unchallenged. But when a community is diverse, the assumptions are more likely to be brought to light and subjected to explicit evaluation. Longino (2002, 129) writes that 'Effective critical interactions transform the subjective into the objective, not by canonizing one subjectivity over others, but by assuring that what is ratified as knowledge has survived criticism from multiple points of view.'

Longino has carefully described the characteristics of ideal epistemic communities that allow them to maximize the effectiveness of these critical interactions. According to Longino, an ideal community (1) has public venues for critical interactions, (2) has public standards for evaluating theories, hypotheses and data, (3) gives dissent uptake and (4) treats its members with tempered equality of intellectual authority. In later sections of the paper I will argue that uptake and equality of intellectual authority prove to be particularly challenging criteria to meet. *Uptake* points to the notion that successful communication requires not only that the speaker clearly state her views, but also that the listener is willing and able to pay attention to those views and engage those views with openness to the possibility of being convinced. Longino makes this point as follows, 'The community must not merely tolerate dissent, but its beliefs and theories must change over time in response to the critical discourse taking place within it' (2002, 129).

A community must also grant its members *tempered equality of intellectual authority*, meaning that assent is not forced by economic or social power and that

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[3] See Wylie (this volume) for a similar strategic use and development of standpoint theory.

'every member of the community be regarded as capable of contributing to its constructive and critical dialogue' (2002, 132). 'The social position or economic power of an individual or group in a community ought not determine who or what perspectives are taken seriously in that community' (2002, 131).[4] The epistemological goal of tempered equality is to expose hypotheses to the widest range of critical scrutiny. Longino presents epistemic communities with a challenge:

> Thus a community must not only treat its acknowledged members as equally capable of providing persuasive and decisive reasons and must do more than be open to the expression of multiple points of view; it must also take active steps to ensure that alternative points of view are developed enough to be a source of criticism and new perspectives. Not only must potentially dissenting voices not be discounted; they must be cultivated (2002, 132).

There are many examples where the addition of women, with varying degrees of implicit or explicit feminist perspectives, have had a positive impact on our understanding of science, on the practice of science and on the products of scientific work. This can be seen in the critiques offered by feminist science studies scholars who are also working scientists. These critiques often involve revealing and questioning the role of gendered assumptions in the development of research questions, application of theories, choice of research methods and experimental design. The Biology and Gender Study Group (1989) describes feminist work as a control for gender influences. Examples include assumptions of female passivity and male activity that have structured investigations of prenatal development of sex differences (Birke 1986), the study of the mechanisms of fertilization (Martin 1991), the roles of hormones in the development of behavioral sex differences (Birke 1986; Longino and Doell 1983; Longino 1990) and the contributions of males and females to human evolution (Hubbard 1982; Hrdy 1986). Patricia Gowaty writes of her own research in evolutionary ecology, mating systems and sexual conflict,

> Feminism made the experimental designs better. Being self-conscious about my politics has made my experiments better than they might otherwise be, because I institute a variety of controls that others might also use, and would no doubt use, if they were more aware of their own biases. (2003, 917)

Donna Haraway's book *Primate Visions* (1989) documents the impact the incorporation of feminist women in research communities had on the study of primate behavior and animal behavior more generally. For example, primatologist Jeanne Altmann, instigated a quiet but powerful methodological revolution. In one of the most cited papers in the study of animal behavior, 'Observational study of behavior: Sampling methods' (1974), Altmann evaluated a range of sampling methods and in doing so developed a method, focal-animal sampling, that both undermined much previous research generating sexist accounts of leadership and control, and enabled research on topics such as mothering. Although Altmann reports that her location as a woman, a feminist and a mother were influential in her

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[4]Longino is also sensitive to the fact that people have differences in training and ability that may grant them a cognitively privileged position in communities, but that does not impact the respect that ought to be shared among community members.

work, she did not write in an explicitly political way about these topics (Haraway 1989). The 'Sampling Methods' paper did not refer to gender at all, but rather to an analysis of the kinds of sampling that allow for good science. Focal animal sampling provides an effective method for studying the social behavior of female primates. This method has become an important approach in research about non-gendered as well as gendered phenomena. Altmann's methodological study had an impact on the practice of science that went beyond research on topics directly related to gender.

In Evelyn Fox Keller's (1983) biography of Barbara McClintock and in her subsequent book, *Reflections on Gender and Science* (1985), she reveals that McClintock was not conducting research on a gendered topic and did not identify as a feminist. However, Keller argues that the social experiences that came along with being a girl and woman affected her psychology in a way that made it possible for her to develop the close relationship with her study organisms that facilitated her Nobel Prize winning work on transposition. The addition of women, with varying degrees of feminist commitment, to scientific communities can uncover gendered assumptions, provide new or alternative methodologies and engage alternative perspectives that have bearing on research that relates to sex and gender and even research that does not.

Although there is a long list of cases where the addition of women to research communities allowed those communities to produce different and better science, the kinds of generalizations that one can draw from this list are not clear. It would be nice to be able use these examples of women making a difference in the practice of science, in conjunction with diversity promotes excellence theories, to argue that academic STEM departments ought to hire a diversity of candidates. It would be nice to be able to argue that departments ought to embrace hiring practices that increase diversity because the research produced by the department and its members will be improved. It will be more objective or better justified. Members of that community will have a better chance of spotting their assumptions, will have access to a wider range of methods, and will have access to those with a broader range of attitudes towards their work, if they are a member of a department where they can interact with people who are different from themselves. One cannot know beforehand what kinds of differences will be salient and so it is a good idea to nurture diversity in academic departments.

However, significant work needs to be done before we can make these nice arguments. First, members of academic departments can gain at least some of the benefits that arise out of diversity without hiring more women or minorities because they can 'free ride' off diversity that is present in other communities both inside and outside of the academy. In order to sort out the epistemic benefits of diversity to departments, I will develop an account of the kinds of communities of which scholars can be members, the interactions among those communities and the effects of status differences among community members. Second, in order for departments to gain maximal epistemic benefits from increasing diversity, they need cultures that enable women and minorities to effectively develop and express dissenting views. In order to assess the importance of these cultural changes, I will explore the relationship between social position and theoretical perspective. While Longino exhorts members of communities to grant each other's dissent uptake and to grant each other equality

of intellectual authority, I will argue that it will take substantial cultural changes in order to meet these desiderata with regard to women scientists.

7.3   Epistemic Communities, Diversity Free Riders and Diversity Development

In order to assess the benefits that can arise from being a member of a diverse epistemic community we need a more detailed account of community structures and relations than the one Longino offers. Longino discusses communities in terms of groups of people who engage in critical interactions regarding their scholarship: a community is constructed in terms of who interacts with whom. When she discusses ideal communities she describes them as having public venues for critical interactions and some shared evaluative standards (Longino 1990, 2002). Lynn Hankinson Nelson offers a similar, yet thicker, definition of an epistemic community as a group that 'constructs and shares knowledge and standards of evidence' (1993, 124). Nelson goes on to write,

> [E]pistemological communities are multiple, historically contingent, and dynamic: they have fuzzy, often overlapping boundaries; they evolve, dissolve, and recombine; and they have a variety of purposes and projects which may include (as in the case of science communities) but frequently do not include (as a priority) the production of knowledge. (125)

That communities are multiple and dynamic and that they have overlapping boundaries has implications for the distribution of the benefits of epistemic diversity. Longino exhorts communities to 'cultivate potentially dissenting voices,' but communities are multiple and it is reasonable to consider which communities need to do this work in order for researchers to reap the benefits of diversity. I will argue that it is possible for a particular community to reap the epistemic benefits of diversity that Longino illustrates without cultivating dissenting voices.[5] It becomes important to spell out what cultivating dissenting voices means. If one holds an *inclusive sense of community* as simply being those with whom one interacts, then developing dissenting voices in a community can simply mean engaging in social interactions with people who have different social locations or theoretical perspectives than one's own. However, developing dissenting voices could also mean nurturing those

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[5]Solomon and Richardson (2005) and Solomon (2006) also argue that Longino's conception of ideal epistemic communities is problematic. Solomon and Richardson argue that we lack historical and contemporary cases of scientific practice that meets these ideals; as a result we lack evidence that following them will lead to better science. Solomon (2006) argues that group deliberative processes can be influenced by biasing mechanisms associated with groupthink that are not transparent to members of groups and that her aggregative procedures lead to better epistemic outcomes than rational deliberative procedures such as Longino's. However see Wylie (2006) for arguments that Solomon's aggregative procedures as well as Longino's deliberative procedures are subject to implicit cognitive errors associated with gender schemas. I argue that views such as Longino's ought to attend to nuances of community dynamics and cultural features that inhibit critical social interactions, if we are to maximize the epistemic as well as the ethical improvements associated with a social approach to knowing.

with dissenting voices and working to increase the representation of those with dissenting voices in various specific communities within the academy. One can accomplish the former without working toward the later by free riding off existing diversity. This makes it difficult to use diversity promotes excellence theories, such as Longino's, to argue for increasing the representation of women and some minorities in particular communities, and is suggestive of ways that theories such as Longino's can be further developed.

7.3.1   Formal and Informal Communities

Faculty members are associated with numerous, overlapping, formal and informal epistemic communities. This distinction between formal and informal communities will often be a matter of degree and will be dependent on context. In this paper I am focusing on scientific or academic institutions. In this context a *formal community* is one that is institutionally recognized and conducts the kinds of activities acknowledged as contributions to the professional advancement of a faculty member. Membership in this sort of formal community is likely something that one could list on their vita. Formal communities can include academic departments (where members can be students, post doctoral researchers or faculty), committees or professional organizations. Departments are formal communities and are important because they are the primary place where scholars are paid for their epistemic labor. It is primarily departments that hire scholars to do scholarly work. While there is lots of scholarly work that happens outside of formal communities, workers could likely do more and better work if they were compensated for that labor by a formal community.

   Informal communities can include professional networks of scholars at one's own institution or at other institutions. They can include networks of people outside of one's narrowly defined field but whose perspectives nonetheless influence one's research. They can also include networks of people who are not academics at all. Informal communities can be important sources of alternative perspectives and scholarly as well as personal support. One can gain the epistemic benefits that Longino describes by developing diversity in an informal community and without having to increase diversity in their formal communities, for example their departments, in order to gain these benefits.

7.3.2   Status – Marginal and Central Positions
Within a Community

One can be a relatively marginal or central member of a formal or informal community or hold a perspective that is relatively marginal or central in terms of being valued by one's community. Longino's criteria of equality of intellectual authority is designed to ensure that the dissent arising from those who have little power or

status in a community, a community's marginal members, is given uptake. However, as I will press in Sect. 7.5, it is likely that women's dissent is not given the same degree of uptake as men's because of unconscious cognitive errors or implicit biases that women are as likely to hold as men (Valian 1999). As a result of the unconscious nature of these biases, it is possible for people of good will to genuinely believe that they are giving women's dissent uptake and fairly rewarding women for epistemic diversity work (or for any of their professional accomplishments), when in fact they are not.

Donna Haraway's (1989) description of the revolutionary work of primatologist Jeanne Altmann exemplifies the multiplicity of communities of which researchers can be members as well as differences in the status of community members. At the time when Altmann published her 'Sampling methods' paper she had neither a doctorate nor any formal training in evolutionary or behavioral biology; she was a Research Associate in the Biology Department at the University of Chicago where her husband was a professor. This position was marginal in many senses, not the least of which was that she could not be invited to speak at conferences without her husband. On the other hand, she was a central figure at the long term Baboon study site in Amboseli National Park in Kenya. At Amboseli she collected many hours of field observations and this work was published in full collaboration with her husband. She was also deeply involved with many informal communities. Haraway writes that,

> Jeanne Altmann would get letters from students in the field with little training asking for methodological help; she gave it. Progressively, she became a node in a network or "invisible college" of field workers, including a growing network of young women. Jeanne Altmann became simultaneously a senior mentor and a peer contributor to reformulations of what could count as female for scientists and for their research subjects, animal and human. (1989, 308)

Altmann was a member of many communities that overlapped. Some of these communities gained epistemic benefits from her work while she held an official position that was marginal, was low-ranked and that positioned her as the wife of a professor rather than a professor herself. Although she went on to become an eminent scientist, even if she hadn't, the disciplines of primatology and animal behavior would still have benefitted from her work. Our sample of women or feminist scientists is biased because it is usually those who persist in their careers and become eminent whose stories are told. But, even among the group of women who persist in academic careers, and even in the case of an elite woman scientist such as Altmann, both formal and informal communities can benefit from their presence while these women are only marginal members of any formal community, or only members of an informal community.

7.3.3   Diversity Free Riding

Because epistemic communities are overlapping, one can glean the benefits of being a member of a diverse epistemic community by cultivating an informal community

while being a member of an academic department, a formal community, that has no diversity at all. Although from an ethical perspective one should, one need not, confer rewards on the members of the informal community one cultivates. Further because of implicit gender biases it is likely the case that women accrue fewer of these rewards than men for the same kinds of work. I call this diversity free riding. A *diversity free rider* is either an individual or community who makes use of existing diversity without increasing the diversity of any formal community or without increasing the total representation of diverse voices. The notions of 'making use of diversity' and 'increasing diversity' need to be filled out; in doing so attention to the relatively marginal or central positions of community members and epistemic perspectives is important.

7.3.4 Making Use of Diversity

Making use of existing diversity involves using people with theoretical perspectives or social locations different from one's own as a means of doing better science by using them to increase the diversity of views in one's communities. This can be motivated by salutary reasons. One can imagine a researcher who suspects that his theoretical background, research design, decisions regarding the saliency of different sorts of data or interpretation of data may be based on gendered assumptions that he does not see. As a result he may seek out people with expertise with regard to gender or feminism (that results from their theoretical perspective or social location), develop an informal community that includes them, and use their perspective to uncover gendered assumptions in his research. This sort of reflexivity, of consciously using social interactions to uncover one's own assumptions, can result in creating maximally accurate knowledge of a gendered topic, which is a good thing and perhaps is not as common as we might like. Developing this informal community may also lead to the professional advancement of the scholar with expertise regarding gender, although this need not be the case. One can achieve these locally beneficial goals without contributing to the education or professional standing of the person who is being used as a source of diversity. The person being used as a source of diversity is doing what I call *epistemic diversity work*. Such work can be manifested in a number of ways, including talking to members of a community about their research and commenting on or reviewing grant applications or papers. These kinds of activities are often part of the everyday research and service activities of academics. However, epistemic diversity work is often performed in addition to the activities in which these scholars engage as part of their own research programs.

The impact of free riding on a diversity worker will depend on the social location of the worker and the kind of diversity that a worker adds to a community. For example, an esteemed developmental biologist may be called on to provide a different perspective on the research of a community of population geneticists, and the community of population geneticists may not reward the developmental

biologist or do anything to increase the representation of developmental biologists in the academy. However, a diversity worker with high status and a valued research program will likely incur relatively small costs associated with being the object of free riding or with declining offers to do diversity work.

On the other hand, the situation can be very different for a diversity worker who is a marginal member of a formal or informal community or who is doing work that is not highly valued in those communities. As I will point out later, this is more likely to be the situation of a diversity worker who is a woman or feminist researcher, or who has a theoretical perspective that is related to gender. Free riding off such workers can have serious consequences for their professional development.

Insofar as there are not mechanisms in the academy that provide compensation for epistemic diversity work, even though diversity free riding may be motivated by salutary goals, it is problematic. It is problematic because this is time-consuming labor that need not contribute to the professional advancement of diversity workers and takes away energy that could be used by the diversity worker to advance their own career. If free riding is a common or continuing strategy, even if it is conducted for salutary reasons, it can have the effect of decreasing the pool of diversity workers since it can have negative effects on their career trajectories. In other words, free riding can lead to a lose-lose game, because it can decrease the overall pool of diversity workers.[6]

Of course epistemic diversity workers can choose to withhold their services and withdraw from communities, formal or informal, who are using their experiences, time and talents without offering reward. But choices about whether or not to provide epistemic diversity work are constrained in various ways and these constraints can differ depending on the status of the diversity worker and the kind of diversity that a worker is providing. First, even if this work does not lead to professional advancement it can be personally fulfilling or the diversity worker can feel a moral obligation to do this work. A developmental biologist may wish that communities of population geneticists conducted research that was more sensitive to developmental constraints and so may decide to provide diversity work for a community of population geneticists despite free riding. However, a woman or feminist scholar who is in a position to detect and possibly decrease the degree of gender bias in scientific research may be motivated to do this work because of the joint effects of producing better and less sexist science. In these cases, moral obligations can swamp considerations of professional advancement. Second, this kind of work may have the potential to build a network of contacts, a relatively stable informal community, which can be personally and professionally supportive. However, there is research showing that access to, and benefits of, these informal networks are not equitably distributed between men and women (Rosser 2004 and below).

For diversity workers who are marginal members of communities, both accepting and refusing to do diversity work can be risky. Refusal is risky because it

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[6]This pattern can be especially prevalent with regard to institutional service work performed by women faculty (Bird et al. 2004) and faculty of color (Monture-Okanee 1995; Baez 2000).

involves withholding services from a person with greater power and authority than the diversity worker or from a community in which one is a marginal member. Since these kinds of social interactions are often thought to be included as a part of professional practice or good citizenship, refusing to do this work can be seen as refusing to do one's job or as being a bad citizen. Acceptance is also risky when the worker is in a marginal position. I recall making a brief comment on a senior colleague's work, saying that gender might play an interesting role. When he asked me to elaborate, my mind flashed to my upcoming tenure review and I realized that my response required not only philosophical acumen but a degree of diplomacy that I might not be able to muster. Epistemic diversity work can involve telling people things that they might not be inclined to hear. The power differences among members of formal and informal epistemic communities have professional and epistemic consequences.

If we employ an inclusive definition of a community as consisting of those with whom one interacts, an individual or community can cultivate diversity by seeking out and interacting with diversity workers. An individual or community can engage such workers and gain epistemic benefits from these engagements without the diversity worker benefiting from these interactions. If this is a consistent pattern or if the diversity work is onerous, this can retard the diversity worker's career advancement. As a result, instances of free riding that exploit diversity workers can lead to decreases in the pool of diversity workers.

While it is true that free riding is possible, if it is uncommon the situation would be less grave. Given the amount of care and effort that many senior faculty members spend mentoring students and junior colleagues, it may initially seem as if free riding off people with marginal social positions is unlikely. However, there is evidence that these important and well intentioned efforts are not equitably distributed between men and women recipients (see Trix and Psenka 2003 on letters of recommendation). A lack or ineffectiveness of formal and informal mentoring is one of the frequently cited barriers to the advancement of women in the academy (Rosser 2004). Further, both men and women tend to unconsciously undervalue the professional contributions and accomplishments of women academics (Valian 1999). We are often unaware when we are free riding off women, or when we are under valuing a woman's relative to a man's contribution to a professional community. A simple example that women often report is making a contribution during a meeting, having her contribution taken up by a male colleague and the meeting proceed as though the woman's colleague came up with the idea. While a single instance of this kind of usurping may be annoying, a persistent pattern can add up to significant devaluing of a woman's contributions to a community.

7.3.5   Some Feminist Concerns

Diversity promotes excellence theories that employ an inclusive sense of 'community' allow people to make use of diversity in ways that are consistent with the leaky

pipeline and also with Harvard past-president Lawrence Summers's rehearsal of economic arguments that discrimination is not a factor in the underrepresentation of women in science at elite institutions. The leaky pipeline is troublingly consistent with 'diversity promotes excellence' theories that use an inclusive notion of community. Currently, there is a steady supply of women with STEM doctorates. Before women leak out of the pipeline they can be useful diversity workers. And the woman who is the well-trained and under-employed spouse of a scientist can be well situated to do diversity work, while being a marginal member of any formal community, or only a member of an informal community. While the supply of junior women academics can provide a source of diversity workers, steps taken to retain those women would make this pool larger, which could result in more dissenting voices and in diversity work being spread over a greater number of workers and thus having less negative impact on an individual diversity worker's career. It could also result in the mainstreaming of diversity work, which could lead to diversity work becoming part of a valued research program.

Theories that do not attend to differences between formal and informal communities have a troubling consistency with economic arguments such as those rehearsed by Harvard past-president Lawrence Summers (2005), to the effect that the underrepresentation of women in STEM is not due to discrimination, but rather to differences in the proportion of men and women with the talent and drive that it takes to succeed in science. The argument is based on the idea that if there were a pool of talented and under-employed women scientists, a university that saw this and hired them would have an advantage over institutions that did not hire women because of discrimination. However, an institution can gain epistemic benefits from diversity by free riding off diversity provided by women scholars in formal communities in other, less prestigious institutions and off of under- or unemployed women scholars. While it is true that such an institution will not garner prestige from employing these talented women, its members can benefit by free riding off of women scholars whom it does not support.[7]

These considerations of the details of kinds of communities and the positions of people within those communities raise important questions about the feminist nature of various social epistemology projects. A 'diversity promotes excellence' theory that uses an inclusive sense of community can be consistent with exploiting scholars who are marginal members of a formal community or only members of an informal community who do epistemic diversity work. It can also be consistent with inequitable employment patterns of women in the academy, with the leaky pipeline, and with women being employed at lower ranks and at lower ranking institutions than men. Furthermore, free riding has the potential to harm scholars in marginal social positions more than scholars in central social positions, epistemic diversity work can be riskier for marginal scholars, and marginal scholars face stronger constraints on their decisions regarding whether or not to perform epistemic diversity work. If we hold that a feminist theory ought to protect and lead to the advancement of those in

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[7]Thanks to Heidi Grasswick for making this point.

marginal social positions, in particular women, then a feminist epistemology that does not attend to the nuances of kinds of communities and the social position of members of communities at least requires further development.

7.3.6   *Increasing Diversity – Diversity Development Work*

Recall that a diversity free rider is one who makes use of existing diversity without increasing the diversity of any formal community or the total representation of diverse voices. In previous sections I discussed the idea of making use of diversity. Here I discuss the notion of increasing diversity. Of course, it is possible to make use of diversity without exploiting diversity workers and this is most likely what feminist epistemologists such as Longino intend. One can avoid free riding by developing diversity in particular ways. Spelling out what developing diversity means may help clarify Longino's call for communities to take 'active steps to ensure that alternative points of view are developed enough to be a source of criticism and new perspectives' (2002, 132).

Communities and members of communities who cultivate those with dissenting perspectives by taking steps to train, hire, or retain those with underrepresented theoretical perspectives, social locations, or to reward them for their epistemic diversity work, or to nurture cultures that are conducive to the development of dissenting views are performing *diversity development work.*[8] Any one of these options can result in epistemic benefits to academic communities as well as improvements in the situation of women and minority scholars. Furthermore, all three of these options are interrelated. For example, rewarding someone for diversity work can help them build their vita and get a job. Increasing the representation of diversity workers within a department can support a culture where such workers can more effectively develop and articulate dissent. Creating a culture that is conducive to the development of dissenting views can have a positive impact on retention rates.

The relationships between kinds of diversity development work can also be negative. In the next section of the paper I will argue that the chilly climate for women and minorities in STEM fields and in the academy more generally is not conducive to the development and articulation of dissenting views. Although one can gain epistemic benefits from interacting with women and minority diversity workers in a chilly climate, this is far from an optimal ethical or epistemic situation.

The discussion above suggests that the answer to the 'what is in it for me if I embrace hiring practices that promote diversity?' question is more complicated than just saying that it is beneficial to be a member of a diverse epistemic community. Although one can benefit from interactions with diversity workers in one's own department, one can also obtain those benefits by engaging and possibly free riding off members of other communities, formal or informal, with which one is

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[8]Thanks to Sandy Gahn for suggesting the name 'diversity development'.

connected. Hiring to promote diversity may be primarily a service to one's profession, because one is increasing the pool of potential diversity workers, not only for one's own use, but also for the use of members of other communities. One benefits from being a member of a profession in which other departments also perform this service thereby increasing the pool of diversity workers with whom one could engage. Considering the administrator's question makes clear the need for diversity promotes excellence theories to attend to the details of community structure.

In the next section of this paper I will explore the ways that the chilly climate impacts the epistemic benefits that a community or member of a community can accrue from diversity. Maximizing the epistemic benefits that can arise from diversity involves developing cultures that support diversity workers with alternative social locations and alternative theoretical perspectives.

7.4   Situational and Epistemic Diversity

In the previous section of this paper I referred to diversity workers as providing diversity in terms of their social locations or their theoretical perspectives, and I referred to diversity development work as a wide range of activities which include changes in hiring practices and cultures. In this section and the next one I will briefly unpack these different senses of diversity and diversity development work because each has bearing on the ways that communities, formal and informal, can cultivate and make best use of diversity. The epistemic benefits that can accrue from creating diverse communities arise not out of the inclusion of more women and minorities per se, but because of the different background assumptions and theoretical perspectives that these people may bring to critical discussions in virtue of their social location. This can be clarified by distinguishing between situational diversity and epistemic diversity. A community is *situationally diverse* when its membership consists of individuals with different social and material locations (gender, race, class, sexuality, etc.).[9] The failure of scientific communities to be situationally diverse is most often couched as an ethical problem. In terms of employment equity, these ethical issues come down to a matter of fairness. The relative lack of women and minorities in the academy is not the result of their lack of ability, commitment or drive, but because of institutional, social and psychological factors that function to exclude them (Wylie et al. 2007).

A community is *epistemically diverse* when it includes members who hold a range of different background assumptions, and theoretical and methodological perspectives. The failure of scientific communities to be epistemologically diverse is most often couched as a cognitive problem. It is a cognitive problem because all of the background assumptions that researchers use to determine the connection between theory and evidence do not announce themselves. Those assumptions can be brought to light through critical interactions with people who are aware of those

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[9]I address situational and epistemic diversity in Fehr (2007).

assumptions or who hold different assumptions. The value of epistemic diversity can be realized in ways other than just making evidential relations explicit. Alternative perspectives can be fruitful in terms of providing alternative questions to ask, theories to test and methods with which to generate data. The relationship between situational and epistemic diversity reveals, what has been pointed out by feminist epistemologists, that our cognitive problems and ethical problems are often intertwined (Code 1991). The examples of women, with varying degrees of feminist engagement, such as Jeanne Altmann, Barbara McClintock, Ruth Hubbard, Sarah Hrdy and Ruth Bleier, demonstrate that situational diversity can have a significant impact on epistemic diversity, and that the epistemic diversity generated out of situational diversity with respect to gender can extend beyond investigations related to gender. One woman scientist interviewed by Sue Rosser reports that her social situation positively impacts her science:

> In the computer science discipline in which I work, respect is conferred upon those who possess knowledge obtained primarily through countless hours investigating the nuances of hardware and operating systems. To many in my peer group, this is a relaxing hobby and way of life. Though I learn these nuances as I need them for my research, outside of my work I read literature, am deeply interested in social issues and am committed to being involved in my child's life. I see this alternate experience base as an asset to my field. As Rob Pike of C language fame recently said, "Narrowness of experience leads to narrowness of imagination". (2004, xxiii)

Even though there are many cases where situational diversity has led to epistemic diversity, this does not mean that situational diversity necessarily results in epistemic diversity, nor that it always should do so. For example, one can imagine a woman, thoroughly professionalized in a traditional discipline, who uses traditional methods and a widely accepted theoretical approach to study a topic that may or may not be related to gender. A woman may not and need not bring any epistemic diversity, gendered or otherwise, to a community. Whether or not she brings epistemic diversity to a community can be influenced by a wide range of factors. Women as well as men can be curious about a wide range of topics and engaged by a wide range of approaches. Women as well as men are subjected to long apprenticeship-like training in central methods and approaches in their disciplines.

In summary, increasing situational diversity can and has led to increases in epistemic diversity, but it is not necessary that it do so. In the next section I will look at cultural factors that can block epistemic diversity from arising out of situational diversity with respect to gender. If communities are to glean maximal epistemic benefits from increasing situational diversity (e.g., departments hiring more women) it is important to discover and remove these cultural constraints.

7.5   From Ineffective to Effective Epistemic Diversity

When considering constraints that can block epistemic diversity from arising out of situational diversity, it is useful to point out a continuum between effective and ineffective epistemic diversity. *Effective epistemic diversity* describes a community

that contains members who hold different background beliefs *and* makes use of that diversity to generate and evaluate theories, hypotheses and data from the widest possible range of perspectives. In this kind of community, members feel free to develop and offer dissenting views, their dissent is given uptake and they are granted equality of intellectual authority with those who hold more common or more central perspectives. In order for a community to reap the benefits described by diversity promotes excellence theories such as Longino's, they do not just require epistemic diversity, they require effective epistemic diversity. *Ineffective epistemic diversity* obtains when a community includes members who hold different background beliefs but *does not* use this diversity to generate and evaluate theories, hypotheses and data. Communities can be blocked from making use of the epistemic diversity that could be offered by their members. As will be discussed below, current research on women STEM faculty and on university cultures indicates that (1) there are likely factors acting that block women's dissent from getting uptake, (2) cultural patterns inhibit the kinds of social interactions required for women to offer dissent and (3) there are forces that inhibit women from developing dissenting views.

7.5.1 Women Can Face Challenges Gaining Uptake

Research in the social sciences reveals that women's professional accomplishments are undervalued relative to men's (Valian 1999). We can see this pattern in several studies that demonstrate gender bias in the evaluation of curriculum vitas that differ only in terms of the gender of the scientist being evaluated (Fidell 1970; Steinpreis et al. 1999). Vitas with a male name at the top of the page were evaluated as belonging to candidates who were more hirable and hirable at a higher rank than vitas with a woman's name at the top of the page. In one study where the vitas were returned to the experimenters, women's vitas had four times as many cautionary notes in written in the margins than identical men's vitas (Steinpreis et al. 1999). Academic vitas are the most objective descriptions of a faculty member's accomplishments. The data is presented in a stark, systematic and highly ritualized manner. What is evident is that this most basic form of evidence is not successful in providing objective data. A man's accomplishments as listed on his vita are more likely to get uptake than a woman's accomplishments.

Of course, there is a big difference between looking at a vita, and the kinds of face to face and written interactions that take place when members of a community engage in critical discourse involving dissent. However, similar patterns show themselves in a study of letters written for successful applicants for positions at a medical school (Trix and Psenka 2003). In general, the relationship between a candidate and a letter writer is closer than the relationship between a candidate and someone reviewing their vita. Trix and Psenka found that letters written for women tended to be shorter, were twice as likely to have a doubt raiser in the text, and one and a half times as likely to contain 'grindstone adjectives' as letters written for men. Women were less likely to be described as successful and their letters were

much less likely to contain the words 'accomplishment' or 'achievement.' Letters written for women were much more likely to refer to the candidate's teaching and training, and much less likely to refer to her research and skills and abilities than letters written for men. In these letters we see different kinds of assessments of the professional accomplishments of women and men. This study suggests that the accomplishments that are most valued in the academy are often not granted uptake by letters writers, presumably some of whom are the applicant's mentors, the people in these women's scientific communities who know their work well and who have an interest in their continued professional success.

In 2005 the Statistical Research Center of the American Institute of Physics conducted a survey of 1,350 women physicists from more than 70 countries (Ivie and Guo 2006). Most of the women found their careers to be rewarding and 86% of respondents said that they would choose physics again. However, 43% of women respondents report being discouraged about physics because of the climate for women, 65% being discouraged by discrimination and 80% of women respondents report that attitudes about women in physics need improvement. Several of the respondent's comments speak directly to issues of uptake. One woman reported,

> It is difficult when you are, as I have been, the only woman in a conference. Or when people interrupt, or do not listen or even laugh at what you are saying, even if it is important. Or when advisors or mentors could not believe that I'd done the work myself. (Ivie and Guo 2006, 11)

If women's professional accomplishments don't make it into assessments of their professional ability by those assessing their vitas and by those who know their work well enough to write a recommendation letter, or if their contributions are mocked and ignored, the epistemic diversity, whether or not it relates to gender, that they may be able to offer their communities is wasted. Epistemic diversity may be present in the sense that there are members of a community who hold dissenting views or different background assumptions, but that diversity is ineffective if it does not get uptake and is not integrated into a community's critical interactions.

One might argue *pace* Kitcher (1993) that selfish motivations could overcome lack of professional respect and result in uptake of dissent that could improve one's research. However, research on the under valuing of women's relative to men's professional accomplishments shows that these biases are frequently implicit (Butler and Geis 1990; MIT 1999; Valian 1999). Not only is it common for subjects not to notice their biases but they often genuinely believe that they are not biased. Women and men are equally likely to undervalue women's contributions. This means that members of communities may not be aware that they are not granting dissent from women uptake. Further, as I will argue below, social arrangements inside departments and other academic units may limit the opportunities for interactions in which dissent can be raised, and women may be pushed to use traditional methods and approaches which may limit their ability to develop dissenting views. The fact that women face challenges getting uptake does not provide evidence that diversity promotes excellence theories such as Longino's ought to be abandoned. Rather, it shows that we need to address issues of culture and implicit gender bias in the evaluation of

women's work and further develop Longino's views. There are both ethical as well as epistemological reasons to work toward ameliorating these issues.

7.5.2   Lack of Social Interactions Required for Women to Offer Dissent – Isolation

One well documented barrier to the retention and advancement of women STEM faculty is isolation and exclusion from networking opportunities. Much of the research on this topic focuses on women lacking knowledge of norms and practices required for tenure and promotion because they are excluded from professional networks. However, if we consider critical social interactions among members of a community as an epistemic desideratum, the isolation and exclusion of women becomes an epistemic issue. A formal community may be situationally diverse and epistemically diverse, but if women are systematically excluded from social interactions within that community, the functioning epistemic community may be an informal community from which women tend to be excluded. It is difficult to measure the impact of factors such as isolation because the vast majority of the data on this topic come from women who have persisted in academic careers. But even among those who persist and win national level competitive grants, isolation is still a factor. In Sue Rosser's study of women who received NSF POWRE grants, she found that in 2000, 30.5% of respondents cite problems with low numbers of women, isolation and lack of camaraderie/mentoring, and 21.9% report challenges gaining credibility/respectability from peers and administrators (Rosser 2004, Table 6, p. 36).[10] One of Rosser's respondents wrote, 'The biggest challenge that women face in planning a career in science is not being taken seriously. Often women have to go farther, work harder and accomplish more in order to be recognized' (Rosser 2004, 40). Similarly, one respondent to the American Institute of Physics survey wrote, 'The main reason [I've felt discouraged] is so often you are just made to feel like you shouldn't be there. You have to work twice as hard, do twice as much just to be considered half as qualified' (Ivie and Guo 2006, 11).

One way that isolation functions is that some women report trouble establishing collaborations with men. In Sonnert and Holton's (1996) study of women and men who won prestigious postdoctoral awards they found that when collaborating with men women were more often treated as subordinates rather than equal or senior research partners. Along similar lines, a woman from the American Institution of Physics study wrote, 'Interaction with colleagues has been the most difficult. I have often felt that I am ignored or discounted when I attempt to initiate collaborations with men' (Ivie and Guo 2006, 11). This comment speaks to uptake as well as intellectual isolation.

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[10] Table 6 shows data ranging from 1997 to 2000. Although there is variation among these years, in all cases low numbers of women, isolation and lack of credibility and respect are identified as significant challenges facing women scientists.

Women can also be isolated in terms of their choice of research areas. Of the highly promising scientists that Sonnert and Holton studied, 40% of women and only 15.7% of men reported that their gender influences their choice of research topics. Sonnert and Holton report that women tend to adopt a niche approach; they tend to create their own pockets of research expertise. Several women report adopting this strategy to avoid taking part in a highly competitive culture in which researchers are racing with one another to solve a particular problem. Whether this choice is the result of women adaptively avoiding a hostile and aggressive work environment or it is simply a benign difference of research styles, this result, in combination with challenges that women report doing collaborative work, paints a picture of women being excluded from social interactions relevant to research as well as social interactions relevant to gaining knowledge regarding professional advancement. Reports of being an outsider or not feeling like a full member of professional communities are common. Mary Frank Fox writes that this has a wide range of impacts on women's careers:

> Within the same type of setting, women scientists can have fewer and different collaborative arrangements, claims to enabling administrative favors, *collegial opportunities for testing and developing ideas*, and entrees into the informal culture of science and scholarship (Fox 1991, 204 in Rosser 2004, 47 italics added).

Research on isolation and exclusion demonstrates that the effectiveness of diversity promotes excellence theories requires structural and cultural changes in the academy.

7.5.3   Forces That Inhibit Women from Developing Dissenting Views

Women are often solo or minority members of scientific communities and are relative newcomers to many contemporary professionalized academic disciplines. Women also tend to be in marginal positions within the academy. The increases of women scientists in the academy can be seen primarily in low-ranking institutions and at low academic ranks, and women are more likely than men to hold non tenure track positions (West and Curtis 2006; NAS 2007). These low numbers and marginality can impact the way women conduct their research.

Sonnert and Holton's survey data show that 34.8% of women and 9.9% of men thought their gender plays a role in the methods they use (1996). That one third of elite women scientists report that their gender influences their methodology might be initially suggestive of epistemic diversity. However, in the interviews respondents rarely reported that they used 'feminine methods,' or even methods different from those used by men. Interviewees rather report differences in the application of traditional methods in terms of using a greater degree of caution, carefulness, attention to detail and perfectionism. Sonnert and Holton write that,

> Rather than being iconoclasts, women tended to uphold to a particularly high degree the traditional methodological standards of science, such as carefulness, replicability and connection

to fundamentals. As a group, women, as relative newcomers to science, adopted – or were taught to adhere to – an extra-high measure of conformity to the formal norms of conducting research. (8–9)

Sonnert and Holton postulate that this conservative research style can 'arise from a collegial environment particularly hostile to women who deviate from accepted standards' (9). One woman reported 'there's always somebody watching for me to make a mistake' and another said that women often find themselves 'under the magnifying glass' (9).

Being in a culture that many women describe as chilly or hostile, where they are marked as outsiders and where their low numbers result in surveillance for error or lack of conformity can push them to take more mainstream approaches to their research. This may have an effect of dampening the epistemic diversity that they are able or feel free to develop and to offer in critical discussions with members of their communities. There may be especially strong reasons to avoid developing approaches and offering dissent with respect to their gendered experiences, but it can also have an effect of limiting the dissent offered on any topic. If we take a social approach to knowledge construction, then it behooves us to look at the actual social arrangements within epistemic communities.

7.6   Conclusions

In this paper I identify several ways that diversity promotes excellence theories such as Longino's critical contextual empiricism, as they currently stand, fail to support arguments for increasing gender diversity in the academy. While increasing employment equity may not be the primary aim of these epistemological approaches, I argue that diversity promotes excellence theories can be further developed in ways that provide resources for epistemologists and activists alike.

One of the challenges I point out concerns the free rider problem. Developing an account of formal and informal communities and of power differences among members of communities reveals that one can nominally follow Longino's advice to cultivate diversity simply by engaging in social interactions with a person who holds a different epistemic position from one's own and without increasing the overall diversity in the academy. Focusing on this issue using employment inequities as a lens shows that a diversity promotes excellence theory can be consistent with the exploitation of members of marginalized groups and with inequitable employment patterns in the academy. This can provide a misleading answer to the 'what is in it for me?' question, because it seems to show that one can reap the benefits of epistemic diversity without employing women, or members of other underrepresented groups, and in fact without even rewarding them for their epistemic diversity work. This is not to say that one cannot benefit from including members of underrepresented groups within one's own department, just that one can find those epistemic benefits elsewhere. But, free riding off marginal members of communities is consistent with and contributes to a culture in which those who are in marginal social positions

are undervalued. As a result, they are not in a position to contribute as much effective epistemic diversity to a community as they might otherwise be. Free riding might be common but it is not an optimal strategy. Although people can gain some epistemic benefits from free riding, in the long run they can likely gain greater epistemic benefits from doing diversity development work.

Longino's theory needs to be developed in a way that blocks this nominal interpretation of her work. Doing so is consistent with a richer sense of developing diversity and taking seriously her calls for members of communities to give dissent uptake and to treat each other with equality of intellectual authority. It is not easy work because, among other things, it involves addressing cultural issues. In many contemporary communities, women's voices are not given uptake and women are not treated with equality of intellectual authority. A richer sense of cultivating dissenting voices includes developing cultures that nurture epistemic diversity workers, both in their ability to explore and develop dissenting perspectives and in the social relations they share with other members of their communities.

I am interested in answering the 'what is in it for me?' question for two reasons. First, the underrepresentation of women and some minorities among STEM faculty, and in the academy more generally, is highly problematic, especially in light of social science research showing that this underrepresentation is not due to lack of the ability or drive to succeed in academic careers. It is apparent that those motivated to improve this situation need access to a wide range of arguments. Although diversity promotes excellence theories, such as Longino's critical contextual empiricism, are not designed to specifically address these employment inequities, they do provide an interesting avenue for addressing these problems. Second, focusing on the 'what is in it for me?' question provides an opportunity to explore ways that diversity promotes excellence theories can be developed both for their own sake and also to guide the activities of scientists seeking to improve their craft.

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