

The Epistemic Significance of Diversity

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Introduction

Diversity is a property of the social organization of science, including scientific communities and research groups. In order to analyze the epistemic significance of diversity, it is necessary to distinguish between cognitive and social diversity (Page 2007). A community or a group is cognitively diverse when its members have, for example, different research styles and skills, different perspectives on the subject matter of inquiry, or access to different bodies of empirical evidence. A community or a group is socially diverse when its members have different non-epistemic values, such as moral and political values, or different social locations, such as gender, ethnic identity, nationality, and race. Given the cognitive/social distinction, epistemological questions concerning diversity can be brought more sharply into focus: When is cognitive diversity epistemically beneficial and why? Under what conditions does social diversity generate epistemically beneficial cognitive diversity?

While I acknowledge that there is cognitive diversity among scientific communities, in this review essay, I focus on cognitive diversity within scientific communities. By scientific communities, I mean specialties where scientists are united by shared concepts, beliefs, epistemic values, or epistemic goals (Wray 2007: 344). Individual scientists can endorse slightly different

constellations of these elements, with the consequence that there may not be any unambiguous way to define the boundaries of communities or to distinguish members from non-members.

Communities may overlap and individual scientists may belong to several communities either simultaneously or in succession (Kuhn 1996: 178). While many community members pursue similar epistemic goals, communities typically host a diversity of theoretical approaches and methods (Rolin 2011: 473). Communities are also arenas for disagreement and controversy (Solomon 2001: 65). Yet, there is a limit to the amount of cognitive diversity a scientific community can accommodate. This is because communities need to strike a balance between cognitive diversity and the requirement of shared standards. This said, it is important to keep in mind that communities do not form a stable social organization of science. A striking feature of scientific change is that some communities become fragmented or dissolved and new ones emerge (Wray 2011: 117).

When research groups are said to be cognitively diverse, diversity can refer not only to disagreement among group members but also to a diversity of expertise and skills scientists bring to a research collaboration. A diversity of expertise and skills is epistemically productive when it enables a research team to carry out a research project no individual scientist could do on their own (Andersen and Wagenknecht 2013). Diversity in the sense of disagreement can also be epistemically fruitful by generating critical exchanges. Yet, as in the case of scientific communities, there is a limit to the amount of disagreement a research group can tolerate. This is because research groups are under pressure to arrive at a collective view so that they can publish their results in a timely manner. Acknowledging that a pressure to conform may be a problem in research groups, some philosophers have examined how research groups can make use of epistemically fruitful disagreement (Tollefsen 2006; Wray 2014).

The social epistemology of diversity can be mapped by identifying three approaches that have emerged in the late 1980s and the early 1990s, and have been influential from then on:

Philip Kitcher's (1990) argument from the distribution of research efforts, Helen Longino's (1990) contextual empiricism, and Sandra Harding's (1986, 1991) feminist standpoint theory. I argue that the three approaches differ in how cognitive diversity and the sources of cognitive diversity are understood.

Distribution of research efforts

In Kitcher's article "The Division of Cognitive Labor" (1990), cognitive diversity is understood as a diversity of theories or methods addressing a common problem. Kitcher argues that cognitive diversity is epistemically beneficial in certain phases of inquiry, when it is not yet possible to tell which theory (or theories) will be true or most successful empirically, or which method (or methods) will lead to a breakthrough. When competing theories have different epistemic virtues or when different methods have complementary advantages, it is more reasonable to distribute resources among the theories or the methods than to allocate all available resources to one theory or method. A distribution of research efforts is an efficient solution to the problem of coordinating community wide research activities when the probability that a community will achieve its epistemic aims by means of distribution (in a given time period) is higher than the probability that it will achieve its aims by focusing single-mindedly on one theory or method.

Kitcher's argument is novel in two ways. First, he does not claim merely that disagreement about theories is rational when theory choice is underdetermined by all available evidence and background information. His claim is more radical than this. He claims that a distribution of research efforts can be epistemically desirable even in an instance where it would be rational for all community members to agree that one theory is superior to its rivals. To suggest that a distribution of research efforts is epistemically rational is to suggest that at least some community members should pursue a theory that is widely known to be inferior to the most promising theory.

While the pursuit of such a theory is not rational from an individual point of view (given the traditional view that individual rationality is purely epistemic rationality), it can be rational from a community point of view.

Second, Kitcher does not claim merely that disagreement about theories is rational when scientists subscribe to different theoretical virtues. Thus, he departs from Thomas Kuhn (1977) who suggests that rational disagreement is an outcome of scientists' interpreting or weighing theoretical virtues in different ways (see also Longino 1995). Kitcher claims that even in an instance where community members are united in their understanding of theoretical virtues, a distribution of research efforts may be an outcome of scientists' personal interest in credit. Instead of evaluating merely whether a theory is acceptable in light of available evidence and background information, a rational individual makes decisions strategically by anticipating other community members' behavior. If an inferior theory will turn out to be true in the end, great credit will be due to the small amount of scientists who have risked their careers for it. Choosing to work with a superior theory may not lead to an equal amount of credit even if the theory will turn out to be true. This is because the credit will be shared by the large amount of scientists who have chosen to work with a low risk theory.

By challenging the traditional view that individual rationality is purely epistemic rationality, Kitcher argues that a community of epistemically "sullied" agents (who are credit-and-truth-seekers) is likely to be more efficient than a community of epistemically "pure" agents (who are merely truth-seekers), because in the former community the agents' desire for recognition will lead some of them to pursue a high risk theory, thereby generating a distribution of research efforts (1993: 310). While personal interest in credit appears to be a non-epistemic factor, it can contribute to the epistemic success of science by generating a distribution of research efforts. In sum, Kitcher suggests that the epistemic benefit of cognitive diversity urges philosophers to (i) modify their

traditional conceptions of individual rationality, and (ii) seek to understand collective (or community) rationality by exploring the question: What is an efficient division of cognitive labor?

Kitcher's ideas have been developed further by many philosophers (e.g., Alexander, Himmelreich and Thompson 2015; D'Agostino 2009; Muldoon 2013; Pöyhönen 2016; Strevens 2003; Thoma 2015; Weisberg and Muldoon 2009). Miriam Solomon (1992) argues that epistemically beneficial cognitive diversity can have many sources (see also Kitcher 2011). In her view, a distribution of research efforts does not require that an individual scientist is a credit-seeker. A distribution may take place also in a community of passionate truth-seekers who make use of different cognitive heuristics. For example, scientists may weigh salient and available information more heavily in their decision making than other information. The geological revolution between 1920s and 1960s is an example of scientific change where the phenomena of cognitive bias and belief perseverance played an epistemically positive role by creating a distribution of research efforts. Solomon (2001) suggests also that science policy makers and scientists who are in a position to make funding decisions are responsible for ensuring that scientific controversies are not closed prematurely. Unlike Kitcher (1990), she does not believe that a distribution of research efforts will take place by "an invisible hand of reason" (2001: 95). Solomon concludes that diversity is a "blunt epistemic tool" (2006: 26), by which she means that more than one kind of cognitive diversity can be epistemically beneficial and it is difficult to tell in advance which kind will contribute to epistemic success.

Kevin Zollman (2010) argues that a distribution of research efforts can be maintained by limiting an exchange of information in scientific communities. He emphasizes that an epistemically valuable property of scientific communities is not cognitive diversity as such but rather transient cognitive diversity. By transient cognitive diversity, he refers to a distribution of research efforts that lasts long enough so that individuals do not discard theories too quickly, but not so long as to hinder the convergence to one theory. Cognitive diversity has to be transient

because the same factors that are responsible for maintaining a distribution of research efforts can also undermine a community's ability to achieve truths.

In a more critical tone, Manuela Fernández Pinto (2016) argues that Kitcher's approach to cognitive diversity does not capture a morally and socially significant phenomenon in the domain of social epistemology. By emphasizing that non-epistemic interests can play an epistemically beneficial role in science, the division of cognitive labor approach overlooks cases where non-epistemic interests play an epistemically harmful role, for instance, by introducing sexist or racist biases into scientific research. As this is one of the concerns in Helen Longino's approach to the social epistemology of diversity, I will turn to it in the next section.

Critical contextual empiricism

In contextual empiricism (Longino 1990) – or critical contextual empiricism (Longino 2002) – cognitive diversity is understood as a diversity of perspectives on the subject matter of inquiry. While cognitive diversity does not always go hand-in-hand with social diversity, Longino suggests that in many cases a diversity of perspectives reflects a diversity of non-epistemic values, that is, values that are not justifiable by appealing merely to truth. For example, in the 1970s controversy over human evolution, “man-the-hunter” and “woman-the-gatherer” narratives offered two different perspectives on the anatomical and behavioral development of human species. Neither perspective was apparent in light of empirical evidence. And both perspectives were value-laden in the sense that they assumed the centrality of one sex's behavior in the evolution of the entire species (Longino 1990: 106-8).

Longino's approach to diversity is novel in suggesting that value-laden perspectives are both (i) a source of epistemic problems such as false beliefs or biased accounts of the subject matter of inquiry, and (ii) a solution to these problems. In critical contextual empiricism, cognitive

diversity is thought to be epistemically beneficial not only because it generates a distribution of research efforts, but also because it generates critical exchanges in the community. Criticism can improve scientific knowledge in many ways. It can help scientists identify and correct false beliefs or biased accounts of the subject matter of inquiry. And even when criticism does not give scientists a reason to reject a view, it can be epistemically valuable by forcing them to provide better arguments for their view or to communicate their view more clearly and effectively. Criticism can help scientists avoid dogmatism.

Longino suggests that Kitcher's (1993) distinction between epistemically pure and sullied agents is not helpful in understanding value-laden perspectives (2002: 75). The reason for this is that scientific inquiry is often value-laden in ways that elude an individual scientist. Scientists' motivations may not make a difference in an instance where non-epistemic values do not figure explicitly as reasons in an individual scientist's reasoning. Longino suggests that non-epistemic values may be "encoded" in background assumptions that are needed to ensure that evidence is relevant to a particular hypothesis or a theory (1990: 216). Background assumptions are value-laden when they lead scientists to highlight certain morally and socially significant aspects of a phenomenon over others, or when they have morally and socially significant practical consequences, for instance, by promoting one conception of human agency over another (1990: 216-8). Both epistemically pure and sullied agents may end up working with value-laden background assumptions without them being aware of the roles that non-epistemic values play in scientific inquiry or the consequences that value-laden research has for the society.

If Longino is right to suggest that evidential reasoning may involve value-laden background assumptions, then social epistemologists are urged to reflect on the question of how non-epistemic values are kept at bay in scientific inquiry. In response to this problem, Longino proposes that a community practice constrained by the four criteria of publicly recognized venues, uptake of criticism, shared standards, and tempered equality of intellectual authority is needed to

ensure objectivity. She argues that the four criteria are epistemically desirable because they facilitate “transformative criticism” (1990: 76).

The fourth criterion is of special interest here because it introduces yet another type of diversity into contextual empiricism. In contextual empiricism, the term “diversity” refers not only to a diversity of perspectives and a diversity of non-epistemic values but also to a diversity of people who participate in scientific communities. The tempered equality criterion requires that a community be inclusive of scientists independently of their race, ethnic identity, nationality, gender, age, and sexual orientation. The criterion invites also outsiders to participate in scientific debates on the condition that they respect the four criteria. Equality of intellectual authority is “tempered” only insofar as human beings differ in domain specific expertise (2002: 132-3). But even when some human beings are more knowledgeable than others in some domains, they all should be treated as equally capable of understanding reasons as well as providing criticisms and alternative points of view. Longino argues that 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 (2002: 131). In sum, Longino suggests that social diversity is epistemically beneficial because human beings are more likely to identify values that have influenced scientific inquiry when the values in question are different from their own.

Longino’s approach to diversity has been well received not only in social epistemology but also in socially engaged philosophy of science. It has been used to strengthen the epistemic rationale for science policy programs that (i) aim to broaden the participation of underrepresented groups in science (Fehr 2011; Intemann 2009), or (ii) encourage scientists to share knowledge or to collaborate with non-scientists (Grasswick 2010; Koskinen 2014; Koskinen and Mäki 2016; Wylie 2015). Yet, some philosophers argue that critical contextual empiricism is in need of further refinement. The challenges come from two directions. Some critics worry that it is not capable of

incorporating all the cognitive diversity that is epistemically valuable in science, whereas some other critics worry that it invites the kind of social diversity into science that is problematic from a moral and political point of view.

The first concern, the concern about exclusion, is expressed by Kristen Intemann and Inmaculada de Melo-Martín (2014) who argue that there is a tension between the requirement for tempered equality of intellectual authority and the requirement for shared standards. While the requirement for tempered equality is meant to ensure that scientific communities benefit from a wide range of perspectives, the requirement for shared standards sets constraints for perspectives that can legitimately expect to be heard and taken seriously. The reason for this is that the requirement for shared standards excludes those critics who do not share all or a sufficiently large number of the standards of the scientific community. One question that divides social epistemologists is whether the shared standards criterion should be understood more thickly or thinly (see also Borgerson 2011).

The second concern, the concern about inclusion, is raised by Daniel Hicks (2011) who argues that critical contextual empiricism is not capable of excluding morally and politically problematic views, such as sexist and racist beliefs (see also Intemann 2011; Kourany 2010). While Longino's intention is to ensure that scientific communities are inclusive of social groups that have historically been excluded from scientific education and the scientific profession, the requirement for tempered equality can be abused by sexists and racists to demand not only attention but also resources to scientific theories that are complicit in sexist and racist ideologies. In Hick's view, there is a tension between the egalitarian ethos of critical contextual empiricism and its potentially anti-egalitarian consequences.

In response to the concern about inclusion, Hicks argues that Longino's account of epistemically ideal communities should be understood to include a good faith principle. The principle states that good faith participation in a scientific community aiming to realize the four

criteria requires a commitment not only to the epistemic but also to the moral-political values that underwrite and motivate the ideal, including formal egalitarianism and liberal pluralism (2011: 340). By formal egalitarianism, Hicks means the view that “all members of the community enjoy the same formal standing; no individual or subgroup is, as such, given greater privileges or advantages than others” (2011: 342). By liberal pluralism, he means the view that “there is room for reasonable disagreement; two members of the community may disagree substantially without one or both being unreasonable or irrational” (2011: 342). In Hick’s view, a diversity of moral-political values cannot include values that threaten to undermine formal egalitarianism and liberal pluralism.

So far we have seen that different approaches to diversity come with different methods and conceptions of epistemic agents. While Kitcher (1990) demonstrates the benefits of cognitive diversity with modelling methods, Longino (1990) develops case studies to illustrate the epistemic benefits of cognitive diversity. And while Kitcher suggests that epistemic agents come in two kinds (epistemically pure or sullied), Longino suggests that they come in many kinds. In Longino’s view, a diversity of social locations and a diversity of non-epistemic values explain partly why in many cases there is a diversity of perspectives on the subject matter of inquiry. Yet, Longino, like some other philosophers (e.g., Wylie 2003), acknowledge that social diversity does not automatically give rise to cognitive diversity, nor does cognitive diversity automatically lead to epistemically valuable outcomes. The crucial question is under what conditions social diversity becomes a source of epistemically valuable cognitive diversity. In the next section, I explore this question by introducing feminist standpoint empiricism.

Feminist standpoint empiricism

In feminist standpoint theory (Harding 1986, 1991, 2015) – or feminist standpoint empiricism (Intemann 2010; Wylie 2012) – cognitive diversity is understood as a diversity of social

experiences that have a bearing on scientific research. When cognitive diversity is understood in this way, it is closely related a diversity of social locations. However, not all social locations are of epistemic interest in all research projects. As standpoint empiricists aim to understand how relations of power interact with the production of knowledge, they are interested especially in those social locations that track systemic relations of power and social inequalities (Wylie 2003, 2011, 2012). Standpoint empiricism has affinities with social epistemologies that emphasize the epistemic benefits of democracy (e.g., Anderson 2006; Bohman 2006; Wylie 2006). In both approaches, a diversity of social locations is seen as an epistemic resource because information that is relevant for understanding complex social phenomena is dispersed across society and distributed asymmetrically depending, among other things, on individuals' social class, occupation, education, gender, race, and ethnic identity.

As Alison Wylie explains, “social location systematically shapes and limits what we know, including tacit, experiential knowledge as well as explicit understanding, what we take knowledge to be as well as specific epistemic content” (2003: 31). Sometimes it is the social location of scientists which is thought to provide them with a critical perspective on their specialty or a particular subject matter of inquiry. For example, scientists who are “outsiders within” are thought to occupy an epistemically significant social location in virtue of having first-hand experience of marginal social locations in the society (Collins 2004). Sometimes social locations matter even when scientists themselves do not have first-hand experience of marginal social locations. It is the social location of their informants or the social location of stakeholders to whom scientists see themselves as being socially responsible that matter epistemically. Ultimately, it is an empirical exercise to find out exactly how social locations shape social experiences in particular contexts, and how these experiences are relevant to particular research projects (Wylie 2003).

Like other social epistemologists, standpoint empiricists believe that cognitive diversity is epistemically valuable when it leads to a distribution of research efforts, critical

perspectives, or novel lines of inquiry (Solomon 2009). In addition, standpoint empiricists suggest that a diversity of social experiences brings yet another benefit to scientific communities. Marginal or unprivileged social locations are potentially a source of insight on the way relations of power work in the society as well as in the academic world.

Standpoint empiricists argue also that a marginal or unprivileged social location in and by itself may not have epistemically interesting consequences unless it is developed into a standpoint (Harding 1991: 123). A standpoint differs from a social location in three ways. First, achieving a standpoint requires that one is critically aware of the social conditions under which scientific knowledge is produced (Wylie 2003: 31). Second, participating in the formation of a standpoint requires that one shares some moral-political values with other participants (Harding 1991: 126-7). Third, a standpoint is a collective rather than an individual achievement (Crasnow 2013: 421; 2014: 158). Insofar as there is an epistemic advantage associated with marginal or unprivileged social locations, a sub-community that is part of the larger scientific community, is needed to realize the advantage. I have suggested that such communities can be understood as “scientific/intellectual movements” (Frickel and Gross 2005). Scientific/intellectual movements are epistemically productive when they enable scientists to generate evidence under conditions where relations of power tend to suppress or distort evidence, and 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).

Conclusion

Cognitive diversity is not an epistemic virtue intrinsically. But under some circumstances, it promotes the epistemic goals of science when these goals are understood to include significant truth (Kitcher 1993) or empirical success (Solomon 2001). Epistemically

beneficial cognitive diversity can come in many kinds – a diversity of theories, methods, perspectives, and social experiences – and it can have many sources. Cognitive diversity is thought to be epistemically beneficial for at least four reasons. One reason is that it generates a distribution of research efforts. As no-one is in a position to know in advance which lines of inquiry will be fruitful, scientific communities are better off by distributing their resources on several different and sometimes competing theories and methods. Another reason to value cognitive diversity is that it is a source of critical perspectives which can improve scientific knowledge in many ways. Critical perspectives are needed especially in those cases where scientific research is value laden. Yet another reason to value cognitive diversity is that it is a source of scientific creativity. It 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. Finally, cognitive diversity is epistemically beneficial especially in those research projects that aim to produce evidence despite obstacles raised by relations of power and social inequalities.

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