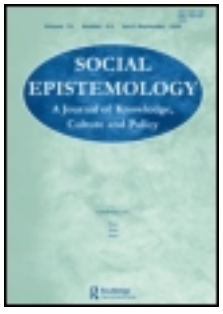

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How can Feminist Theories of Evidence Assist Clinical Reasoning and Decision-making?

Maya J. Goldenberg

While most of healthcare research and practice fully endorses evidence-based healthcare, a minority view borrows popular themes from philosophy of science like underdetermination and value-ladenness to question the legitimacy of the evidence-based movement's philosophical underpinnings. While the feminist origins go unacknowledged, those critics adopt a feminist reading of the "gap argument" to challenge the perceived objectivism of evidence-based practice. From there, the critics seem to despair over the "subjective elements" that values introduce to clinical reasoning, demonstrating that they do not subscribe to feminist science studies' normative program——where contextual values can enable good science and justified decisions. In this paper, I investigate why it is that the critics of evidence-based medicine adopt feminist science's characterization of the problem but resist the productive solutions offered by those same theorists. I suggest that the common feminist empiricist appeal to idealized epistemic communities is impractical for those working within the current biomedical context and instead offer an alternate stream of feminist research into the empirical content of values (found in the work of Elizabeth Anderson and Sharyn Clough) as a more helpful recourse for facilitating the important task of legitimate and justified clinical decision-making. I use a case study on clinical decision-making to illustrate the fruitfulness of the latter feminist empiricist framework.

Keywords: Evidence; Underdetermination; Gap Argument; Value Judgments; Value-laden Inquiry; Feminist Epistemology of Science; Evidence-based Medicine; Clinical Reasoning; Epistemic Communities

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Introduction

The motivating question for this inquiry, "How Can Feminist Theories of Evidence Assist Clinical Reasoning?", arose from my observation that a strain of critical discussion within clinical medicine has adopted a line of critique sourced from feminist epistemologies of science. While the feminist origins go unacknowledged by its clinical adopters, I demonstrate that the "gap argument" (Intemann 2005), a reading of underdetermination in a social context, characterizes the misgivings that some practicing clinicians and health researchers have regarding evidence-based practice imperatives. Following a common trajectory found in critical science studies, these ground-level critiques challenge the alleged objectivity of scientific evidence, insisting instead that theory is underdetermined by the evidence and that medicine is a value-laden enterprise. Yet, these critics of evidence-based medicine (EBM) do not accept the normative interpretation of the gap argument, whereby values can play a productive role in scientific inquiry. Instead, they seem to despair over the perceived unapologetic subjectivism of value-laden science, and can offer no means for negotiating clinical decision-making without the previous security of an objectivist account of evidence. This finding invites an important opportunity for self-reflection among feminist epistemologists of science. Why it is that these critics of EBM accept the feminist characterization of the problem but do not take up the productive solutions that feminist scholarship has diligently provided?

Looking to understand why this uptake failure occurred, I find difficulty in the feminist criterion for inclusive community arbitration of the values that inextricably enter into scientific reasoning. While articulating idealized configurations of an epistemic community can be informative, this effort offers little guidance for practicing scientists and clinicians trying to navigate their current less-than-ideal conditions. I provide a case study of a physician making a sound clinical judgment in order to demonstrate how, against the fears of the EBM critics, justifiable evaluative judgments can be made; furthermore, they can be made without recourse to an idealized epistemic community. Instead, as Elizabeth Anderson has argued, many contextual values have empirical content, therefore, making them amenable to evaluation for their empirical adequacy and fruitfulness. Thus, this investigation shows that the normativity of value-laden science is viable within clinical medicine, and that this normative project is best supported by empirical inquiry into the appropriate values that support sound health science and care rather than appeals to idealized epistemic communities as value arbiters.

Background: Two Streams of Feminist Empiricism

Before articulating the critical debate over evidence-based health care (see the next section, "Evidence based medicine and its critics"), some background in feminist epistemologies of science is required. In order to make my case for feminist theoretical assistance to clinical decision-making, I must distinguish between two conceptual trajectories within feminist empiricism. The first is the dominant

stream, which I will refer to as *community-based social knowledge*, a richly developed area of scholarship whose figureheads are Helen Longino and Lynn Hankinson Nelson. Later in this paper, I will argue that the critical resources offered in this area of feminist scholarship prove to be unhelpful for clinical decision-making insofar as the community ideal is impractical. The second stream, championed by Elizabeth Anderson and Sharyn Clough, accepts the value-laden nature of evidence that the former stream so aptly theorized, and adds the converse, namely the empirical aspects of values. This addendum to the picture of value-laden science helpfully offers a framework for evaluating value judgments that does not require recourse to democratic and inclusive epistemic communities. Instead, the methods already available to science for critical empirical inquiry can accomplish the task of evaluating competing values in medicine. In this second stream, which I will call the *values as evidence* position, I find a workable theoretical framework for negotiating the nonscientific warrants that ground justified clinical decisions. My proposal that recourse to idealized communities are impractical and unnecessary for clinical decision-making builds on Anderson's argument that values are undertheorized in critical science studies (2004, 2006) as well as Clough's articulation of a characteristic "hasty retreat from the evidence" in feminist epistemologies of science (2003a).

Community-based Social Knowledge

Feminist empiricism is characterized by, and distinguished from, other feminist epistemologies of science by its commitment to the empirical adequacy standard of science. Additionally, feminist empiricists typically adopt the following two themes: (1) knowledge production is a social process and (2) communities rather than individuals are the agents of knowledge. Some support for these themes stem from descriptive accounts of the interactive nature of knowers. Longino, for instance, has argued that beliefs and theories only come to be regarded as knowledge by enduring and surviving a public process of critical scrutiny (Longino 1990, 66–76). In this process of "transformative criticism", individual knowers engage with one another——"disseminating and responding to criticism" of contending hypotheses——in order to transform claims into knowledge (Longino 2002, 134). While individuals can know, those knowledge claims are situated in community.

Nelson (1990, 1993a) draws on Quine's holistic theory of evidence in order to endorse a model of communities as knowers, as standards of evidence reflect historically contingent public and communal values. While Quine charged that there are no firm boundaries between evidence and theory, Nelson broadened his evidentiary scope to include the larger social and political context within which science is produced (Nelson 1990, 265). Nelson demonstrates that standards of evidence emerge within the processes through which we generate knowledge; these processes are numerous and diverse in their origins from broad sources of experience and understanding that extends well beyond the traditional scope of analytic

epistemology. Many of these sources are also social in nature. The naturalized view of epistemology endorsed by Nelson (1990, 1993a, 1993b) regards knowledge production as radically interdependent with other knowledges and undertakings. Nelson proposes that just as individual theories are thought to neither develop nor face experience in isolation, empirical evidence should be similarly contextualized (Nelson 1993a, 174). The relevant evidence available to us is in fact broader in scope than previously acknowledged and includes such factors as our going theories, assumptions, projects, and values. This view of evidence is holistic in its inclusive scope, as it does not erect artificial boundaries between politics and science, and recognizes a broad system of theories and practices, including those of science, "everyday" experiences and events, and politics, as constituting part of the evidence for reasonable beliefs (Nelson 1993, 179). This account is also naturalistic, for the expansion of evidence to include such factors as politics has emerged concomitantly with feminist experience and knowledge. Against positivist theories of science, stricter methodological controls cannot (and should not) "filter out" the social factors that come to bear on scientific theorizing. The call for more authentic accounts of the connections between knowledge and sociopolitical relations broadens the factors relevant to our knowledge and undertakings (including science) to encompass social relations, politics, values, and other factors long regarded as a threat to objectivity, if not the very antithesis to evidence.

Longino's contextualized analysis of evidence demonstrates some similarity to Nelson's theory of evidence insofar as the relevant evidence available to us for scientific reasoning is broader in scope than previously acknowledged. Longino draws from her social account of science to argue that background assumptions must be acknowledged in evidential reasoning. Similar to Kuhn, Longino proposes that contextual values play an active role not just in the context of discovery, but also in the context of justification. Given that theory is always underdetermined——that is, theory choice is always based on something more than the data——an accurate theory of evidence must include the role of contextual values in mediating from data to theory. Thus, Longino's reconfiguration of evidence is holistic insofar as it expands the concept beyond the previous bounds of the so-called "factual" to include "evaluative" categories.

By drawing attention to both the perspectival nature and community-specific elements of knowing, feminist empiricists have critically contested the possibility of value-free science. They adopt Quine's influential underdetermination thesis to argue this position. The underdetermination thesis proposes that there is no a priori logic of science——no algorithm or criteria that uniquely tells us what to believe, given the data. To use a popular example, if we were to extend the curve on a graph from a finite set of data, there would be no guaranteed way to pick one right curve from the many curves consistent with the data (Kincaid, Dupré, and Wylie 2007). Something other than data and rules of inference are involved, namely values, both epistemic and nonepistemic. Values, then, are inextricably part of the confirmation process (Kincaid 2007). Underdetermination can be variously articulated, however, and so further specification is required. Feminist social

epistemologists, and, as I will soon show, critics of EBM, have adopted a particular reading of the underdetermination thesis termed the "gap argument" by Intemann (2005). Longino and Nelson, among others, have relied on some version of this argument to challenge the value-free account of science. Underdetermination is characterized as a *gap*[1] between theory and observation that can be filled by political or social values (Intemann 2005, 1002). This gap must be filled in order to justify the acceptance of one theory over its competitors (Intemann 2005, 1003).

Both Longino's and Nelson's theories of evidence follow from their support of the gap argument——the view that underdetermination leaves a gap between evidence and theory that may be properly filled by political or social values. Because facts only provide evidential support for a hypothesis in conjunction with auxiliary hypotheses or priors, two knowers who accept different background assumptions may take the same fact as evidence for conflicting hypotheses. Empirical evidence may support a background assumption, but only in conjunction with further prior assumptions, which may be additional factual claims but may also entail conceptual, epistemological, and metaphysical considerations (Kuhn 1996). Feminist epistemologists maintain that values legitimately fill the gap between observation and theory, thereby guiding science alongside evidentiary considerations (Longino 1990; Nelson 1990, 173–74). Furthermore, those values are not merely the *cognitive* or *epistemic* values internal to science, as Kuhn suggested,[2] but *contextual* values (including moral, political, economic, and social values) traditionally thought to operate outside of science in the "social context" in which science is practiced. Longino even denies the tenability of the cognitive/contextual distinction, which is why she refuses the suggestion that contextual values are eliminated within the context of justification. In short, sociopolitical factors are part and parcel of every dimension of scientific practice. Longino and other feminist empiricists argue that values embedded in background assumptions help determine what counts as evidence, how we interpret it, and what makes an explanation adequate, and so their presence does not compromise but rather enables scientific reasoning. While empirical adequacy is an important standard for theory choice, this standard does not serve our practical interests in predicting and controlling phenomena (Longino 1994). And, it is our practical interests in a given research question that determine what level of empirical adequacy is demanded.

With this unapologetic support of the value-ladenness of science, the onus is placed on feminist empiricists to demarcate good from bad science (or more reliable from less reliable knowledge claims) in order to avoid charges of relativism. Evidentiary holism, which expands the concept of evidence to include background beliefs and other values, challenges the notion that science can be objective in the sense of "value-free". But, relativism is not accepted as the necessary alternative. Instead, objectivity has been redefined as a social process by numerous feminist and nonfeminist scholars——"contextual objectivity" (Longino 1990, 82; Weinstein 2003), "strong objectivity" (Harding 1993, 1995; Tannoch-Bland 1997), "objectivity by degrees" (Longino 1990, 76–82), intersubjective objectivity, and the like.

Longino's contextual empiricism (1990, 2002) is an example of a framework that incorporates a social conception of objectivity, thereby denying the relativism that value-laden science ostensibly invites. By this account, a theory is objective if it has undergone and survived a rigorous social process of critical scrutiny. Public critical scrutiny permits the (often latent) background assumptions that support particular theories to be exposed. Controversial assumptions can then be debated by members of the scientific community, and consensus determines whether the hypothesis will be accepted, rejected, or modified. The objectivity of this process is measured by the degree to which this system of public scrutiny can serve its critical function (Longino 1990, 76). Objectivity is thereby a function of the community's composition. The system is working well when the following four governing norms characterize the interaction of participants in an epistemic community: (1) publicly recognized forums for criticism; (2) uptake of criticism; (3) public standards; and (4) tempered equality of intellectual authority (Longino 1990, 76–81, 2002, 128–35).

If these norms of social interaction are sufficiently fulfilled by an epistemic community, the theories under consideration will be properly scrutinized, and, therefore, they will be objective. The community must also encourage a diversity of perspectives to ensure "epistemically effective critical discourse" (Longino 2002, 131). Diverse representation, especially from those with marginal voices, increases the opportunity for revealing widely held background assumptions that might have gone unnoticed. Diversity also encourages the formation of novel considerations. Marginalized perspectives must also be represented in the social process of scrutinizing those assumptions and deciding whether they should be accepted or rejected. The resultant knowledge will not be value-free, but it will represent a perspective that is broader than that held by any one individual or a narrowly framed community of stakeholders.

With values now inextricable from evidentiary considerations that science undertakes, and the stakes of knowledge production being too high to permit relativism, the socially situated community of knowers becomes epistemically important. This is not only because knowledge arises intersubjectively, but because social arbitration becomes central to the justificatory process.

Values as Evidence

The alternative position, which I termed "values as evidence", proposes to mediate the contextual values that enter into scientific decision-making differently than previously proposed. They are not excised from scientific reasoning, as value-neutralists would have it, but they are also not subject to community-based trial, as many feminist empiricists recommend. Instead, contextual values may be subject to empirical testing. Both Anderson's and Clough's lines of argument are distinct from other feminist empiricists because of their departures from the view commonly held by feminists (and others) that values affect evidence. Both thinkers deny the unidirectional influence of values on evidence. Anderson promotes

bidirectionality, while Clough takes the more radical position that values *are* evidence.

This alternate view can be characterized by two complementary critiques of the dominant stream of feminist epistemology just described. Anderson argues that values are undertheorized in feminist epistemology, while Clough describes a characteristic "hasty retreat from the evidence" (2003a) by influential feminist epistemologists including Longino (and I will extend Clough's criticism to Nelson too). I will later build on these two "values as evidence" theses to propose that these theoretical problems in the mainstream of feminist empiricism result in a reliance on idealized epistemic communities for justifying knowledge claims that is impractical for biomedicine in its current context. This can explain why feminist empiricism's normative program has not been embraced by practitioners and researchers weary of EBM.

In her 2004 paper "Uses of value judgments in science: A general argument, with lessons from a case study of feminist research on divorce," Anderson proposes that contextual values play an evidential role in science. Arguing that values are undertheorized in feminist science scholarship, she proposes that value judgments depend on factual claims (see also Anderson 2006). Anderson's position regarding the place of values as evidence in certain decision-making contexts stems from her criticism of the underdetermination thesis which, she claims, permits the scientist's use of political values among the priors necessary to mediate the link between evidence and hypotheses to guide inquiry, yet problematically provides no criteria for differentiating legitimate from illegitimate deployment of those values.[3] Yet, she does not want to deny the place of value judgments in science because not only is value-free science untenable, but, as her divorce case study shows, non-cognitive value judgments can help to uncover the evidence that bears on the question under consideration (Anderson 2004, 11). In these respects, her position is consistent with the dominant stream of feminist empiricism just described. The novelty arises in her claim that even rigorous accounts of value-laden science are characteristically missing criteria for legitimate and illegitimate uses of value judgments in science. Anderson's criterion for illegitimate use is the employment of value judgments to drive inquiry to predetermined conclusions. This amounts to dogmatism. Many proponents of value-free science see this dangerous direction, but err in thinking that this is the only way that values can operate in science. Anderson provides the case of feminist research on divorce to reveal legitimate deployment of values to guide scientific inquiry. The legitimacy lies in open-ended inquiry rather than the reinforcement of preset conclusions.

Anderson illustrates an instance of open-ended value-laden inquiry in her analysis of feminist divorce research. Research into the impact of divorce on families, like much of social scientific and applied scientific research, seeks to answer evaluative questions on the basis of empirical evidence (Anderson 2004, 22). Divorce research is controversial, and an excellent case study for analyzing the role of values in science, because the research evidence serves to inform value judgments about a highly contested issue, namely the impact of divorce on

(typically nuclear) families, and to offer practical recommendations (Anderson 2004, 11). The ideal of value-neutrality is out of place here; when we ask value-laden questions, we need to use value judgments to guide scientific inquiry in order to answer that question. Medicine, Anderson explains elsewhere (2006), along with engineering, and most social sciences, ask evaluative questions; specifically, they are concerned with how phenomena impact human welfare and how to service human interests. Divorce research, for instance, evaluates the impact of the disrupted gendered division of labor that divorce brings to many traditional family units on both children and parents (Anderson 2004, 12). Researchers will be indelibly influenced by prior beliefs about the value of the nuclear family, gender norms, models of parenting, and the like. Without some "framing set of background assumptions regarding human welfare and interests, empirical inquiry would be directionless" (Anderson 2006, 3). Yet, these assumptions must not be excluded from critical evaluation in order to function legitimately in scientific inquiry. Anderson notably does not, however, call for a social process of critical scrutiny of these values. By her account, the legitimate use of values in scientific inquiry is underwritten by the empirical content of value claims.

Divorce research investigates such evaluative questions as: Are children better off if parents who want divorce stay together? What strategies make divorce go better or worse for the parties involved? Approaching such questions require some sort of evaluative framework. A researcher might approach such questions with the background assumption that divorce is a traumatic breakup of a family. A feminist researcher might begin with the alternative assumption that divorce presents a transformation of the family unit as well as an opportunity for personal growth for divorcees. These background assumptions will certainly guide research, and that guidance is legitimate when those values are amenable to empirical testing and revision, and, therefore, do not determine the conclusion. Empirical research, therefore, can effectively evaluate which alternate position on divorce is more fruitful and illuminating without need for the epistemic community to render judgment.[4] Anderson found that the background assumption that divorce is properly characterized as loss, for instance, encountered empirical problems regarding the difficulty in evaluating family harm initiated by the divorce against harms that family members were already experiencing prior to divorce as the spousal relationship was deteriorating. The feminist research described by Anderson offered a more epistemically fruitful framing of the experience of divorce because it could account for perceived losses and gains by the stakeholders as a result of divorce (Anderson 2004, 20).

The researchers adopted the feminist background assumption about the evaluative significance of divorce not to confirm it (the dogmatic position) but rather to explore its consequences (the legitimate use). They investigated divorced women who subscribed to this view of divorce as inviting personal growth and positive change. These women used this commitment as "a tool for uncovering possible new ways to live" (Anderson 2006, 4). Whether exploring new career or education options, changing one's appearance, socializing differently, or dating, *if* the subject

feels satisfaction as a result of these new ways of life, then her outlook on divorce as an opportunity for personal growth is vindicated by its fruitfulness. Against the fears of proponents of value-free science, adopting this background assumption, importantly, is not a self-confirming belief. The divorced subjects, as well as the researchers, could have discovered that their experiences did not match their outlook. Their hopes for positive change could, say, have been constricted by feelings of bitterness, loneliness, or regret regarding the divorce. The new economic constraints and increased household and childcare responsibilities that often accompany divorce could have also bridled opportunities for self-exploration. These findings would serve as evidence in support of the judgment that divorce impacts people negatively (Anderson 2006, 4–5). Value judgments are, therefore, subject to empirical support——they are testable and even revisable in light of experience. They are subject to many of the same cognitive requirements that factual claims are held to, such as fruitfulness and defeasibility.

The divorce case study disproves the widely held assumption that value-laden research overtly serves to confirm researchers' evaluative presuppositions. The research team reported several surprising and even unwelcome results, along with null hypotheses, among their findings regarding fathers' visitation, mothers' employment, and children's maturity. They kept the known biasing influences in check by taking precautions against sampling bias and biased data analysis (Anderson 2004, 11). While the team's background assumptions guided the research, the research did not circularly confirm those assumptions.

Those who advocate value-free science do so because they understand values to be ideologically held and immune to rational evaluation. The feminist empiricist invocation of a community court of value arbitrators suggests a similar view that values are not amenable to the same empirical modes of inquiry as are factual statements. Here, we see the products of a rigid ontological separation of "facts" and "values" that seems to be unnecessary. Values, according to Anderson, are only science-free (i.e. unaccountable to empirical claims) if they are held dogmatically, that is, when they are held with "stubbornness in the face of any conceivable evidence" (Anderson 2004, 22).

In "A hasty retreat from the evidence" (2003a), Clough charges several notable feminist epistemologists (Longino, Keller, Harding) with relativizing evidence (see also Clough 2003b, 85–100). This charge contributes to her larger project of recasting feminist science studies nonrepresentationally (to borrow Donald Davidson's terminology for the inappropriate separation of content and scheme) (Clough 2003b). Rehearsing her larger project is beyond the scope of this paper, as is an analysis of whether she is correct to call Longino an evidentiary relativist. It is sufficient for my purposes to demonstrate the legitimacy of her observed "hasty retreat from the evidence" in the first stream of feminist empiricism.

The "hasty retreat from the evidence" is Clough's characterization of the defensive move that many contextualists (including Longino and several other influential feminist philosophers of science[5]) are forced to make in order to deflect accusations of relativism as a consequence of value-laden science. The "hasty

retreat" is the flight from discussion of evidentiary justification in favor of attention to the legitimacy of one conceptual scheme over another.

Influenced by Donald Davidson and Richard Rorty, Clough maintains that regardless of whether one posits a priori *or* concludes a posteriori (through naturalized inquiry) on the existence of an independent external world, a separation between the "objective" and the "social" world (or "content" and "scheme") is created. Objectivist accounts of science bridge those distinct spheres through one-to-one correspondence of our theories to the world. Contextualists deny this bridging effort, but leave the metaphysical dualism intact. While the methodological holism found in critical science studies highlights the interrelatedness of content and scheme, it still holds them to be distinct entities, as seen in the post-positivist position that we always comprehend the world *through* language, culture, filters, or standpoints. For instance, Nelson writes that "we experience the world through the lens of our going theories" (1990, 112). The *content* is the "world" of publicly observable empirical entities, while the *scheme* is the "going theories" that are private and not empirically testable. Longino also assimilates a representationalist gap into her ontology when she argues that "substantive background assumptions can bridge the gap between hypotheses and evidence that the formal positivist analysis cannot" (1990, 60). Those background assumptions and the thing she calls "evidence" are ontologically distinct entities, evidence being the product of empirical inquiry, and background assumptions or contextual values being comprised of subjective preferences, individual biases, and other normative content that foster evidential relations. Longino recognizes, and promises to account for, the seeming relativist view of science that this schema invites (Longino 1990, 61).

Clough highlights how representationalism arises as a consequence of the *gap* perceived to exist between empirical evidence (data) and theory via Longino's (and other members of the "first stream" of feminist empiricism) subscription to the underdetermination theory. That gap is filled by the contextual values that mediate evidential relations. Those values, notably, "may not be subject to empirical confirmation or disconfirmation" (Longino 1990, 75). Background assumptions are thereby not subject to the same empirically driven modes of scrutiny that scientific reasoning affords to data. Without external criteria for evaluating our background assumption, the specter of relativism is raised. In order to deflect those accusations, Longino and other feminist epistemologists of science are forced to undertake this "hasty retreat from evidence" (2003a), that is, to pay attention to justifying the conceptual scheme mediating the evidential relationship rather than insisting on the evidentiary strength of their claims. To illustrate, Clough analyzes Longino's well-known defense of the gynecentric "woman-the-gatherer" theory of human evolution against the androcentric "man-the-hunter" competitor. Longino finds the evidence——namely, archaeological findings of the development and use of tools by early hominids——to equally support both theories (underdetermination), and so theory choice is directed by allegiance to one of the competing interpretive frameworks, neither of which is supported by direct evidence (Clough

1993b, 116; Longino 1990, 109, 111). While Clough agrees that feminist commitments are worth promoting, she finds that Longino abandoned the evidentiary analysis too quickly by positing "feminist values" as extraneous to the evidence. Instead, feminist values are empirically supportable due to past successes of feminist science in providing better explanatory frameworks in the study of complex social interactions and behavior (Clough 1993b, 117). By treating "feminist values" as ontologically distinct from the evidence, Longino unnecessarily invited relativist concerns. Those concerns then need to be rectified by an appeal to the composition of the scientific community, whose allowance for transformative criticism is the marker of objectivity (Longino 1990, 76, 80). Those relativist concerns can be overcome within the correct community context. The "values as evidence" position does not challenge that corrective ability,[6] but does question its necessity. Soon, I will question its practicality for current conditions in biomedicine.

Because the standard for applying evidence to resolve concrete problems is no longer merely empirical adequacy (as objectivists would have it), but also the range of epistemological virtues and values that our sciences should be promoting, numerous new ways to challenge scientific findings open up and place the burden on Nelson, Longino, and others to argue that their theories are not relativistic. To do this, Nelson must justify the epistemic integrity of the community of knowers that create these truths through consensus.[7] This is no small task, and it is notable that the pages of Nelson's "A question of evidence" (1993a) are largely dedicated to rehearsing her previous work on the composition of epistemic communities *rather than* an examination of the nature of evidence. This "hasty retreat" is unhelpful for critics of EBM who want and need theoretical guidance on how to construct an alternative theory of evidence to ground medical decision-making.

Longino similarly relies on the community of knowers to rationalize the role of contextual values in scientific inquiry. Against the presumed negative causal role that values play in scientific reasoning, Longino argues that they can have a positive role as well (Longino 2002, 51). The epistemic community creates this normative allowance, as the contextual values of *individuals* can indeed damage scientific inquiry, by, say, causing the scientist to misrepresent data or ignore evidence, while a *community* of inquirers introduces different and diverse contextual values that can serve to *identify* these negative effects (Intemann 2005, 1005; Longino 1990, 73–4). This is precisely what many feminist scientists and theorists have been doing for decades: analyzing the scientific literature and critically challenging the sexist assumptions in various scientific programs (for instance, some classics in feminist biology include Birke 1986; Bleier 1984; Fausto-Sterling 1985; Hubbard 1990; Lloyd 1999; Longino and Doell 1983; Travis 2003). Providing that there is a forum for consideration and uptake of alternate views, competing values are properly scrutinized by external and shared public standards rather than the preferences of the few (Longino 1990, 75), and scientific reasoning, therefore, does not lapse into relativism.

While a diverse community of knowers allows for a greater representation of contextual values and, therefore, have a better chance of catching any contextual

values influencing scientific theorizing, this social schema establishes good science through the diversity of the contextual values represented and not the *content* of those value judgments. Feminist critics like Clough (2003a; 2003b), Intemann (2005), and Anderson (2004) are unconvinced that this encourages feminist goals because this maneuver does not uphold feminist political commitments as more fruitful and potentially more reliable than sexist scientific political commitments. Healthcare workers, who need to decide *now* and to do so with justification, are understandably dissatisfied with a model of evidence that cannot render a substantiated verdict.

The "values as evidence" stream are critical of how the final arbiter of value-laden scientific theories within the "community-based social knowledge" framework is the diverse community of knowers, whose members decide which values are appropriate influences for particular scientific research programs. Further rationalization of contextual values is required by specifying the composition of an appropriately diverse community of inquirers whose diversity warrants them to adjudicate the legitimacy of those intruding contextual values. As Clough highlighted, we are getting far from the evidence, the alleged grounding of scientific inquiry. More problematically, there are as many opportunities to question the membership composition of the communities as there were opportunities to challenge the values entering into inquiry, and, once again, little guidance regarding how those challenges would be properly resolved.

While Anderson's and Clough's positions certainly converge via their attention to the empirical arbitration that contextual values can invite, their theoretical differences should be noted. Clough concludes that value judgments operate as empirical hypotheses in relevant cases (Clough 2008), and, therefore, should be evaluated as such in any scientific inquiry, while Anderson still holds factual and value judgments to be distinct insofar as they play different roles in an investigation.

> Value judgments guide inquiry toward the concepts, tools, and procedures it needs to answer our value-laden questions. But facts——evidence——tell us which answers are more likely to be true. These two roles must be kept distinct, so that inquiry does not end up being rigged simply to reinforce our evaluative preconceptions. So long as they are distinct, the active direction of scientific inquiry by value judgments is not only legitimate, but indispensable. (Anderson 2004, 23)

Anderson stops short of collapsing value judgments into factual judgments (at least for the purposes of evaluating those judgments), as the careful adherence to *legitimate* uses of contextual values in science relies on such a conceptual distinction.

In summary, the key difference that I want to highlight in this differentiation of two streams of feminist empiricism is the divergent avenues pursued for arbitrating contextual values in scientific inquiry. The first, community-based social knowledge, placed values under scrutiny by the democratic, inclusive, and responsive community of knowers. The second, values as evidence, evaluated

nonepistemic values using many of the same empirical modes of inquiry used to scrutinize empirical claims. With this background context provided, I now turn to the problem of EBM and the conceptual impasse experienced by its critics. In the next section, I will describe EBM, the standard of best practice in health care, and articulate the criticisms levied against it by a minority of health scientists and practitioners. I will demonstrate the critiques to incorporate features of the first stream of feminist empiricism, as the critical effort challenges the concept of "evidence" underwriting the EBM movement. Yet, while the critical components are incorporated, community-based feminist empiricism's positive program of legitimate value-laden science is not adopted, as the EBM critics seem to despair over the inherent subjectivity of contextual values now inextricable from scientific reasoning. In the subsequent section, I draw from the second stream of feminist empiricism in an effort to explain why the positive program of community-based feminist social empiricism is impractical for biomedicine in its current context.

EBM and its Critics

A hugely influential healthcare movement since its incipiency in the early 1990s, EBM is popularly defined as the "conscientious and judicious use of current best evidence in the healthcare of individuals and populations" (Sackett et al. 1996). EBM's doctrine first appeared in the *Journal of the American Medical Association* as a brief polemic authored by the Evidence Based Medicine Working Group:

> A new paradigm for medical practice is emerging. Evidence based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision-making and stresses the examination of evidence from clinical research. EBM requires new skills of the physician, including efficient literature searching and the application of the formal rules of evidence. (Evidence Based Medicine Working Group 1992)

Instead of relying on hunches, habits, and other subjective decision-making criteria, evidence-based decision-making relies on evidence, which, in turn, is supposed to support informed and unbiased reasoning. EBM began by promoting an antiauthoritarian medical education, teaching new clinicians to critically read the research literature rather than rely on the expert opinions of senior faculty. The movement soon increased in sophistication and assisted busy clinicians by offering structured abstracts, meta-analyses, and systematic reviews meant to synthesize the huge mass of literature into digestible formats that drew reliable conclusions. With this appealing mandate, EBM rose quickly into prominence in medicine, with virtually every area of healthcare now subscribing to the evidence-based mantra (for more on the EBM movement's history and influence, see Bluhm and Borgerson 2011; Goldenberg 2012;).

Yet, within the ranks of health research and clinical medicine, there is a minority opinion that is unpersuaded by the hubris of the EBM movement. Among the

strategies employed to critically respond to and to reconfigure EBM, the most frequently used tactic has been a championing of certain popular related themes in postpositivist philosophy of science, namely the underdetermination of theory by the evidence, the theory-ladenness of our scientific claims, and the fallibilism of knowledge claims. While it is unsurprising to find philosophers of medicine utilizing tools provided by philosophy of science to investigate EBM, as EBM invites many of the traditional epistemological questions regarding knowledge and justification (e.g. Goldenberg 2006), this philosophical approach also appears in the admittedly slim volume of critiques coming from the laboratories and clinics by clinicians and health scientists questioning the very framework in which they are supposed to judiciously practice.

To illustrate, in Edwin Harari's "Whose evidence? Lessons from the philosophy of science," published in the *Australian and New Zealand Journal of Psychiatry* (Harari 2001), the author, a practicing psychiatrist, explains the "lesson from the philosophy of science" to be the inadequacy of positivist empiricism's account of knowledge production, on which the evidence-based approach is predicated. Harari promotes the theme of fallibilism, which he takes to be the antidote to EBM's misplaced confidence in the power of observational or (more accurately) measurable facts in determining what constitutes reliable knowledge. He borrows from the underdetermination thesis in arguing that "a plurality of theoretical moves have to be made beyond the observation statements themselves to explain any particular set of observations" (726). This finding leads Harari to skepticism about the truth of our knowledge claims. He writes, "we cannot understand 'facts' free from the influence of previous learning and the conceptual framework that selects and organizes the observations at different conceptual or epistemic levels" (728). The "lessons from the philosophy of science" apparently end there, as Harari's investigation does *not* include an account for how to manage those social and interpretive dimensions. Yet, without this piece, not only is EBM confounded, but so is the entire practice of medicine.

In another critical venue, "A Popperian perspective of the term 'evidence-based medicine'," Shahar (1997), a health scientist, draws from Karl Popper's theory of falsification to argue against the logical possibility of medicine being *based* on the evidence. The incompleteness of evidence and the fallibility of our theories and beliefs are invoked to make the case that *even when* the latest, best, and most relevant clinical research is consulted, more goes into medical decision-making than experimental evidence.

Shahar highlights many points of subjective preference that enter into the production and interpretation of clinical data. His challenges to the supposed objectivity of clinical trials lead him to this pessimistic conclusion:

> the results of a clinical trial hardly deserve the title *evidence*, not only because every interested scientist can question various statistical and design aspects, but also because the whole process of data analysis, presentation, and interpretation contains many subjective elements. (113)

Furthermore, Shahar tells us, power and prestige dictate which competing interpretation wins:

> there is no rule of logic that can help us decide whose interpretation of empirical experience is *the evidence*, [instead] we can formulate many rules of preference. (114)

Shahar fears that since preferences have no logical content, the mantra of evidence-based medicine permits certain interests and agendas to go unchecked. One can appreciate his anxiety here. If there is no way to decide which filters, interpretive frameworks, or standpoints are preferable, then patients are in a terrible predicament.

The "gap argument," which posits a chasm between evidence and theory that may be filled by social and political values, presents in both EBM criticisms. Posing the question when is there enough evidence to justify action, Shahar finds "no logical answer" regarding whether, say, one mega-trial provides the justification or whether three smaller trials would suffice (114). And so,

> [t]he answer is simple: there is enough evidence (or weak evidence or strong evidence or equivocal evidence) whenever the mind of a doctor decides so. (Shahar 1997, 114)

Here, the "gap" between evidence and a justified theory of action is filled by the "subjective elements" invoked by the decision-maker. Those "subjective elements" may be epistemic or nonepistemic values, but both Shahar's and Harari's foci are on the latter. This is apparent in Shahar's discussion of the "rules of preference" guiding evidence-based (and nonevidence based) decision-making. He writes,

> … one can prefer consensus guidelines over one's own guidelines, the majority opinion over the minority opinion, or the opinion which is printed on a letterhead of "A Centre for Evidence-Based Medicine" over an opinion which was printed on a letterhead of "A Centre for Medicine". Needless to say, none of these rules of preference necessarily have any logical content. (Shahar 1997, 114)

Shahar suggests that the last preference characterizes evidence-based practice. He challenges the legitimacy of this authority by asking:

> What is this entity that offers to help some helpless doctors (or all doctors?) make wiser medical decisions? What is this entity that can decide on right and wrong in daily medical practice? What is behind the title if not other doctors who claim to know better? Who claim that what they call *evidence* is more valid than another doctor's interpretation of empirical experience? (115)

The legitimacy of evidence-based practice, he claims, comes from the authority relegated to the research centers, researchers, and clinicians that are recognized to participate in evidence-based practice. By his reading, this authority is not bestowed by any straight forward measure of merit. This suggests the "gap" between the evidence and the theory underwriting evidence-based practice to be filled at least in part by unwelcome contextual values and not merely constitutive values.

Now that the gap argument has been established, we can look further into Intemann's (2005) analysis to consider which of the three alternative interpretations of the gap argument is used by the EBM critics. Intemann's review of the usage of the gap argument in the feminist science literature revealed three different interpretations with respect to the role that contextual values play in scientific reasoning (in order to "fill the gap"): (1) causal, (2) tie-breaker, and (3) normative. The causal interpretation is the reading that contextual values causally influence scientific reasoning, by, for example, causing data to be interpreted in certain ways, or causing researchers to rely on certain background assumptions over others or to give more weight to certain constitutive values (Intemann 2005, 1004–5). The "tie-breaker" refers to the scenario where evidence equally supports two competing theories, and so contextual values enter in order to decide which theory trumps (1007–8).[8] Lastly, the normative interpretation importantly and uniquely

> *gives us good reason* to interpret observations in a particular way, to rely on or reject a particular framework, to give more weight to some constitutive value over another, or to adopt a certain standard of evidence. (1008)

Unlike the other two interpretations, this view "seeks to establish that contextual value judgments can provide legitimate epistemic or cognitive reasons for accepting one theory another" (1008).

The arguments offered by Shahar and Harari both indicate the *causal interpretation* of the gap argument in their discussions of the incompleteness of the evidence that undergirds evidence-based practice. After dismissing the objectivist account of evidence (which he incorrectly attributes to "empiricism" instead of "naïve empiricism"), Harari characterizes both the scientific method and clinical practice as involving "the judicious yet knowingly fallible, *theory-driven construction, selection and interpretation* of observations and empathically derived experiences" (Harari 2001, 729; my emphasis). In other words, values *cause* data to be produced, presented, and analyzed in certain ways. Similarly, Shahar invokes the causal argument by highlighting the nonrational elements (preferences) that shape the study design, data analysis and presentation, and interpretation of the results (Shahar 1997, 113). He offers a few illustrative examples drawn from medical research in which two different interpretations of the same research data were derived from different members of the same research team; unable or unwilling to pick a winner, the publishing journal printed both papers side-by-side. Though probably unintended, these examples illustrate the "tie breaker" more readily than the causal argument it meant to show, as the intrepid journal reader is left to decide which interpretation trumps despite presumably having no further knowledge pertaining to that specific clinical research trial.

What is missing from these EBM critiques is the positive project that the normative interpretation of the gap argument offers. The normative interpretation is distinct from the causal interpretation because it recognizes the irreducible nonepistemic values that inform scientific reasoning to be able to provide *good reasons* for selecting particular courses of actions, whether drawing conclusions from the

research data or prescribing a therapeutic regimen to a patient. This normative project, if successful, would get EBM critics out of their current impasse regarding a workable theory of evidence.

And, indeed, by virtue of being practicing researchers and clinicians, these critics *are* looking for a positive program. Relativism is not an option for those working in the field, where they need to routinely make clinical judgments and do so with justification. EBM critics generally agree that EBM's effort to make medicine more amenable to the research evidence is worthwhile. Their quarrel is in the method for achieving this. Furthermore, no one thinks we should return to the old ways of intuition-based and poorly informed medical practice. Thus, feminist empiricism seems well positioned to offer the alternative theoretical framework that EBM critics want: a model of rigorous value-laden science where evidence guides practice and decisions are made with justification. Community-based feminist empiricism indeed offers such a framework in its models of science as social knowledge, which contain both an alternative theory of evidence to the narrow theory implicit in evidence-based decision-making, and a means for arbitrating contextual values.

The EBM critics and the feminist empiricists from whom they adopted their framework for criticizing their standard of best practice interpret the gap argument differently. Both Longino's and Nelson's influential scholarship reveals the normative interpretation of the gap argument at work, while the EBM critics demonstrated the causal interpretation. It is the normative interpretation that predicates the positive role that contextual or nonepistemic values can play in scientific reasoning. Therefore, it is the normative interpretation that pulls us out of the impasse regarding the negotiation of values in which the EBM critics find themselves.

Unlike the causal interpretation, which merely affirms that background assumptions play a causal role in the scientific process——from selecting the research question and experimental design, to gathering and interpreting data, and applying the findings for such practical purposes as individual patient care——thus offering no legitimation of some assumptions over others, the normative interpretation regards contextual value judgments as being capable of providing legitimate epistemic or cognitive reasons for theory choice. In other words, nonepistemic values can "give us good reason" to assign particular weight to, accept, or reject the evidence in the scientific reasoning process (Intemann 2005, 1008). This is why evidence is best construed holistically to include social values and everyday beliefs; these noncognitive values are not merely an inextricable complication in the scientific process (as the EBM critics seem to think), but rather a means for making sound scientific judgments.

Without this normative interpretation of the gap argument, the important epistemological insights offered by way of the underdetermination and value-ladenness theses seem to confound rather than motivate the constructive project of offering an alternative theory of clinical evidence and correcting the shortcomings of EBM.[9] Thus, while the EBM critics follow the feminist epistemological insight

into the framing of the "gap argument", they do *not* adopt the feminist conviction that social values can *improve* scientific practice. Why is it that the EBM critics stop short of endorsing the productive epistemic interventions offered by key contributors to feminist science studies? Why is it that the critics subscribe to the gap argument as revealing the problem with EBM but do not embrace the holistic evidentiary framework as the solution?

The Community of Knowers in Evidence-based Healthcare

Rather than good science being evidence-based, the mainstream of feminist empiricism regards science as communally arbitrated and pluralistic with respect to evidentiary warrants and the influence of values. We know that this alternative is unappealing to those that hold on to the ideal (and myth) of value-free science. The EBM case tells us that it is also unappealing to many adopters of the value-laden view. I want to propose the latter response occurs because the community framework is an unhelpful recourse for the EBM critics who want to ground their scientific practices in the strong justification that EBM promises but does not deliver.

The reluctance that clinicians and health scientists may have with engaging in a feminist practice of building inclusive communities of inquirers may initially come from an intensely perceived need for expediency. The huge appeal of evidence-based practice stems not only from its promise of promoting the *best* clinical decisions, but also the framework offered for coming to those decisions *quickly*. With the volume of health research and clinical information available, no practitioner can easily keep up with the literature in addition to meeting the demands of clinical practice (Sackett 1996). But, it is unlikely that expediency is the final deterrent from community-building; the time required to do so could be perceived as a worthwhile investment in the long run. Instead, the reluctance either stems from a residual desire for the true scientific claims that evidence-based methods and objectivist science promise (consensus, of course, does not guarantee truth) or from the perception that community building cannot ensure the epistemic justification that its advocates within feminist science studies promise. In other words, EBM-weary practitioners have reason to question the likelihood of successfully constructing the sort of epistemically trustworthy community of knowers that feminist science studies relies on to promote an epistemically sound value-laden science.

Within this social view of science, the community is the final arbitrator of which values appropriately influence science. When the community is well structured and organized, individual biases are properly reined in by an engaged, critical, and diverse community that can thereby produce epistemically legitimate judgments. This is the nonatomistic framework that grounds a feminist empiricist understanding of good science. Yet, the health researcher or clinician undertaking healthy critical reflection on the evidence-based program will likely be unpersuaded by this feminist criterion for community decision-making because

the current structuring of biomedical research and practice does not invite democratic ownership of the means of knowledge production.

The current state of the biomedical community of knowers is a far cry from the feminist ideal community proposed in the first section. With pharmaceutical companies funding 60–70% of the costly randomized controlled trials that serve as the evidence informing evidence-based practice (Baird 2003), and the well-documented biases that promote positive outcomes more frequently in these trials than publicly funded research (Bhandari et al. 2004), evidence-based practice's claim to promoting best practices is seriously undermined. Privately funded research is frequently shielded from the typical avenues of dialog, discussion, and exchange within scientific communities (for example, conference presentations, early reports, and peer review) in order to protect industry interests (Lewis et al. 2001). The far reach of pharma-influence into academic research (Blumenthal et al. 1986; Weatherall 2000), continuing medical education (Elliott 2004), and even the drug approval process (Lenzer and Epstein 2012) has forced the meaningful correctives to funding bias to be radical (see the "sequestration thesis" proposed by Schafer (2004) and endorsed by Doucet and Sismondo (2008)) and therefore unlikely to be implemented. Under the guise of efficiency, the evidence-based movement is very top-down in its approach to creating and proliferating reliable clinical information. Its research consortium, the famed Cochrane Collaboration (see Bero and Rennie 1995; Grimshaw 2004), select and interpret their evidence in order to create authoritative clinical summaries, reviews, and meta-analyses. There has been documentation of financial ties between biotech companies and members of the Cochrane Collaboration, highlighting potential bias in those authoritative Cochrane reviews (Cundiff 2007). Those research summaries then inform the practice guidelines hammered out in consensus conferences attended by leading experts in the relevant fields. The prepackaged information that makes it to the practicing clinician offers the authoritative stamp of "evidence-based practice"; justification for those practice determinations is minimal (Solomon 2011, 249–52). For example, a summary will list the studies that were considered in the analysis but will not explain which studies were excluded and why. That selection is thought to be justified by reference to the methodological norms that EBM promotes: the hierarchy of evidence (Montori and Guyatt 2008) and the Consolidated Standards of Reporting Trials requirements (Moher et al. 2001). These minimal standards will not justify all inclusions and exclusions in a complex evaluation of what evidence counts and for how much, and when has the weight of evidence requirement been met. All the while, EBM promotes itself as a democratic medical enterprise, encouraging clinicians to read the literature critically, evaluate the evidence, and come to their own well-reasoned conclusions; the hypocrisy of its message against its practices has been noted [See the exchange between Sestini (2010, 2011) and Goldenberg (2010, 2011) for an illustration of this dispute.].

Amidst these difficulties with EBM, the evidence-based movement is remarkably productive: within the "audit culture" (Shore 2008), its standards of best practice can serve to justify both treatment choices (thereby minimizing

opportunities for litigation) and policy decisions. They can also serve as benchmarks for measuring quality performance and accreditation for individual clinicians, health care institutions, and medical training programs. In this respect, EBM meets many of the important goals of patient-centered care. Clinical guidelines also help clinicians, especially those newly minted MDs, mitigate the stress of clinical uncertainty that differs so greatly from their recent medical training (Timmermans and Berg 2003, 88). Finally, with EBM guidelines and structured abstracts easily accessible online, the busy clinician saves valuable time (Haynes 2001). It is fair to conclude that with so many interests being served by the current configuration of evidence-based enterprise in healthcare, there is little motivation to shift course in favor of feminist-friendly inclusive methods at the suggestion of the antiEBM minority position within healthcare.

The conclusion meant to be drawn from this overview of the current state of undemocratic and uninclusive manufacturing of medical knowledge is that the building of an inclusive community of inquirers will be difficult. This summary of the state of affairs only highlights the difficulty of creating an inclusive community for *biomedical* inquiry. If we determine the community to more appropriately address a broader conception of health (to include social determinants of health, for instance), the demands of inclusiveness multiply considerably. These findings do not fault feminist empiricists for devising an idealized model of knowledge-building, but they do serve to justify why clinicians and researchers working at the ground-level may not find the epistemic guidance offered by community-based science revisionists to be helpful. The EBM critics are seeking epistemic reform; they are not looking for direction in overthrowing the system, but rather asking how to judiciously and responsibly pursue their craft *now*.

While Longino and Nelson seem to be aware of the difficulties surrounding consensus building in a pluralist context, their support of building diverse epistemic communities (and the lengths that they go to in order to establish these communities as epistemically robust) indicates that they either think that the investment into community-building is worthwhile or that it is the only good option available. I have suggested that the community-building exercise will likely not be seen by practicing scientists and clinicians as a reasonable response to the clinical situation. I will now further suggest that there are other less demanding avenues to pursue within the current context of "evidence-based everything" (cf. Fowler 1997). This less radical pursuit will be further demonstrated to be underwritten by the second stream of feminist epistemology, the "values as evidence" framework.

A Case Study of Clinical Decision-making

The following case study provides an illustration of a physician devising a reasonable treatment recommendation for a patient despite the knowledge deficits that EBM permits. While the physician is forced to rely on contextual values to mediate her inquiry, doing so does not lead her to unjustified appeals to nonrational

preferences, but rather serves to guide her investigation and thereby derive a legitimate conclusion.

> A physician considers recommending a new drug treatment option instead of the standard of care to her elderly female patient because of reports of increased effectiveness using this new regimen. Being an old-fashioned EBM doc, she foregoes the structured abstracts and clinical summaries now downloadable to her PDA and does the literature search on her own. She finds one seemingly relevant study——it used the standard treatment as its control, included women in the trial population, and statistically measured gender difference——although these women were somewhat younger and did not have co-morbidities like her patient does. The trial was properly blinded, the subjects randomized, the p-value was .05[10]——in all respects the study appears to be methodologically sound. Yet she wonders why the dosage for the control group was only 250 mg, when in her experience patients typically respond well to 300 mg or higher. Looking at the fine print of the study, she notices that the primary investigator holds grants administered by this drug's manufacturer, who also co-sponsored this trial. Having read the past literature about sponsorship bias that has appeared in the medical journals, the physician is quite familiar with the finding that pharma-sponsored trials tend to score higher in methodological rigor than publicly funded trials, *and* they are four-times more likely to ascertain positive results for their products (Lexchin et al. 2003). Her powers of reasoning tell her that they manage to do this by carefully designing trials that overemphasize the benefits of the experimental drug. Indeed, the low control dosage for the trial in question now becomes suspect. As a result, the physician chooses to ignore the conclusion that the new drug is advantageous for women with her patient's condition. Instead, she recommends the dependable standard of care.

What do we learn from this case? The critics of EBM will appreciate its illustration of the shortcomings of an evidence-based approach——the evidence-base was found wanting because numerous values and interests were not properly acknowledged within the evidence-based framework. EBM's objectivism does not lend credence to this background and contextual evidence. Some aspects of underdetermination were affirmed: clinical evidence only served as part of the story in theory choice. In this case, it was ignored! But, this situation also results in what seems like a reasonably justified conclusion, and not the epistemic stagnation that the EBM critics anticipate. How do we understand this successful decision-making exercise, given that it is so laden with numerous values and background assumptions on the part of the decision-maker? We see that numerous scientific findings, background assumptions, and values lead to the treatment decision made. The failure of the clinical evidence to guide action did not lead the physician towards evidentiary ambivalence and stalled theory choice. Instead, the background assumptions and values led to a rational ordering of the relevant information, and what appears to be a reasonable decision within the confines of the information available to her. This is different from Shahar's characterization of theory choice as "a subjective exercise" with no logical content.

The difference is that the background assumptions that guided the physician's evaluation of the clinical evidence were not merely preferential. They were grounded in evidentiary claims that rendered them rational. In accordance with

the normative interpretation of the gap argument, which holds that contextual values can play a role determining whether or not a hypothesis is supported by the evidence, the background assumption that pharma-funded trials should be read cautiously because of a higher chance of biased conclusions led the physician to investigate the contents of the trial carefully in order to reassess the validity of the clinical conclusions drawn by the pharma-funded research. She gathered direct evidence against the legitimacy of the trial's conclusions——the control arm was underpowered——and relied on indirect evidence, namely knowledge of "tricks of the trade" in trial design used by Big Pharma to better ensure positive results without overtly compromising methodological rigor (Angell 2004; Borgerson 2009; Jadad and Enkin 2007), to establish an alleged pattern of questionable conduct in the evidence-generating process suggesting that this design flaw in the trial could be intentional and, therefore, should factor significantly in her reasoning.

Shahar's fears were thereby allayed, and it was done without the cumbersome recourse to epistemic communities. And this, once again, has to do with the rational content of the physician's background beliefs. An inclusive community of knowers is only needed for determining which values ought to be included in a scientific inquiry if those values have no rational content for the (current) scientific community to evaluate. Even flawed scientific communities currently have the resources available to evaluate empirical claims, providing that certain safeguards are in place to protect open discourse and critical investigation. Our case shows that relevant values may be grounded in empirical content——in this case, the empirical claim that pharmaceutical funding often biases trials——which means that not only can values be arbitrated (i.e. new data might undermine the physician's assumption) but values can also rationally support theory choice (whether directly or by guiding further investigation). In conclusion, in addition to facts not being value-free, this case pushes the further point that values are not fact-free.

It should be apparent that my analysis of the rationality of the physician's clinical reasoning is underwritten by the "values as evidence" framework for feminist empiricism. The contextual values that guided the physician's conclusion were neither arbitrary nor *merely* subjective, as proponents of value-free science fear. There was no recourse to a social process of critical scrutiny required either in order to justify the values invoked or the conclusion that the physician drew. Instead, the relevant contextual values rested on empirical claims that were legitimately arbitrated using the same modes of scientific reasoning to which all empirical evidentiary claims can be subjected.

This case study in clinical reasoning parallels Anderson's divorce research study in several important ways. The divorce case study disproved the widely held assumption that value-laden research overtly serves to confirm researchers' evaluative presuppositions. Our physician's background assumption was perhaps more obviously revisable than the divorce research team's, as it rested on the single defeasible empirical claim that pharma-sponsored trials are more prone to bias than trials funded by public agencies. Time will tell if the physician encounters the same surprise findings as did the divorce researchers. Perhaps, further

methodologically sound clinical trials will confirm the findings of that pharma-funded trial, thus proving that her suspicions led to incorrect beliefs. Furthermore, the physician judiciously did not let this background knowledge predetermine her conclusion that the trial data were not trustworthy. Instead, those contextual values guided her to pursue a critical reading of the trial data, upon which she found the relevant evidence that confirmed her assumption. Anderson's criterion of open-ended inquiry was met; the use of values in this case was not only legitimate, but those value-laden assumptions actually promoted better science by assisting to "uncover the evidence that bears on our question" (Anderson 2004, 11).

Our case of clinical decision-making, therefore, appears to meet the criteria of the "model of the bidirectional influence of facts and values" proposed by Anderson (2004, 11). Briefly, evaluative presuppositions direct inquiry but do not predetermine the answer to the evaluative research questions. Instead, that question is left open to empirical testing.

A Productive Direction for Value-laden Clinical Decision-making

This discourse on the empirical content of contextual values does not, in the end, offer road-weary EBM critics an alternative theory of evidence to the evidence-based and feminist social empiricist offerings. However, it does productively offer a framework for negotiating those inescapable contextual values that enter into scientific reasoning. By doing so, the holistic theories of evidence offered in critical science studies become operational in the clinical context. While clinicians and health researchers working within the evidence-based framework first stalled at the realization that science is value-laden, and then failed to pick up on the feminist empiricist recourse to inclusive epistemic communities (for reasons that I have suggested to be entirely warranted given certain practical and organizational constraints within the biomedical context), the finding that value judgments can be evaluated much like factual statements encourages the same critical reasoning and rigorous analysis that scientists already ought to be doing in their work. The critics of evidence-based practice know this "critical attitude", as Popper (2002) called it, very well. A key criticism of EBM is precisely the complacency with which practicing clinicians are expected to adopt and follow guidelines and, where further research is required, to consult the digested evidence-based literature rather than critically reading the original trial data (Goldenberg 2009; Borgerson 2009). And, just as both evidence-based proponents and critics agree that medicine is best practiced with a critical attitude towards the evidence, value-judgments can and ought to be subject to the same level of rigorous empirical inquiry.

Conclusion

Rather than good science being evidence-based, the mainstream of feminist empiricism regards science as community-based (albeit with empirical constraints). While

the reservations that proponents of value-free science have to this proposal are well known, the misgivings of EBM critics demonstrate that this picture of scientific reasoning is also unappealing to some of those who hold the value-laden view of science. I challenged the community framework promoted by leading feminist empiricists. For starters, these idealized democratic and inclusive epistemic communities are difficult to establish, as many powerful interests are promoted by current hierarchical structures of expertise within biomedicine. This is not to fault feminist empiricists for promoting an idealized community that differs greatly from the current demographics of many scientific communities of knowers. They are, after all, idealized. However, I object to the tacit assumption that community arbitration is the *only* way to negotiate competing values within science. I drew from the "values as evidence" scholarship of Anderson and Clough to establish that values are not immune to evidentiary challenge and, therefore, they do not need to be relegated to arbitration by democratic vote. Recognizing the empirical content of many contextual values that influence scientific reasoning and judgment invites the judicious use of scientific modes of inquiry to evaluate the legitimacy and fruitfulness of competing values. Thus, a physician, faced with an evaluative judgment regarding the legitimacy of an evidence-based practice protocol or research summary, can negotiate those intrusive values as justifiable or discordant with respect to her goal of providing the best patient care. No appeal to an idealized community of knowers needs to be made to come to a reasonable decision, and so the great effort required to build this epistemic community need not discourage healthcare workers and researchers from pursuing smaller scale remedies to the problems of evidence-based healthcare. Recognizing clinical decision-making to be value-laden does not need to result in epistemic deadlock. Instead, many of the critical inquiry skills characteristic of rigorous science can and ought to be applied to the practical work of challenging the received wisdom of evidence-based health care when needed and working to minimize discordant values from influencing scientific thought and practice.

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Notes

[1] Nelson (1990) refers to this same "gap" as "slack" and "play" between theories and empirical evidence.

[2] Kuhn (1977) argued that theory choice is properly guided by the values of accuracy, consistency, fruitfulness, breadth of scope, and simplicity.

[3] By extension, feminist science is charged with relativism because no justification needs to be provided for selecting background assumptions on account of their congruence with feminist values. There is also a seeming hypocrisy when feminists additionally object to

the deployment of sexist values in background assumptions that "insulate the theoretical underpinnings of patriarchy from refutation" (Anderson 2004, 2).

[4] I do not deny the utility of epistemic communities of knowers for scientific research, however. For instance, without a feminist community of divorce researchers, the hypothesis that divorce is a positive opportunity for women's growth might never have been formulated.

[5] Clough lays this charge on Longino (1987, 1990), Keller (1992), and Harding (1991). As mentioned, I will apply her critique to Nelson, who is notably absent from Clough's analysis.

[6] But others have challenged the alleged objectivity that transformative criticism brings to scientific reasoning. See Crasnow (1993).

[7] However, not any consensus is legitimate. As a feminist empiricist, Nelson holds that these truths are delimited by empirical adequacy.

[8] For the "tie breaker", "contextual values operate as reasons (rather than causes for reasons) for taking one theory to be justified over another" (Intemann 2005, 1007).

[9] I am working with the assumption, of course, that we do not want to abandon evidence in the medical context and maintain that, short of a few outliers, most of us see it to be a worthy pursuit to motivate a philosophy of medicine that is responsive to the evidence.

[10] The *p*-value of .05 is the 5% probability of the null hypothesis outcome being obtained.

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