Naturalizing Objectivity

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Books reviewed in this essay:

Lorraine Daston and Peter Galison, *Objectivity* (Cambridge: Zone Books, 2007).

Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham: Duke University Press, 2007).

We can understand objectivity, in the broadest sense of the term, as epistemic accountability to the real. Since at least the 1986 publication of Sandra Harding's *The Science Question in Feminism,* so-called standpoint epistemologists have sought to build an understanding of such objectivity that does not essentially anchor it to a dislocated, 'view from nowhere' stance on the part of the judging subject. Instead, these theorists have argued that a proper understanding of objectivity must recognize that different agential standpoints offer different access to objective truths, with some standpoints holding better epistemic potential than others. As Harding puts it, standpoint epistemology calls for "a critical evaluation of which social situations tend to generate the most objective knowledge claims" so as to identify those standpoints that "produce empirically more accurate descriptions and theoretically richer explanations" (1991, 142, 149). Which standpoints enable the most objectivity with respect to a particular inquiry is, for the standpoint theorists, always an empirical at least as much as a conceptual question; it requires attention to the actual, material relationship between knowers, knowledge practices, and objects known.

Standpoint epistemology was developed primarily by self-identified *feminist* epistemologists. Virtually all developments of standpoint episte-

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mology have incorporated (a) a discussion of distinctive ways in which gender constitutes what and how we know and see, and (b) a claim that at least when it comes to *some* kinds of judgment, women, or some women, or feminists, are in a better position to be objective than others.[1] Moreover, 'mainstream' epistemology has viewed the material and social positions of different subjects and their epistemic consequences as a marginal, distinctively feminist concern.

Now it seems that any sensible feminist standpoint theory of this sort would in some sense strive for its own obsolescence. Standpoint theorists who believe in the truth their own theory should hope that it ceases to be marginalized in this way. And gender ought to remain a privileged category for theorizing different standpoints only for as long as sexist society positions men and women in systematically segregated subject positions, in a way that makes gender a particularly salient influence upon people's epistemic positions. There is no reason to hope or expect that people's subject positions will cease to be relevant to their capacity for objective judgment, nor even that gender will cease to shape epistemic practice. But as political life progresses, we ought to hope that gender will cease to create a systematic fracture between subject positions—and in fact, feminist standpoint theorists have increasingly moved away from the idea of a distinctive feminine or woman's standpoint, and towards attention to the wide variety of ways in which empirical facts about our social and material position can inflect our capacities for objective judgment.[2] In short, feminist standpoint theorists should hope for the arrival of post-feminist standpoint epistemology—that is, epistemology that, without needing to be qualified as 'feminist', does not associate objectivity with a transcendental 'view from nowhere', but rather asks empirical questions about the conditions for objective judgment that cannot be separated from the material and social contexts in which epistemic practices occur.

Two recent books arguably herald the beginning of such post-feminist standpoint theorizing: One is a 500-page tome simply entitled *Objectivity,* by historians of science and long-time collaborators Lorraine Daston and Peter Galison, and the other is physicist-philosopher Karen Barad's *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (henceforth MUH).[3] While neither book thematizes the gender of

1. Harding 1986; Harding 1991; Hartsock 1997; Haraway 1991; Hill Collins 1991; Hankinson Nelson 1992; Bar On 1993; Haslanger 1995; Wylie 2004. This is a small, incomplete sample of some influential examples of such writing.

2. That there is, or ever was, any interesting *unity* to the epistemic standpoint of women, or feminists, is a claim that has received constant critical interrogation from the start, and most standpoint theorists are sensitive to the troubled nature of any such claim.

3. Daston and Galison 2007; Barad 2007. There is a handful of other recent books that

the knowing subject in any substantial way,[4] both have clearly absorbed lessons from feminist standpoint theory. Both books take it as fundamental that objectivity is a feature of certain kinds of empirical *practices* that are, by their nature, engaged in by particular kinds of concrete subjects, caught up in complex and often unequal power relations, in the course of trying to disclose particular kinds of concrete phenomena. At the same time, neither book is obsessed with proving that such a situated, practice-specific, empirical understanding of objectivity needs to be rescued from deflationism, relativism, or anti-realism, for neither is seduced by the idea that only a transcendental, aperspectival account of objectivity is immune from the need for such rescue.

Naturalizing Objectivity

A *naturalistic* understanding of objectivity, I suggest, is the healthy legacy of feminist standpoint theory. Briefly, a naturalistic understanding of objectivity (a) presupposes that objective judgments—judgments that are genuinely accountable to how the world really is—exist and are the goal of many epistemic practices, rather than trying to provide a ground-up transcendental argument proving the possibility of objectivity, and (b) studies objectivity by analyzing particular empirical, historically and socially situated practices, in order to tease out their internal standards and potential, rather than first developing an abstract account of objectivity against which particular epistemic practices are measured. Within these broad constraints, a naturalized account of objectivity, as I am defining the phrase, will contain several tightly interwoven, complementary but separable components, all of which we can find in both *Objectivity* and MUH.

First, both offer what Barad calls a 'performative' account of objectivity: they take objectivity as a feature not of isolated judgments or results or representations, but rather of concrete practices. That is, some of our practices are epistemic practices that are governed by norms of accountability for getting the world right, and it is to these that can be meaningfully assessed for their objectivity. Observation, representation, and even 'reflection' (despite the inherently passive metaphor) are material activities that require training and skills to execute—skills at measuring, attending, manipulating, selecting, and so forth. The scientist engaged in objective practices, Barad says, must "create, produce, refine, and stabilize phenomena" (144), but this process of stabilization is hard work. Likewise,

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fit into this trend, notably including Rouse 2002. I focus only on the two very recent works for the purposes of this review.

4. Though Barad gives lip service to the importance of gender in understanding the concrete positions and potentialities of knowing subjects.

Daston and Galison devote most of their book to documenting the complex practices that have, at various times, constituted the project of objectively representing the facts. Both Barad and Daston and Galison thus reject Ian Hacking's (1983) classic distinction between 'representing' and 'intervening', since they understand representing as itself a performative practice involving engagement with the objects of representation.[5]

Second, both *Objectivity* and MUH stress that these performative practices of objectivity are themselves *natural* activities—activities performed by natural beings within the natural (and, Daston and Galison stress, historical) world. So there can be no strict, metaphysical separation between the natural world being studied or observed and our practices of observing it. However much we may strive to minimize our empirical impact on the phenomena we study—a goal that Daston and Galison think is eminently sensible in many contexts—it makes no sense for us to understand ourselves as on the other side of some basic ontological divide from the objects of our inquiries. Barad calls this (somewhat melodramatically in my opinion) a 'posthumanist' account of objectivity: "Posthumanism, in my account, can be understood as a thoroughgoing critical naturalism, an approach that understands humans as part of nature and practices of knowing as natural processes of engagement with and as a part of the world" (331–2).

Third, both books are committed to a naturalistic, performative understanding of how objectivity comes to have a determinate character in the first place. As Daston and Galison put it,

> This is a view of objectivity as constituted from the bottom up, rather than from the top down. It is by performing certain actions over and over again—not only bodily manipulations but also spiritual exercises—that objectivity comes into being. . . . One becomes objective by performing objective acts. Instead of a pre-existing ideal being applied to the workaday world, it is the other way around: the ideal and ethos are gradually built up and bodied out by thousands of concrete actions. (52)

Standards of accountability to reality emerge bottom-up out of the micro-practices of epistemic labour, rather than controlling such micro-practices

5. Barad claims that the final moment of representation—that of recording what one observes—is in fact a relatively trivial and uninteresting part of science. Daston and Galison, on the other hand, spend hundreds of pages exploring the wide and rich variety of practices and standards that make up this 'final' act of recording. Barad here seems to be overgeneralizing from her narrow subfield of experimental physics. I discuss Barad's tendency to overgeneralize the lessons learned from experimental quantum mechanics in more detail below.

top-down. Accordingly, the best way for philosophers of science to understand how epistemic practices succeed or fail at being objective is not to come up with a philosophical theory of objectivity and then measure practices against it, but rather to look at actual, concrete epistemic practices engaged in by natural beings at particular historical moments and extract an understanding of the normative ideals of objectivity that these practices strive to embody. Both Daston and Galison and Barad give much more than lip service to this methodological principle. Daston and Galison's book is organized around an extraordinarily detailed analysis of the history of atlas construction from the eighteenth century to the present, while Barad keeps her analysis grounded in a richly contextualized and detailed history of experimental quantum physics.

Fourth, both *Objectivity* and MUH insist that it is impossible to understand the character of objectivity except as intertwined with the character of the judging self. Different kinds of selves engage in different kinds of epistemic practices, and different kinds of epistemic practices demand different kinds of selves as their practitioners. Thus our naturalized epistemology must proceed hand in hand with an equally naturalized metaphysics and ethics of the self. Barad argues that neither the subjects nor the objects of science can be understood as ontologically determinate in advance of their encounters in the context of scientific practices. Daston and Galison argue that different types of scientific practice require the cultivation of different ethical virtues or characters, and not just different narrowly epistemic capacities, leading to the "tight intertwining of scientific practice and character" (390).

Fifth and finally (and refreshingly), both books take it as uncontentious that scientific practices aim for objectivity and that they sometimes achieve it, if never perfectly. They are not tempted by a deflationary account that *reduces* objectivity to whatever scientists and other epistemic agents happen to count as good practice, thereby eliminating any room for genuine accountability to the real. At the same time, neither is tempted to search for an *a priori,* transcendental argument that would block the excesses of anti-realism, relativism, subjectivism, and so forth. They take it to be an obvious empirical fact that we often engage in practices that are normatively accountable to how the world really is. I count this as a signal feature of a naturalized account of objectivity. In this way among others, a naturalized account of objectivity would seem to be the perfect accompaniment to Arthur Fine's 'natural ontological attitude,' which does for metaphysics roughly what naturalizing objectivity does for epistemology by taking it as empirically obvious that science is in the business of disclosing truth while rejecting transcendental theories of reality, or of the 'really real', as Fine (1984) puts it.

Naturalizing accounts of objectivity build upon the work accomplished by standpoint theorists, and at the same time they make the central claims of standpoint epistemology (minus the focus on gender as a privileged category of analysis) seem quite mundane and commonsensical, rather than the product of some kind of spooky social constructionism or deflationary relativism.[6] If objective practices require skill, training, and specific forms of agency and character, then it follows nearly immediately that different subject positions will enable different amounts and kinds of objectivity.

Daston and Galison on the History of Objectivity

Gorgeously illustrating their book with dozens of spectacular full-colour plates, Daston and Galison chart a path through the history of atlas-making and the art of scientific visual representation since the mid-eighteenth-century. Their goal in doing so is to support the thesis that objectivity itself is an historically situated concept and ideal—one constituted by a specific constellation of scientific micro-pressures rather than some grand philosophical insight. According to their account, the eighteenth century was dominated by an understanding of the project of representation as governed by the norms of "truth to nature," the nineteenth by "mechanical objectivity," and the twentieth by "trained judgment," although they happily insist that these three stages do not really supplant one another, but rather messily co-exist and challenge one another even while different bodies of norms dominate at different times. In an earlier article, "The Image of Objectivity," Daston and Galison distinguished between three distinct, historically situated conceptions of objectivity, which they dubbed "ontological objectivity," "mechanical objectivity," and "aperspectival objectivity."[7] In *Objectivity,* they have revised this typology, and they have decided to retain the term 'objectivity' only for "mechanical objectivity."[8] It is important to note, however, that all three stages or pictures still count as versions of objectivity according to my broad definition; they are each bodies of norms for epistemic and representational accountability to the way the world really is.[9]

Under the norms of "truth-to-nature," the job of the image-maker is to find the essential natural form that underlies and unifies various contingent particulars. On this view, it is the *proper* order of nature that is most

6. As charged by, for instance, Haack 1996.

7. Daston and Galison 1992. See also Daston 1992.

8. The term means something slightly different in this work than in the earlier papers.

9. As Daston and Galison argue in both *Objectivity* and the earlier papers, mimetic representational fidelity to an object is only one specific conception of accountability to the real; indeed such a correspondence standard is not what primarily governs any of the stages in the book.

'natural' and true, while the monstrous, the idiosyncratic, and the messy is deemed unworthy of scientific attention. The task of the objective image-maker, here, is to "strip away the accidental to find the essential" (16)—that is, to have insight into this underlying proper form and to represent it for those with less insight. The result was "reasoned images" that expressed this essential, orderly form—think of the crisp and elegant lines that we see in the botanical drawings of Linnaeus, for example. There was, Daston and Galison claim, no presumption that reasoned images would represent what 'anyone' would see when confronted with the objects themselves; on the contrary, it took a 'sage' with special wisdom and insight to find and display underlying form amidst messy particularity.

This all changed in the nineteenth century, with the emergence of the new ideal of "mechanical objectivity": By the mid nineteenth-century, the 'perfect' image was not one that cleared away the accidental and the monstrous to reveal true form, but one that retained all the messiness of an original particular. "What had been a supremely admirable aspiration for so long, the stripping away of the accidental to find the essential, became a scientific vice" (16). This change in representational ideals went hand-in-hand with a changed conception of the task of the representer. Now, the job of the representer was not to display his special insight in a reasoned image, but rather to *excise* the self as completely as possible from the process of representation—to reduce representation to a mechanical procedure that allowed no trace of his own interpretive perspective or judgment to seep in. Representation thus became an exercise in disciplined self-abnegation; the characterological ideal was no longer the insightful genius but the patient and diligent, self-effacing worker. "By *mechanical objectivity* we mean the insistent drive to repress the willful intervention of the artist-author, and to put in its stead a set of procedures that would, as it were, move nature to the page through a strict protocol, if not automatically . . . Mechanical objectivity required a certain kind of scientist—long on diligence and self-restraint, scant on genial interpretation" (121). The elimination or minimization of the impact of the representer's agency and perspective upon the representation thus became the hallmark of objectivity. The source of disorderliness and variability in representational practices had thereby been turned on its head: "Eighteenth-century savants tended to locate the variability in the objects themselves—in the accidental, the singular, the monstrous. By the mid-nineteenth century, the chief sources of variability had shifted inward, to the multiple subjective viewpoints that shattered a single object into a kaleidoscope of images" (113). Hence "the greatest obstacle on the path to scientific objectivity was the uncontrolled, disordered will" (190).

Thus objectivity as a self-effacing 'view from nowhere' from which we

can produce "knowledge that bears no trace of the knower"—the very kind of objectivity whose hegemony the standpoint theorist seeks to undermine—turns out to be a rather "young epistemic virtue" according to Daston and Galison (17). Indeed, they argue, mechanical objectivity was never more than one virtue among many, and this self-effacing stance should never be taken as synonymous with the epistemically rigorous or the scientific stance, despite the way that both its boosters and its critics have allowed it to take up the whole terrain, "eclips[ing] or swallow[ing] other epistemic virtues" (372). (Consider, for instance, how Descartes' proposed method for achieving certainty was inherently first-personal; the entire idea of expunging the perspective of the knower makes absolutely no sense in the context of much of his writing. "He thinks therefore he is" is not an argument whose antecedent can make a claim on self-evidence.)

According to Daston and Galison, not only is mechanical objectivity a young virtue, but it is one that has been importantly trumped in various ways. The twentieth century, as they tell the story, saw the rise of "trained judgment" as a successor standard for proper representation. Scientists became increasingly disenchanted with the idea that fully particular, uninterpreted images could display the saliencies and generic properties that they needed to display if they were to be scientifically valuable. They turned to graphs, schematic images, and other stylized representations (not to mention MRI's, sonograms, etc.) in order to represent salient features of particulars and general scientific truths. The detection of relevant features of particulars and the production of representations that disclosed them required the trained eye of the expert, with his special capacity to spot and disclose saliencies. "Two opponents of mechanical objectivity should not be equated: the sage revealed the true image of nature, and the trained expert possessed and conveyed to apprentices the means (through the 'trained' or 'seeing' eye) to classify and manipulate" (332). Where the character suited to truth-to-nature was that of the sage, and that suited to mechanical objectivity was the diligent and self-effacing worker, trained judgment called for a seasoned expert.

Although Daston and Galison examine scientists' vexed and changing attitudes towards the place of art in objective representation, they do not consider how attention to artistic practice might reveal changing understandings of this place. This is a shame, as this sort of attention to art might have helpfully complicated and enriched their story. For example, in 1915, just as Daston and Galison claim that mechanical objectivity was 'destabilizing', Duchamp began exhibiting his 'readymades'—found objects purportedly transformed into art by the act of exhibiting them. This artistic innovation seems to assault the ideal of mechanical objectivity at its core. If the mere act of display transforms an otherwise un-

touched object that predated the artist into a work of art, then any representation, no matter how mechanically produced, will become art (and thereby reflect the interpretation of the artist) merely by being displayed as a representation in an atlas or elsewhere. Thus one could argue that some of the questioning of the ideal of art-free mechanical representation was coming from within artistic practice itself.

Daston and Galison's three paradigms of representation—which I think of as three practical understandings of objectivity, despite their recent decision to restrict that term to a narrower use—do not neatly supplant one another, but rather messily co-exist. The authors intentionally avoid any discussion of which is the 'right' understanding of objectivity or the 'real' or 'correct' method of representation. This is by no means because they are 'relativists' or 'anti-realists' who believe that there is no truth of the matter about how well a representation succeeds in its accountability to reality. Rather, it is simply because they recognize that there is no need to decide among these paradigms—each 'stage' actually identifies a body of practices that is helpful for capturing the real *in specific contexts.* Which practices are 'best' depends entirely on the use to which the image will be put and the context in which it is produced, as well as the features of reality we are concerned to disclose. This is not a fancy point; it's just that because we use images for diverse epistemic purposes, we need graphs *and* mechanical reproductions of particulars *and* pictures of 'typical' or 'ideal' examples of a kind, and so forth. There is no reason why we cannot say that sometimes it is helpful to excise the perspective of the self and produce an image mechanically, sometimes it is helpful to produce schematic expert representations, and so on.

Partly because they so nicely show how these different paradigms coexist and collide, I never became fully compelled by Daston and Galison's framing historical narrative, in which truth-to-nature dominates the eighteenth century, mechanical objectivity the nineteenth, and trained judgment the twentieth. Their approach is Foucauldian, in the sense that these historical shifts are supposed to be driven bottom-up by decentralized micro-pressures and micro-practices, rather than by some centralized causality or ideological sea change. They avoid offering any quasi-Hegelian master-narrative that accounts for the movement through history from stage to stage. As a result, though, it is hard to see how any number of examples of *one* approach to representation being utilized at a particular time—and their book is brimming them—could really support the negative thesis that the other approaches to representation weren't equally live at the same time, elsewhere on the epistemic scene. One cannot give examples of the *absence* of an approach.

It seems to me, in fact, that the norms and pressures that constitute

mechanical objectivity were already live in the eighteenth century, as Daston and Galison themselves argued in their earlier paper (Daston and Galison 1992). Rousseau, for example, often reflects upon his efforts to keep his interpreting self entirely removed from the process of observation; he attempts (sometimes) to record every detail without selection or distortion, in the name of fidelity to the truth. Of his obsession with botany, he writes, "I did not want to leave even one blade of grass or atom of vegetation without a full and detailed description . . . Every morning I . . . would study one particular section of the island, which I had divided for this purpose into small squares, intending to visit them all one after another in every season" (Rousseau [1782] 1979, 84). Here we see the characteristic goals of mechanical objectivity: the search for a mechanical procedure for observing and recording, and the desire to remove all traces of judgment or interpretation that would privilege some details over others. Granted, elsewhere Rousseau is happy to make use of what he believes is his special insight in representing the true, orderly form of nature rather than its monstrous accidental manifestations. Part of what is most interesting about his writing, I submit, is that he experiences and documents the battle between truth-to-nature and mechanical objectivity as a personal conflict.[10]

Daston and Galison could respond that they never denied that the paradigms overlap and collide, or they could move their date for the rise of mechanical objectivity back into the eighteenth century, where they originally had it. But the point remains that without a master-narrative that compels us to think in terms of unified stages, I do not see much reason to accept their progressive narrative. *Objectivity* compels less in virtue of its progressive story than by way of its complex, naturalized understanding of objectivity as manifested in a variety of practiced conceptions of representation and fidelity to the real.

Barad's Agential Realism

Karen Barad's naturalized account of objectivity is grounded in her close reading of the experimental practices of quantum mechanics—a reading that is heavily indebted to that of Niels Bohr, although she also explains her several important points of departure from Bohr. Barad scathingly rejects pop-cultural interpretations of quantum mechanics that transform its message into one of skepticism ('the truth is inherently unknowable by us') or humanistic relativism ('it is up to us how the world really is', or 'our human minds and decisions determine how things really are'). These

10. I argued this at length in Kukla 2005.

readings, she argues, depend on a naïve individualist ontology, an unjustified anthropocentric understanding of the constitutive forces that stabilize phenomena, and—perhaps most importantly for my purposes—insufficient respect for our fundamental empirical accountability to how the world really is.

In place of these bad readings, Barad proposes a bold revisionist ontology. Her theory is complex, to say the least, and I can give only the barest sketch here without ending up too far astray. In brief, the "ontologically primitive" "basic units of existence", according to her, are not subjects or objects but *phenomena,* which are "entangled material practices" (333 and elsewhere). In other words, in the first instance it is performative events of agents encountering and negotiating and being accountable to a world that matters that are real. Such phenomena inherently produce a 'cut' between agent and object, so that both are ontologically derivative upon their entangled interaction—or "intra-action", as Barad calls it—rather than the other way around. It is not right to say that 'we' or 'our minds' constitute how things are, because we and our minds are not ourselves independently determinate prior to our practices of encountering things, any more than the things are. It is apparatuses—which themselves do not have given, traditional boundaries but must be understood performatively—that "enact agential cuts that produce determinate boundaries and properties of 'entities' within phenomena . . . *Hence apparatuses are boundary-making practices*" (148, emphasis in original). It is not "the subject's perspective" but the "specificity of the experimental practice" that enables quantum phenomena to become determinate (19). She gives the name "agential realism" to this ontological picture. Within it, objectivity is a matter of accountability to the real, but it is not even coherent to equate such accountability with the non-interference of the self. Since objectivity arises as an issue only in the context of a 'cut' between agent and object enacted by concrete intra-actions between them, the 'meddling' of the self in the phenomenon is a condition for the possibility of the question of objectivity arising in the first place.

Barad offers a naturalized account of objectivity: hers is a performative, bottom-up account based in the practice of science, and she takes it for granted that some form of realism and anti-skepticism is obvious. It is fundamental, for Barad, that knowers do not stand outside of the natural phenomena they seek to know but are rather part of nature, and accordingly that practices of knowing are themselves natural phenomena. And clearly, the ontology of the self and the demands of objectivity are thoroughly intertwined, for her, since both are produced in relation to one another within particular phenomena.

Yet MUH is very different from Daston and Galison's book, not only in content but in tone and sensibility. Although Barad, citing Daston's earlier work, claims that "objectivity has a history" and is "not a monolithic notion," in fact she treats 'classical' objectivity as a pretty monolithic target. According to this "classical worldview," "observers must remove themselves from the system they study, otherwise they are a part of it and cannot have a completely objective point of view. Also, their actions and the choices they make are likely to affect the system itself" (350, quoting Smolin). In other words, Barad more or less equates the classical worldview with Daston and Galison's mechanical objectivity. One might also complain Barad erects a monolithic successor account. Despite her insistence that ontological and epistemological questions should be addressed bottom-up from within scientific practice, she is much more willing than are Daston and Galison to make unrestricted claims about the true nature of fundamental ontology and the character of objectivity. She does not merely claim, for instance, that twentieth century quantum mechanics takes phenomena rather than agents or things as its primitive units, but that quantum mechanics reveals that these *are* the primitive units, tout court. She is willing to make unscoped pronouncements such as, "The world is an open process of mattering through which mattering itself acquires meaning and form through the realization of different agential possibilities. Temporality and spatiality emerge in this processual historicity" (141). She here operates at an opposite level of abstraction from Daston and Galison, who are reticent about drawing conclusions that exceed the particular events of experimentation and representation that they explore. Daston and Galison do not deny that there are such things as eternal ontological truths, but their bottom-up approach deflects attention away from such discourse.

One would expect any bottom-up, naturalized account of objectivity to be very wary of generalizing from the epistemic ideals and ontological picture that underwrite the practices of one scientific paradigm to epistemological and ontological truth *tout court.* Yet, despite Barad's early claim that physics should not be treated as a privileged practice that provides a complete ontological picture (24), she seems oddly willing to accept that experimental quantum mechanics reveals universal, transcendental truths that are apparently independent of any natural context of inquiry and observation. She takes quantum mechanics to refute both the individualist metaphysics of classical physics, and the self-effacing, aperspectival ideals of 'classical' objectivity. But since entities are produced by 'cuts' within practice, on her account, one would expect her to say that practices other than those of experimental quantum mechanics might well involve enti-

ties and ideals that are well-captured by this classical picture. Why assume that the ontology produced by experimental physics shows us anything about how we should understand the metaphysics of organisms, people, numbers, or any of the other things that the practices of experimental physics will not help us disclose? And whereas Daston and Galison seek to reveal the type of objectivity that strives for an erasure of the knowing subject as a limited, historically situated epistemic ideal, Barad rejects this version of objectivity outright as simply wrong-headed. But Daston and Galison offer rich examples of the epistemic productivity of the ideal of mechanical objectivity in specific contexts; why reject it rather than contextualize it? We should not be surprised if close attention to our various epistemic practices reveals an "anarchic"[11] ontology, with different sets of practices disclosing different kinds of objects, and being governed by different norms of accountability to phenomena. Given Barad's commitment to naturalized objectivity, her apparent faith that quantum mechanics in particular reveals transcendental ontological truths and transcendental constraints on our norms of objectivity is baffling.

More generally, Barad's taste for unrestricted ontological pronouncements seems often to be at odds with her naturalistic commitments. For example, her claim that phenomena are the "basic" or "primitive units" (333) of ontology is in tension with her more general suspicion of the idea of self-standing units that have the determinate character they have independent of any particular, concretely enacted epistemic encounter. In challenging an independent-unit ontology of agents and things by identifying a more fundamental type of "primitive unit," she does not escape the logic she criticizes. On a kindred note, she mentions several times that hers is a realist account, but that she is a realist about phenomena *as opposed to* things (i.e. 56). But it certainly seems that she should be a realist about things—unless she thinks that one can only be a realist about stuff that has a determinate character independent of our entangled encounter with it, which is just the sort of anti-naturalist position she should want to avoid. That things do not form the independent building blocks of the real should not, for Barad of all people, undercut their reality.

Another way in which Barad implicitly betrays her own naturalizing principles shows up in her discussion of 'experimental metaphysics'. She is very excited by what she takes to be the fact that "it is possible to *empirically* differentiate between two different *metaphysical* possibilities!" (289). But the whole idea that one could do such a thing presupposes a stable

11. I have borrowed the idea of an "anarchic" ontology from Natasha Leibig, with many thanks.

dualistic split between metaphysical and empirical facts that would seem to be incompatible with her belief that all inquiries, including philosophical inquiries, are in the first instance natural phenomena. In particular, she thinks that experimental quantum mechanics has refuted the "metaphysical individualism" that underlay classical physics. However, if we are to take her method and her reading of quantum mechanics seriously, what we should really say is that 'metaphysical' individualism is itself an empirical position. Whether it is a *correct* empirical position ought to depend, for her, not upon some transcendental facts, but rather upon the 'cut' produced by a particular enacted apparatus. It seems that what she should be committed to is the claim that, *in the context of quantum mechanics and its practices,* 'metaphysical' individualism turns out to be an empirically false understanding of the entities involved.

The Independence of Objects from Objective Practices

On the one hand, a naturalized account of objectivity will understand standards and ideals of objectivity as grounded in local scientific practices. On the other hand, such an account will take some form of realism and anti-skepticism for granted; hence it cannot merely reduce standards of objectivity to what scientists actually do, for it must be possible for them to be wrong. They might get the world wrong, and indeed they might use the wrong methods to disclose it in the first place. As John Haugeland has argued, any epistemic practice must be able to distinguish between following its own conventional rules and actually getting the world right, and it must be able to recognize evidence that its own conventional practices are the wrong ones because they give incorrect results (Haugeland 1998). In other words, if we take objectivity to be a natural phenomenon, we cannot deflate it in the way that Hacking does when he claims: "We cannot reason as to whether alternative systems of reasoning are better or worse than ours, because the propositions to which we reason get their sense only from the method of reasoning being employed. The propositions have no existence independent of ways of reasoning toward them" (Hacking 1982, 65). The standards for getting the world *right* cannot be internal to the standards that govern our epistemic practices, for otherwise our epistemic practices would become immune from rational correction in the face of empirical evidence.

Neither Daston and Galison nor Barad countenance such a relativistic reduction. Indeed, Daston and Galison write, "It is a misconception, albeit an entrenched one, that historicism and relativism stride hand in hand, that to reveal that an idea or value has a history is *ipso facto* to debunk it. But to show that [mechanical] objectivity is neither an inevitable

nor an eternal part of science passes no verdict on its validity, desirability, or utility . . . Between dogmatism and relativism stretches a wide plane of debate" (376).[12] Nor do these authors accept the kind of incommensurability of epistemic perspectives that Hacking asserts. Bodies of practices governed by specific norms of objectivity are not paradigms in the strong Kuhnian sense that would enclose them within incommensurable worlds. Rather, Daston and Galison show how practitioners of different paradigms of representation argued with one another in detail about the relative merits of their different methods; ultimately, the measure of success was how well the representations accurately disclosed real features of the world. Similarly, Barad gives a careful account of how the early practitioners of quantum mechanics used evidence to argue with one another about how to properly observe quantum mechanical phenomena. Bodies of epistemic practice are empirically segregated but they are not fundamentally isolated from one another, and their practitioners can understand, critique, and even respect one another's epistemic values.

From a naturalized perspective, there is no coherent possibility of a transcendental stance outside *all* possible bodies of epistemic practices from which we can judge which one's deliverances are really *really* right. Different bodies of epistemic practice can be used to assess one another, and their practitioners can struggle with one another over which practices and standards of objectivity yield the best and most accountable results. But there is no such epistemic practice as the practice of stepping out of all such practices in order to assess their objectivity 'from above'. This will bother us only if we begin with the question-begging, anti-naturalistic assumption that such an impossible stance is the only one that counts as objective.

Now this might seem to justify the sweeping rejection of self-effacing objectivity for which I criticized Barad above. For if there is no such thing as a transcendental perspective outside all local bodies of epistemic practices, then in an important sense the understanding of objectivity as self-erasure is simply incoherent, rather than merely limited and historically situated. Standpoint theory is deeply right, on this naturalized picture: knowledge is always and ineliminably the knowledge of a performative, concrete self who is situated within a particular, historically and socially contextualized body of norms. As natural beings engaged in natural epistemic practices, selves cannot adopt a stance outside of the nature they seek to know, and knowing is a material, interactive activity, and hence

12. Similarly, according to Barad, "quantum theory leads us out of the morass that takes absolutism and relativism to be the only two possibilities" (18).

there is no possibility of attaining objectivity by erasing the traces of the knowing self and its standpoint. Doesn't this make the ideal of mechanical objectivity fundamentally and unqualifiedly wrong-headed, as Barad, unlike Daston and Galison, believes?

I think this conclusion would be based on an unsubtle understanding of mechanical objectivity. Let us grant that it is incoherent to believe that the self can, in fact, completely erase all traces of itself from the material practice of knowing, or that it can inhabit some unmarked perspective that is ontologically severed from the world. It can still make perfect sense to strive, in practice, to minimize the traces of the self, and to produce knowledge that is maximally reproducible and minimally tied to the particular perspective of its producer. Indeed, in *some* domains and for *some* purposes, holding oneself to this regulative ideal is surely a useful and important component of accountability to the real. (In addition to the many examples Daston and Galison offer, we might think of the task of the court stenographer, for instance.) Daston and Galison are clear that mechanical objectivity can only serve as a regulative ideal, and that at its limit point it would become self-undermining: "[Mechanical] objectivity . . . is epistemology taken to the limit . . . The demands it makes on the knower outstrip even the most strenuous forms of self-cultivation, to the brink of self-destruction" (374). But this does not, in their view, mean that the ideal is not actually mobilizable in practice. Norms can serve as regulative ideals even when they are never fully realizable—consider Kant's command that we abstract from our pathological existence as material objects and act in accordance with the demands of pure rationality, for example, which he certainly never meant to be a fully achievable goal. Indeed, the mere impossibility of an absolutely self-effacing, aperspectival form of objective knowing seems to be no count at all against the utility of this ideal in practice. In the laboratory, we regularly go out of our way to control some variables in order to better disclose the real relations between others. When we do this, we are under no illusion that the controlled variables have thereby been metaphysically excised from the natural scene. Similarly, I think that Daston and Galison effectively show that some scientific practices involve minimizing or 'controlling for' the influence of the self—but this does not mean that these practices depend upon an ontological picture upon which the self can effectively cast itself out of the natural scene of inquiry. Thus even if Barad is right, as it appears to me she is, that quantum mechanics is a domain where this ideal is inappropriate and distorting, she has not earned the right to extend this conclusion to other kinds of objects and epistemic projects—any more than the impossibility of walking through a forest without leaving a trace renders pointless the effort of minimizing one's impact on the land.

Daston and Galison show a historical and contextual sensitivity and a humble reticence about sweeping ontological claims that is missing in Barad's book. Barad, on the other hand, is willing to address normative questions about which practices are *more* objective than others—questions that standpoint theorists always insisted we should be willing to address—whereas Daston and Galison are not. In this sense the books complement one another nicely, and together they give us a tantalizing taste of how epistemology might look once the lessons of standpoint theory have been absorbed, and we need no longer spend all our time battling the charge that we are relativists or anti-realists just because we reject the mythic possibility of aperspectival knowledge practices that leave no trace upon the world known.

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