



Editors' Introduction: Epistemic Boundaries

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FOCUSED DISCUSSION

Editors' Introduction

Epistemic Boundaries*

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As science studies scholars, one of our basic tasks is to draw the boundaries that will define our units of inquiry and constrain the chronological and geographical limits of our studies. Without these boundaries, the categories of our analysis remain imprecise. Fortunately, we now have an extensive toolkit to help us with this task. With paradigms, research programs, epistemic cultures, or styles of reasoning, historians, philosophers, and sociologists of science now have a large set of resources for locating the fissures and discontinuities in science. The papers from the focused discussion of this issue of *Spontaneous Generations* present us with an opportunity to take a step back and examine the ways that science studies scholars are currently drawing boundaries. In reviewing the articles for this discussion, our aim as editors was to reflect on what boundaries scholars were paying attention to and what use we can make of these boundaries.

Our first set of papers (Niemoczynski, Lehoux, Aikin et al.) probe one of the most fundamental boundaries in the scientific enterprise: the border between the natural and the supernatural. In these papers, this boundary proves difficult to locate, yet charged with political and philosophical consequences. The papers in the second set (Delbourgo, Ottinger, Gooday) ask how boundaries are illuminated when we focus on objects and artifacts. The objects in these studies resist definition, revealing social, cultural and practical epistemic boundaries. The next

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two papers (Wright, Baus) look at what happens at the formation of new epistemic communities, tracing boundaries as they blur, shift and reform. Finally, our last papers (Levina, Wald) ask how we can understand the nature of epistemic disagreements. Are there times when we should agree to disagree?

I. THE BOUNDARY BETWEEN SCIENCE AND NOT-SCIENCE

Thomas Gieryn (1983; 1995) has argued that we should move away from using universal demarcation criteria for drawing boundaries. Rather than generating normative theories about how to draw epistemic boundaries between science and non-science, Gieryn suggests that we look at how boundaries between science and pseudo-science have been historically constructed and the ways in which these boundaries have been put to use by scientists trying to secure resources and credibility while denying them to others. For Gieryn, the question of how to draw boundaries between science and non-science is primarily a sociological one rather than a philosophical one.

However, framing the demarcation problem as a sociological rather than philosophical problem should not imply that philosophy has nothing interesting to say about epistemic boundaries. In this volume, for example, LEON NIEMOCZYNSKI suggests a way that philosophy can make an important contribution to our discussions of the boundaries of science. In his article, Niemoczynski scrutinizes the epistemology of twentieth century American naturalists like Dewey, Quine, and Santayana, and argues that their conflation of the natural with the physical restricts the kinds of questions science and philosophy can ask and leads to reductionist accounts of human experience. The problem with this kind of naturalism, Niemoczynski argues, is that proponents are “so intent on denying the supernatural that it actually ends up unnecessarily excluding the abstract components of experience that clearly can and do contribute to knowledge (knowledge of the self or knowledge of the ideal laws that govern the universe, for example)” (Niemoczynski, 18). Instead, Niemoczynski recommends a strain of naturalism espoused by the early twentieth century philosopher Justus Buchler, who argues that ideal entities and phenomenological events deserve the same status as sense data when we provide descriptions of the natural world. Niemoczynski’s argument suggests, then, that ontological commitments about the natural orient and shape what we consider knowable and can thus inform the epistemic boundaries that scientists adopt. What is considered natural serves as a constitutive boundary.

Whereas Niemoczynski looks to expand the boundary of what is considered natural, DARYN LEHOUX argues that there is no clear boundary

that marks the birth of naturalistic thought within the history of science. In received accounts, we are told that creation myths give way to naturalistic explanations with the Presocratics and the subsequent birth of Western philosophy. Lehoux argues, however, that there are many difficulties with this simple narrative. There is good reason to believe that Plato, Aristotle, and the Presocratics took their creation myths quite seriously; further, we can point to practices that predate the Presocratics, like agriculture and domestic breeding, as areas of knowledge that surely require some kind of understanding of natural causes. For Lehoux, then, the birth-of-naturalism narrative represents an epistemic boundary that is artificially imposed by the historian rather than a boundary that helps us make sense of how the ancients understood their world. Whereas many historians and philosophers in the Anglo-American world have sought to draw a well-defined boundary that designates the birth of naturalism, Lehoux suggests that we should approach the ancients as anthropologists approach foreign cultures and try to understand what the ancients *themselves* understood by the natural.

Both Niemoczynski and Lehoux present arguments for broadening the scope of what we consider natural. Niemoczynski argues that we should include non-physical phenomena, such as ideal objects and private phenomenological experiences, whereas Lehoux proposes that there is no reason to think that cultures that have creation myths do not also have intricate knowledge of natural causes. SCOTT AIKIN, MICHAEL HARBOUR, and ROBERT B. TALISSE contribute to this discussion by teasing out some policy implications of the way the boundaries between the natural and the supernatural are drawn. Aikin et al. respond to Thomas Nagel's argument that there is no principled way to demarcate between science and non-science when we are talking about evolution versus intelligent design (ID). For Nagel, we either have to consider both evolution and ID as science or both as non-science. However, according to Aikin et al., the policy implication of treating ID and evolution symmetrically is that we should give both equal time in the science classroom. Thus, Aikin et al. issue a word of caution—if we want to expand our boundaries of what we count as *natural* or *scientific* we should be mindful of the politics and practical implications behind such a move.

II. OBJECTS AT THE BOUNDARIES

Where philosophers like Karl Popper once sought to draw a single firm line separating science and non-science, science studies scholars now talk about a multitude of boundaries in flux. Once-firm boundaries, like those between science and the public, and between religion and science, have become increasingly difficult to pin down, and new boundaries within

science itself have emerged. In this new picture, science is undefinable and fundamentally disunified. One way to investigate these boundaries is to focus on their material dimensions and ask whether and how particular instruments and objects of study define distinct epistemic communities. Disciplinary boundaries in science have always been, at least partly, ontological; at first pass a biologist differs from a physicist primarily in the objects of her gaze. But to what extent are these boundaries epistemic as well (Knorr-Cetina 1999)? And do particular objects or instruments compel particular epistemic norms? Or can the same instrument operate within very different epistemic contexts (as Daston and Galison [2008] argue was the case with the camera)? And, if so, should we be satisfied with the compromise offered by the idea of a “boundary object,” that is able to “inhabit several social worlds. . . both plastic enough to adapt to local needs. . . yet robust enough to maintain a common identify across sites” (Star and Griesemer 1989, 393)?

JAMES DELBOURGO emphasizes the epistemic instability of objects as they move across boundaries. He follows the trajectories of two particular objects of curiosity at the turn of the eighteenth century as they crossed the colonial divide into Europe. Delbourgo argues that in order to understand the historical meaning of an object, we must pay attention not just to the boundaries that are being crossed but also to the particular modes of transfer. In the case of one of these objects, a Chinese cabinet of surgical instruments, this means uncovering the contingent nature of its path to the collector. By emphasizing the weakness of the collector, his inability to exert complete control over the choice of items in his collection or to convince others of the worth of these collected objects, Delbourgo highlights the multiple identities embodied by this single object.

GWEN OTTINGER asks whether a new, shared instrument can bring previously separate epistemic communities together. She looks at two communities—residents and experts—both monitoring air quality along an oil refinery fence-line in Louisiana. These groups have traditionally used different instruments and different methods to collect air quality data, disagreeing over the significance of each other’s results. The hope that a new, shared type of fence-line monitor would bridge this epistemic divide has not, however, played out. She finds the old boundaries reproduced in the ways that each community approaches the new measuring device.

In his study of early twentieth-century research into permanent magnets, GRAEME GOODAY highlights the social-industrial boundary of trade-secrecy that acted as an epistemic boundary preventing the dissemination of knowledge. This commitment to secrecy was challenged by Marie Curie, who published some of the first comprehensive research on the properties of these magnets. Like Delbourgo’s Chinese cabinet

and Ottinger's fenceline monitors, the permanent magnets at the heart of Gooday's study resist definition. But where the previous authors highlight the socio-cultural reasons for this resistance, Gooday points, in addition, to theoretical and practical boundaries that constrain researcher's attempts to achieve permanence. The boundary imposed by trade secrecy was ultimately overcome, but the quest for permanence proved to be unachievable.

III. COMMUNITY FORMATION

The objects in the previous studies illuminated boundaries already firmly in place. AARON SIDNEY WRIGHT, however, follows a boundary in motion by focusing on astronomer Matthew Fontaine Maury and his efforts to train a new community of nineteenth-century American navigators to perform trustworthy meteorological observations for sea charts. Wright focuses in particular on the work done by the standardized log sheets distributed to these new observers. These log sheets did exactly what Ottinger's new fenceline monitors couldn't: Wright argues that they began "erasing the boundary they sat on" (91). The log sheets helped to introduce these thousands of American navigators into an already existing epistemic community of trained astronomical observers.

But we still might wonder about the particular dynamics of this epistemic conversion. What cultural practices did these new observers bring with them to the established community of astronomers? Was the conversion of these new observers complete? Or could elements of this process be understood using the idea of a trading zone (Galison 1997), in which the log sheets might function as a type of creole?

DANIELA BAUS argues that scholars studying the formation of new epistemic communities can benefit from analytical tools borrowed from anthropology. These include the idea of creolization, the process by which new languages and cultural practices develop as formerly distinct cultures intermix, and the idea of the hybrid, the notion that every individual's identity is in fact fractured. Using these concepts, Baus asks us to examine four complementary dimensions of the formation of new scientific communities: the construction of a communicative space, the formation of new institutions, the flow of symbols in the form of texts and instruments, and the migration of individual scientists between communities.

IV. DISAGREEMENT

Encounters between epistemic communities are not always moments of convergence. Often epistemic boundaries have to be negotiated when communities with different epistemic standards interact. The interaction

of separate communities raises interesting questions about the nature of disagreements. Can alternative spaces be built where the epistemic authority of experts stands on equal footing with that of the public? Are there times when disagreement is necessary and productive?

MARINA LEVINA focuses on the disagreements that arose in the blogosphere in response to the presentation of alternative medical treatments on *The Oprah Winfrey Show*. Levina takes issue with media criticism of *Oprah* that relies on a strict demarcation between science and popular culture, where science is said to hold the upper hand in the creation of knowledge. Instead she interprets the *Oprah Winfrey Show* as an alternative space where the distinct epistemic practices of scientists and the public can interact and where scientists do not necessarily retain the epistemic authority granted to them by their institutions. Like Baus, who describes the convergence of epistemic communities and examines tools for interpreting the formation of new epistemic spaces, Levina moves away from an examination of boundaries from within epistemic communities and focuses on how boundaries are negotiated when communities interact.

On the other hand, BENJAMIN WALD considers situations when recognizing and maintaining epistemic boundaries is both rational and productive. In his discussion of epistemic disagreements, Wald distinguishes between two kinds of epistemic peers: epistemic peers who share evidentiary standards and therefore reason in similar ways, and peers who reason very differently but appear equally knowledgeable. In disagreements with peers of the first sort, Wald argues that it is rational to suspend one's judgment, whereas with peers of the second sort he argues that it is rational to maintain one's position. For Wald, disagreements with our remotest peers provide an opportunity to re-consider and evaluate our own epistemic standards and beliefs in order to examine why we find them convincing. For Wald, in cases where epistemic boundaries seem insurmountable but borne from equally rigorous considerations, the best strategy is to respectfully disagree.

V. MOVING FORWARD

Historians, philosophers, and sociologists of science have always paid attention to boundaries, but the boundaries of the past were fewer and more clearly marked. We now have a multitude of flexible boundaries, and it seems, no shared language for talking about them. As we continue to refine the models we deploy to make sense of changing epistemic norms, of moments of contact between competing knowledge cultures, and of the ways in which boundaries are shaped by discipline, by geography, and through language and practice, a number of important problems emerge. We should ask, for instance, what makes some boundaries more

permeable than others and what features allow certain epistemic cultures to be more resistant to change? Or is it the case that all epistemic commitments are equally malleable? What happens if we begin to consider the ways in which power dynamics affect communication between two separate cultures (Collins et al. 2007)? And how do we find a way to talk productively about these cultures, when we know, on closer inspection, that they are far from homogeneous themselves?

The idea of epistemic boundaries is undoubtedly a powerful metaphor, but one requiring reflexive scrutiny. As an epistemic tool of *our* trade, boundaries delimit our research projects, frame our perspective and determine our stance. As students of science, we must attend to the boundaries we draw.

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