SOPHIA ROOSTH and ASTRID SCHRADER

Feminist Theory Out of Science: Introduction

What is the relationship of critical feminist theory to science studies? How might we envision critical theory's encounter with scientific accounts of the world? Might we read scientific theories as already critical, the lived world as already doing science, busily generating theories of itself? Rather than engaging again and again with the impossibility of the "new" (as in "new feminist materialisms"), an announcement in danger of offending the marginally established, *Feminist Theory Out of Science* is an attempt to refigure possible relationships and traffic between feminism and science. Inspired by the University of Minnesota Press's Theory Out of Bounds series, we did not set limits in advance. Beginnings, after all, are always elusive.

How do scientific theories inform cultural critique? How might scholars generate critical theories *out of* scientific ones? Answering this last question demands a few words about prepositions, which are etymologically entitled to come first and are always about how things relate to one another. "Feminist theory out of science" does not imply that feminist theory emerges from science. It implies, rather, that the world is already

Volume 23, Number 3 DOI 10.1215/10407391-1892880

theory all the way down. "Theories are," as Karen Barad writes in this special issue, "living and breathing reconfigurings of the world" (207). Barad offers theory as a form of experiment, to which we might add that experiment is a mode of theory making. The world, it seems, is inhabited by theories of itself. The corals and nudibranchs about which Sophia Roosth writes in these pages, for example, do not simply manifest mathematical theories; they *do mathematics*. Vicki Kirby concurs, suggesting that bacteria perform the same code-breaking as cryptographers and hackers when they develop antibiotic resistance. Depending on the metaphor, bacteria may also be competent engineers, crystallographers, pharmacists, social organizers, literary critics, and architects (Margulis and Sagan). And as Kirby proposes, echoing Barad, "[W]e are already practicing physics" (204).[1] Feminist science studies is committed to being both "in" and "of" science. That is, writing *about* science is never separable from the work of science itself. Inhabiting the ecotone where feminist theory meets science studies invites us to suspend divisions between doing science, making sense of science, and simply getting on in the world.

Is it, then, simply a matter of choosing one's initial conditions, the right sorts of scientific theories to serve as analytical starter cultures? The relation of theory to method is today under revision, at least in some quarters. Some scholars work by holding scientific theory in tension with critical theory. Operating "athwart theory," they move iteratively between the theoretical and the empirical in order to generate new theories while still acknowledging the dense material reality of theory (Helmreich, *Alien* and "Nature").[2] "Laterality" or "to-one-sideness" are recently forged tools used to describe and analyze emergent forms of knowledge in a way that is legible to those who speak and act within those discourses (Maurer). Such sideways maneuvers can be both methodological and analytic, as we send relays between the critical and the empirical, the semiotic and the material. Thinking across or beyond, like thinking athwart, invites us to write and think against neat distinctions between theories and things, between matter and method, and to query the analytic constructs we have inherited.

In introducing an encounter between feminist theory and science studies, another point of departure would call into question the notion of encounter itself, to ask how we make sense of our own entanglements and partial engagements with creatures, technologies, and other things that furnish our world. A philosopher of mind, Thomas Nagel, once asked, "What is it like to be a bat?" Nagel wanted to know not "what it would be like for me to behave as a bat behaves," but rather "what it is like for a bat to

be a bat." Such a question is, of course, impossible to answer. Science, Nagel suggests, surely offers no means of traversing the gulf between observable fact and phenomenal experience. Perhaps here is a ground, or a shared tradition: there is no way to know the other from the point of view of the other. Any serious engagement with feminism and science must reckon with this fact, while not giving up on the promise of such an impossibility. This does not mean that "positive" knowledge about and with nonhuman others is not possible; it only means that it is always perspectival, incapable of effacing our accountability to the other. Grappling with the other entails reimagining and thickly describing encounters "in which commerce and consciousness, evolution and bioengineering, and ethics and utilities are all in play." Like Donna Haraway, we are "especially interested here in 'encounters' that involve, in a non-trivial and hard-to-characterize way, subjects of different [biological] species" (*When Species* 46), as well as contemporary species that include technological assemblages.

Tracking technoscientific practices makes the question of what it is like to be someone or something else cease to make sense altogether. Neither objects of study nor modes of inquiry can be contained in disciplinary discourses when subjects and objects get involved with one another, leaving inherently indeterminate who engages with whom. Rather, affectivity begins to emanate from spaces between discourses, frames, images, subjects, and objects. One way to envision critical theory's encounter with scientific accounts of the world might, then, be through close attention to practices of communication that exceed the human realm.

What happens, for example, when self-affection, the elusive experience we call subjectivity, undergoes technical modification and expansion? New media theorist Mark Hansen poses this question in his essay "The Time of Affect, or Bearing Witness to Life." He distinguishes two modes of engendering affectivity, which he identifies in the art of Douglas Gordon and Bill Viola, both of whom technologically manipulate our [human] experiences of time. Gordon's aesthetic, he argues, focuses on the role of playback. Taking for granted the cinematic sequences of images as raw material for his manipulations, he shows how radical decelerations open up a space between images into which affectivity can enter. Viola's video art, in contrast, simultaneously modifies recording and playback, retooling the image itself so that the perceptual present becomes contaminated with the "nonlived" (Hansen 610). Through a vital encounter with the materiality of this nonlived—that which exceeds our lived experiences; "something nonlived in us that remains nonliveable by us"—Hansen argues

that Viola's videos put us in touch with the "excess of the self over itself" (622). The experience of auto-affection (which philosophers at least since Kant have identified with human time consciousness) is here disturbed by an imperceptible passivity, enabling and enabled by affectivity. "We are subjects precisely because we are 'out-of-phase' with ourselves" (622).

While Hansen's concerns remain within the realm of technologically enhanced human subject formation, there is no reason to constrain the implications of his analysis to the all-too-human realm of auto-affection. It is precisely the passivity within subjectivity—the out-of-syncness of the self with itself—that allows for care, affect, and responsibility in scientific knowledge production (Schrader, "Dinos"). In intra-active knowledge production, affectivity manifests itself through an active desubjectification that allows for a "passive" decision "coming from the other within" (Derrida, "Mochlos"). Following Jacques Derrida, such a passivity at the heart of subjectivity refers to mortality and a vulnerability shared among all living beings, a nonpower at the heart of knowledge/power that all witnessing (scientific or otherwise) entails (Derrida, *Animal*). In this way, it becomes possible to move from auto-affection—giving oneself a presence—which forms the basis of selfhood in humans, toward heteroaffection, which recognizes that the other is internal to the self and that nature is always contaminated by technology.

Hansen's account of affectivity in the formation of subjectivity and time resonates with Barad's account of diffraction as both a scientific practice and a metaphor for a critical approach to science. Elaborating on Haraway's notion of diffraction as "an optical metaphor for the effort to make a difference in the world" (*Modest_Witness* 16),[5] Barad distinguishes the classical notion of diffraction based on geometrical optics from its generative meaning as entanglement in quantum optics. In classical optics, light is treated as rays that can be reflected and refracted upon encountering material objects. While engendering differences for an observer, the object itself remains as if untouched. Similar to Gordon's video art, which presupposes "cinema" as the technological embodiment of our experience of time, differences are made in our human perspective alone. Feminist accounts of technoscience do not stay at the pole of playback but reconfigure scientific "recordings" and "playbacks" simultaneously, seeking to make critical differences from within. As Barad notes: "Diffraction is not merely about differences, [. . .] but [is] about the entangled nature of differences that matter" (*Meeting* 36). In her formulation, diffraction is not merely an instrumental apparatus but is, rather, inseparably entangled

with that which it diffracts. Barad's quantum mechanical notion of diffraction pays close attention to the indeterminate nature of light. For her, diffraction is about the undecidability between what functions as an apparatus and what the object of that measurement is. The intra-actions can never be extracted from resulting patterns.

Diffracting both Barad's and Haraway's notions of diffraction, we suggest spectrology as a visual technology for generating untimely interferences. *Spectrology*, according to the *Oxford English Dictionary*, is the "study or science of specters" and "the scientific study of spectra." A spectral pattern appears as a result of diffraction that disperses light, for example, into its component colors. *Spectral* derives from the Latin *specere*—to look, look at, see. It is also about different kinds of species, and about respect: *respecere*—to look back at, to regard, to concern (the French verb *regarder* preserves both meanings "to look" and "to concern").

Spectrology joins diffraction with *spectrality*, such that diffractions no longer happen in time, but reconstitute time (Schrader, *Dinos*).[4] The classical notion of diffraction requires the interfering "components" of a phenomenon to be in phase, that is, temporally coherent in order to lead to a well-defined diffraction pattern. Spectrality presupposes an out-of-jointness of time, a fundamental asynchrony. Such an untimeliness draws attention to the physical and affective work required in making temporal connections, while continuously undermining all attempts to engender a temporal unity. Although "all work produces spectrality" (Derrida and Stiegler 117), we would like to take the metaphor somewhat further.

For Roland Barthes, the spectrum is the "object-image" of the photograph, and in Bernard Stiegler's reading of Barthes, "This specter is produced by touch" (Stiegler 152). The "touch" to which Stiegler refers is a *physical* touch, the touch of light rays modifying the photosensitive silver particles, leaving an imprint, and then transmitting the image to the retina of the eye of the "spectator." In an unbroken chain of memorial light, the spectrum becomes the "this was," the real past. For Stiegler, the (analog) photograph epitomizes irreversibility, as physical trajectories are traced back toward moments of touch. The geometrical optics of reflection only work one way. Taking issue with Stiegler's account, Derrida points out that touch is exactly what one is deprived of when looking at a photograph (115). In Barthes's account, the specter of touch becomes a desire signifying its absence. In other words, the givenness of the "real past" presupposes difference as absence. In contrast, for Derrida, photons touch in a very different sense. "The flow of light which captures or possesses me,

invests me, invades me, or envelops me is not a ray of light, but the source of a possible view: from the point of view of the other" (122–23). Such an impossible point of view becomes an affective possibility through attention to the inherent indeterminacy of the nature of light. Like Barad's notion of diffraction, spectrology introduces indeterminacy into any transmission of photons. As Stiegler proposes for digitizing technologies (in contrast to analog photography), spectrology also "introduces manipulation *even into* the spectrum" (153), without, however, distinguishing between different kinds of technologies. In other words, it affects not only the playback (or reading) but also the recording (or writing) process of intra-active technoscientific work. Spectrology, however, is "not simply another machine for the perception of images" (123) but, rather, attends to an irreducible alterity, a respect for the "other," "for what is not simply present," a specter that concerns us and requires a response.

Spectrologies not only record histories but undo past meanings. Undoing here is neither a rejection of inherited tools nor a negation of negation achievable without doing any work. Specters do not have histories; they *are* histories. Spectrology guards against the possibility of relations becoming ontologically fixable.

Each of the essays in this issue takes a different tack toward spectrology, letting multiple specters interfere, through incorporations, appropriations, and rerecordings of inherited discourses in affective transdisciplinary labor. Sophia Roosth tracks how biological and mathematical theories are made manifest through the crafty labor of women who collectively crochet models of coral and other hyperbolic sea creatures. Lina Dib is interested in how memories are "made to matter" and how new technologies of memory storage and recall are both symptoms of and cures for our contemporary anxieties about time. Taking as their subjects Darwin's studies of orchid pollination and twentieth-century chemical ecology, Carla Hustak and Natasha Myers read Darwin "against the grain" to tell old stories in new ways, describing "affective ecologies" in which organisms become intimately involved with one another in a process of involution. Similarly, Astrid Schrader insists that "pasts" are never fixed once and for all. She takes up Maxwell's demon, a thought experiment that questions the thermodynamic arrow of time, reopening ambiguities in physical accounts of memory to arrive at the co-constitution of time and work. Eva Hayward, in her observations of human-marine jelly encounters at the Monterey Bay Aquarium, filters scientific accounts of display technologies through her own poetics; her "ciliations" echo Hustak and Myers's

"involutions"—twin analytics for species cohabitating in technoscientific ecologies. At stake in each of these essays, as in the commentaries by Vicki Kirby and Karen Barad, are what Hayward calls "critical enmeshments" ("More") between scientific and feminist theories: across, alongside, within, against, athwart, beyond, betwixt, and between.

SOPHIA ROOSTH is Assistant Professor in the Department of the History of Science at Harvard University. Her research focuses on the twentieth- and twenty-first-century life sciences. Her first book manuscript, titled "Synthetic: How Life Got Made," examines how the life sciences are changing at a moment when synthetic biologists, biohackers, and bioengineers build new biological systems in order to investigate how biology works.

ASTRID SCHRADER is Visiting Assistant Professor in the Science, Technology, and Society Program at Sarah Lawrence College. Her current research investigates the relationships between time, technicity, and animality in scientific determinations of environmentally harmful species. She has previously published in the journals *Social Studies of Science* and *Environmental Philosophy* and is currently working on a monograph provisionally titled "Species Politics in Environmental Crises."

Notes

1 See also Schrader, "Haunted Measurements."

2 See also Hustak and Myers, "Involutionary Momentum."

3 See also Hayward, "Sensational Jellyfish."

4 The term *spectrology* was introduced by Derrida in his filmed conversation with Stiegler (131). The meaning of "spectrology" changes somewhat in our appropriation of it, which filters Derrida's intervention through Barad's notion of diffraction, paying special attention to the indeterminate nature of light.

Works Cited

Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke UP, 2007.

———. "On Touching—The Inhuman That Therefore I Am." Roosth and Schrader 206–23.

Derrida, Jacques. *The Animal That Therefore I Am*. New York: Fordham UP, 2008.

———. "Mochlos, or the Conflict of the Faculties." *Eyes of the University: Right to Philosophy 2*. Palo Alto, CA: Stanford UP, 2004. 83–112.

Derrida, Jacques, and Bernard Stiegler. *Echographies of Television: Filmed Interviews*. Cambridge, MA: Polity, 2002.

Hansen, Mark. "The Time of Affect, or Bearing Witness to Life." *Critical Inquiry* 30 (2004): 584–626.

Haraway, Donna J. *Modest_Witness@Second_Millennium.Femaleman©_Meets_Oncomouse™: Feminism and Technoscience*. New York: Routledge, 1997.

———. *When Species Meet*. Minneapolis: U of Minnesota P, 2008.

Hayward, Eva. "More Lessons from a Starfish: Prefixial Flesh and Transspeciated Selves." *Women's Studies Quarterly* 36.3/4 (2008): 64–85.

———. "Sensational Jellyfish: Aquarium Affects and the Matter of Immersion." Roosth and Schrader 161–96.

Helmreich, Stefan. *Alien Ocean: Anthropological Voyages in Microbial Seas*. Berkeley: U of California P, 2009.

———. "Nature/Culture/Seawater." *American Anthropologist* 113.1 (2011): 132–44.

Hustak, Carla, and Natasha Myers. "Involutionary Momentum: Affective Ecologies and the Sciences of Plant/Insect Encounters." Roosth and Schrader 74–118.

Kirby, Vicki. "Initial Conditions." Roosth and Schrader 197–205.

Margulis, Lynn, and Dorion Sagan. *Acquiring Genomes: A Theory of the Origins of Species*. New York: Basic, 2002.

Maurer, Bill. *Mutual Life, Limited: Islamic Banking, Alternative Currencies, Lateral Reason*. Princeton: Princeton UP, 2005.

Nagel, Thomas. "What Is It Like to Be a Bat?" *Philosophical Review* 83.4 (1974): 435–50.

Roosth, Sophia, and Astrid Schrader, eds. *Feminist Theory Out of Science*. Spec. issue of *differences: A Journal of Feminist Cultural Studies* 23.3 (Fall 2012).

Schrader, Astrid. "Dinos and Demons: The Politics of Temporality and Responsibility in Science." PhD diss. U of California, Santa Cruz, 2008.

———. "Haunted Measurements: Demonic Work and Time in Experimentation." Roosth and Schrader 119–60.

Stiegler, Bernard. "The Discrete Image." *Echographies of Television: Filmed Interviews*. By Jacques Derrida and Bernard Stiegler. Cambridge, MA: Polity, 2002: 145–63.