2008

Fresh Networks: Science, Literature, Feminism, and Cultural Studies

Randall Knoper, *University of Massachusetts - Amherst*

Fresh Networks: Science, Literature, Feminism, and Cultural Studies

Randall Knoper

Randall Knoper is the author of ***Acting Naturally: Mark Twain in the Culture of Performance.*** *He teaches English and American Studies at the University of Massachusetts in Amherst*

Herrnstein Smith, Barbara. 2006. *Scandalous Knowledge: Science, Truth and the Human*. Durham, N.C.: Duke University Press. $74.95 hc, $21.95 sc. viii + 198 pp.

Levine, George. 2006. *Darwin Loves You: Natural Selection and the Re-Enchantment of the World*. Princeton, N.J.: Princeton University Press. $29.95 hc. xxvii +304 pp.

Grosz, Elizabeth. 2004. *The Nick of Time: Politics, Evolution, and the Untimely.* Durham and London: Duke University Press. $84.95 hc, $23.95 sc. viii + 314 pp.

Grosz, Elizabeth. 2005 *Time Travels: Feminism, Nature, Power.* Durham and London: Duke University Press. $79.95 hc, $22.95 sc. viii + 257 pp.

Wilson, Elizabeth. 2004. *Psychosomatic: Feminism and the Neurological Body*. Durham

and London: Duke University Press. $69.95 hc, $19.95 sc. x + 125 pp.

Livingston, Ira. 2006. *Between Science and Literature: An Introduction to Autopoetics*. Urbana and Chicago: University of Illinois Press. $40.00 hc, $18.00 sc; xi + 192 pp.

In the current scene, in which science—especially evolutionary psychology and cognitive science—predicts that the laboratory will soon provide explanations for all human behavior, including the creation and consumption of art and literature, what should the response of the humanities be? Should we be "talking back" to the scientists, displaying their ignorance of the complexities of our fields, attacking the capacity of scientific reductionism to explain Shakespeare? Should new lines be drawn and fortified in the "science wars"? Should modes of understanding established in the humanities be extended to a rethinking of the sciences? Can insights and models from the sciences be imported profitably into the ways we think about literature and culture, as ways to reframe the questions we ask or to reinvigorate our theories and practices? In sum, how exactly should we be thinking about the relations between the humanities and the sciences? The six books reviewed here will not gain the notoriety attained by *Consilience*, E. O. Wilson's popular attempt to promote a unification of knowledge under the banner of scientific reductionism, or *How the Mind Works*, Steven Pinker's attempt to give a full account of the mind through evolutionary psychology. This is a shame, since they provide smart, often provocative attempts to rethink the territory between what C. P. Snow famously called the "two cultures." Together they also reveal the turbulence in this academic pursuit, since, while they have plenty of points of agreement, they sometimes differ radically in their stances toward science, their attitudes about the value of social-constructionist accounts of knowledge, their friendliness toward scientific method and reductionism, and their conclusions about the compatibility or possibilities of exchange between the sciences and the humanities.

One of the essays collected in Barbara Herrnstein Smith's *Scandalous Knowledge: Science, Truth and the Human* directly takes on "The Sciences and the Humanities Today," and much of the rest of the book is a brief for a constructivist understanding of knowledge—including knowledge in both the sciences and humanities. As such, it is a good place to begin. It lucidly (and polemically) lays out many of the fundamental conflicts at play in the territory between the sciences and the humanities. While this essay firmly sides with constructivism and an associated "relativism," the book works to defuse the caricatured positions in the so-called "science wars"—between the supposedly monstrous postmodern relativists and the supposedly naïve scientif-

ic realists. Smith leans toward the side of feminist and antiracist critiques of science, but she distinguishes between *constructivist* and *social constructionist* understandings of knowledge, here making the case for the former. Social constructionism she characterizes as more politically engaged, focused on a cultural critique of the naturalization of beliefs about race, class, gender, and sexuality and of the ways such naturalization is implicated in sustaining dominant social and political formations. Constructivism, on the other hand, is more descriptive and explanatory, emerging most immediately from the work of Ludwik Fleck (whom Smith particularly champions), Thomas S. Kuhn, Michel Foucault, David Bloor, and Bruno Latour.

From the constructivist point of view, Smith explains, "truth" is not what a realist thinks it is (or at least hopes it could almost be)—a correspondence between a statement, belief, or mental representation and features of an external, autonomous world. Rather, a statement is taken as true when it can be coordinated with other more or less stable and effective beliefs, assumptions, statements, experiences, and practices. As such, it is historically contingent, a product of an ever-evolving constellation of mutually shaping social-cultural perceptions, concepts, and practices that are sustained or enfeebled through ongoing interactions with the environment. Truths emerge, are stabilized, and are transformed, and constructivists aim to understand how this happens, to explain the processes and dynamics of cognition. Constructivists are not anarchic relativists; they will adjudicate between, say, the adequacy of the theory of evolution and that of "intelligent design," using as criteria each theory's congruence with and connectability to other stable, effective beliefs and its appropriability and extendability (guess which would win!). Nor do they deny that a natural world exists apart from our socially constituted perceptions and descriptions; they are just agnostics about that world, refusing to credit our understandings of it with absolute, objective, universal validity.

In the course of her book Smith gives a wide-ranging history and account of constructivism and relativism, a fuller account than I can even begin to summarize here, one that eruditely situates these intellectual movements in relation to a host of philosophers and theorists, from René Descartes and Immanuel Kant, to Friedrich Nietzsche, Martin Heidegger, and Ludwig Wittgenstein, to Jacques Derrida, Foucault, Jean-François Lyotard, Paul Feyerabend, and beyond. But as I suggested earlier, she saves her most enthusiastic affirmation for Ludwik Fleck, a lesser-known Polish microbiologist and medical historian who wrote *Genesis and Development of a Scientific Fact* (1935). Fleck influenced Kuhn's now ubiquitous theory of scientific paradigms of knowledge and their revolutionary shifts, but Smith much prefers Fleck's understanding of knowledge, which she finds less monolithic, and which more or less epitomizes her general account of con-

structivism. For Fleck, facts emerge within continuously fluctuating networks of beliefs and practices, which have multiple sites of activity and change, all in constant play, contending and converging, constantly reclustering and creating new lines of development. Truth or facts are elements in these systems that are momentarily coordinated, congruent, and stabilized with other elements through mutual adjustment and adaptation; truths gain their value by becoming established in a provisional harmony within the network. Fleck characterizes a relatively coherent network of beliefs and practices as a "thought style," the property of a "thought collective," which is a kind of epistemic or interpretive community. Such a network provides the very conditions for knowledge, both enabling and constraining the development of facts and truths. Also important is that such developments in knowledge take place across multiple domains and at variable tempos. And each of us belongs to multiple thought collectives, whose epistemological networks we are constantly trying to manage in order to sustain a general coherence in outlook. Movement between different thought collectives can create dissonances or unexpected consonances that can precipitate new ideas. And to a great extent it is this understanding of Fleck and the production/construction of knowledge that serves as Smith's platform not only for thinking about science, but also for thinking about the divide between the sciences and the humanities.

On the "two cultures" divide, Smith ends up declaring that separation, tension, and traffic between the sciences and the humanities are all good things. That is, she characterizes the sciences, social sciences, and humanities as constituting different thought collectives—as well as different cultures, fields, and disciplines. They are "relatively stable clusters of continuously emerging, developing, combining and differentiating intellectual traditions and practices," she writes. "Integrations and *dis*integrations" among these clusters "appear to be fundamental processes and phases of intellectual history" (Smith 2006, 123-24). Communication and exchange between fields with deeply different perspectives, different epistemic stances toward the world, and different forms and procedures for knowledge-seeking can bring innovation and change. Hence we should promote interaction among disciplines, "the mutual appropriation of skills and techniques, the inter-translation of concepts and findings, the extension of models and theories into new domains of application," and so on (124). This is why there is a benefit when humanities scholars import some scientific program, like cognitive science, into their field. And this is also why notions such as E. O. Wilson's "consilience," which promotes and predicts a unification of knowledge under the auspices of science, are "dubious" developments. Smith sees value in interaction, not in totalizing integration (123).

But Smith arrives at this ideal of intellectual traffic only after a rather dismal account of the current state of the two-cultures divide. Presently, she laments, we have crippling effects of the divide sedimented into our disciplines, institutional organization, curricular structures, and teaching traditions. Crossings between the two cultures are thus made tremendously difficult. More visibly troublesome, perhaps, cultural and ideological differences feed into the divide, fomenting crude, polarizing binaries and "us/them" oppositions—hard/soft, logical/emotional, serious/playful, masculine/feminine, objective/subjective, rigorous/mushy, and so on. Antagonisms not necessarily directly relevant to or mappable onto the two-cultures divide further feed the antipathy—between, say, generations, or between scholars devoted to traditional scholarly methods and scholars trained in constructivist or poststructuralist methods. Though Smith is basically even-handed in her criticism of the parties to these antagonisms—suggesting that the "science wars" have been the effect of ignorance, arrogance, and opportunism on both sides—the participants she names, and the ones subjected to the most pointed criticism, come from the side of science. Alan Sokal, Paul R. Gross, Norman Levitt, E. O. Wilson, Steven Pinker are identified as those who ignorantly demonize "postmodern relativists," misrepresent the positions of "the academic left" and "postmodern French intellectuals," and paranoically imagine an attack on science coming from the humanities' side of the fence. In Smith's view, their charges gain traction because of widespread prejudices against the humanities in the larger culture, which is partial toward more traditional views, which thinks that scientists are rigorously trained in esoteric disciplines while anyone can do what humanities scholars do, and whose universities have a production ethos that rewards the sciences and demeans the humanities. Unhappily, Smith's book leaves one with a greater sense of the lingering two-cultures divide, even as it provides a lesser hope for the constant metamorphoses of knowledge that exchanges between science and the humanities can occasion.

The kind of exchange between the sciences and the humanities that Smith applauds occurs in the books by George Levine and Elizabeth Grosz. Though these two writers provide us with very different work, they both put Darwin and Darwinism at the center of their writing, Levine's being a literary scholar's rethinking and rereading of Darwin, Grosz's being an attempt to transform feminist theory by bringing Darwin and biology into it. Both authors provide a sense of evolution that works as an alternative to that of, say, Daniel Dennett or Richard Dawkins, with its vision of evolution as algorithmic, mechanical, rule-bound, and mindless. Levine pushes directly against a related cluster of elements—a mechanistic biology, a supposedly disenchanted world that results from it, and the burgeoning of religious funda-

mentalism that arises as an alternative to a meaningless Darwinian world—and he retrieves from Darwin a "secular enchantment," a wonder and awe felt in the presence of the complexities of nature. For Grosz what is at stake is a new feminist politics that takes Darwin's view of time and the future, follows its elaboration through the work of Nietzsche, Henri Bergson, and (especially) Gilles Deleuze, and issues in an "evolutionary" politics that resonates with Darwin's view of the living world. Both Levine and Grosz acknowledge that Darwinism, the theory of evolution, and biological discourses more generally have been used for oppressive purposes—including scientific racism, sexism, and eugenics. They both note that Darwin himself was a creature of his place and time, specifically a Victorian gentleman, whose patriarchal, sexist, and racist views colored his theorizing. But both nonetheless insist that there is much to be gained from Darwin—for purposes other than a narrowly scientific understanding of evolution.

Levine's first argument in *Darwin Loves You: Natural Selection and the Re-Enchantment of the World* is launched against Max Weber's pervasive assessment that science and Western secular rationality have necessarily disenchanted the modern world, promising explanations of all natural mysteries and thus expelling meaning and value; we are left, Weber wrote, with a "spiritual vacuity" (Levine 2006, xii). Levine declares that Darwin proves Weber to be wrong. True, Darwin's theory leaves us without a transcendent spirit to believe in or a teleological goal to provide us purpose; but Darwin's aim was to reveal the world's wonders, and he faced the natural world with excitement, surprise, awe, reverence, and, indeed, enchantment and *love* as he unveiled nature's marvelous transformations and staggering, miraculous complexity. According to Levine, for Darwin intellect and feeling, scientific explanation and sheer amazement, went hand in hand. This is partly due to Darwin's Romanticism: he saw nature as a vital, creative power whose sublimity could be revealed by scientific rationality and detachment. In an equally Romantic way, Darwin anthropomorphized nature, seeing human traits—desire, intention, choice, emotion, consciousness, intelligence, a sense of beauty—across the biological world, from worms to chimpanzees. This very anthropomorphism was part of the wonder he experienced in the presence of nature, a wonder at the miracle of life, the miracle of intelligence, the miraculous way these things arose without the guidance of a transcendent being. Anthropomorphism, mind you, not anthropocentrism, and this distinction is crucial to the modern and secular enchantment Levine wants to take away from Darwin. "It is not some god that gives the world its meaning but the intelligence that humans share, in varying ways, with all living creatures" (170), Levine declares, following Darwin. This intelligence, anthropomorphically projected, is awesome and sacred, inviting a romantic, sympa-

thetic feeling for nature and its organisms as well as a reverence and respect for the sheer otherness of nature. In this way Darwin secularizes wonder, thereby energizing an ethics, a "laudable generosity of spirit" that trumps "a cold-eyed instrumentalism" (36). In contrast to this, Levine declares, "Deference to a power we cannot understand in the faith that it all makes anthropocentric sense seems a very weak option indeed" (267). Levine affirms Darwin's statement at the end of *The Origin of Species* that "there is grandeur in this view of things" (223).

Levine's second basic argument is related to this culturally conditioned enchantment Darwin experienced. Levine pursues the question as to how we should engage with a scientific theory that is so profoundly shaped (as any scientific theory would be) by the biases and beliefs from which it emerged. In answering this question, Levine writes against those who would discount Darwin because his theory is so intertwined with laissez-faire capitalism, social Darwinism, and the bourgeois gentleman's sense of the superiority of his class, gender, and race. To this, Levine replies, first, that Darwin's theory was, and is, tremendously supple and polyvalent, as rich in meaning as any great scientific theory (or myth) must be, and as such it has always been used, usually with some justice, to support a wide range of ideologies and politics. That it is larded with retrograde Victorian conceptions should not prevent us from retrieving from it both scientific insight and social inspiration. Second, Levine asserts, in a way attentive to Smith's kind of constructivism, that not only is any scientific theory a product of its cultural conditions, but also those conditions *enable* scientific discovery. Darwin's anthropomorphism, for example, "limited and distorted his ideas," but it also "became a means to rich and original speculation about complex biological issues" (2006, 171). Darwin's prejudices about gender informed his theory of sexual selection, but "the theory itself forces a break with just those prejudices that produced it" (190)—for example, in the effect he attributes to female choice. Absorption in the assumptions and values of his culture directed his attention and shaped his theories, but then they enabled not only a theory that outstripped and in many ways disrupted those assumptions, but also theories that, in their afterlife, have no necessary connection to the ideologies they grew from—and which we can tap to develop our own secular, nontheistic ethics. Darwin loves us, Levine declares, we can love him back, and we can spread that love around. I don't really mean to be flippant here, or to suggest that Levine is Pollyanna-ish in his case for a Darwinian re-enchantment of the world. His argument is sophisticated, offers a kind of intricate intertwining between science and the humanities rather than some sort of rapprochement that presupposes the two-cultures

divide, and is persuasive in the hope he presents—or, at least, should be persuasive enough to fellow atheists.

Elizabeth Grosz's two books go together, making an overarching argument that feminism must reconceive *time* in order to formulate a new politics open to unpredictable change. But the relevance of her work in this group of texts is that Darwin and evolution are persistently in focus, partly because they provide a conception of biology that Grosz thinks must be incorporated into feminist theory, and partly because they supply a conception of time, evolution, and especially *becoming* that can transform feminist politics. Her promotion of a reconceived biology is pertinent not only for feminist theory but also for cultural theory and literary theory more generally. In a nutshell her argument is that feminism and cultural theory have quite wrongly and contemptuously characterized biology simply as inert, passive, fixed, limited, given, essential—the tool of those who would naturalize conditions of oppression, the means to foil radical change by invoking a mechanical biological determinism, a way to reduce the social and cultural to the natural. Though she grants that biology so conceived has indeed been used as a rationale for oppression and subordination, she argues by contrast that Darwin's biology is one of unpredictable and dynamic change and mutability, a nonreductive picture of nature in all its complexity, a nonteleological and open-ended generator of variation and difference rather than a dimension of sameness. By rereading Darwin—and elaborating Darwinist conceptions through Nietzsche, Bergson, and, in the background, Deleuze and Luce Irigaray—Grosz forges a framework for undoing our oppositions between mind and body and between culture and biology, and for freeing our theorizing from the confines and limits of culture and language so that it can acknowledge the forces for change that emerge from life and matter.

Primarily a theoretical and philosophical intervention, Grosz's argument has a fundamental philosophical point: that our theorizing, for a long time disproportionately attentive to questions of epistemology, has dropped *ontology* out of its mix. Jacques Lacan's *Real* is unknowable, Derrida's system of *différance* allows for nothing outside the text, poststructuralism more generally looks only at the inside of representation, and constructionist theorizing reduces nature to an inert substrate whose interest is overborne by the cultural work we perform in its name. Grosz turns for relief to Deleuze, Irigaray, and Bergson, who credit the force and effects of what is "outside" culture and representation, beyond the knowing subject. Grosz hopes partly to revitalize ontology—and nature, biology, bodies, matter, forces—by refusing the culture/nature and mind/body oppositions that continue to shape our thinking. Instead she wants to rethink this "real" as continuous with culture, or as the substrate and enabler of culture, the terrain from which culture emerges and

on which it elaborates and develops itself. More specifically, biology, reconceived as a difference-generating, open-ended system, induces the variations of culture through its self-permutations; far from limiting, its complications impel social and cultural transformations. Darwin's theory of evolution is also continuous from organisms to culture; biological evolution and cultural evolution are part of the same system, informed by the same logic of productivity, proliferation, "becoming," and "self-overcoming." Sexual difference, too, is an ontological characteristic of life itself, an irreducible, ineliminable mechanism for maximizing biological variation and also an inherent, constitutive factor in every culture. The questions thus become, first, how culture can acknowledge its embeddedness in a natural world it cannot control but to which, to a great extent, it is a response, and, second, how culture can respond otherwise.

Another nagging question, however, brings us back from ontology to questions of knowledge and epistemology: what can we know of this "real"? Here Grosz relies especially on Bergson. He credits and respects science's ability to manipulate, regulate, anticipate, and predict matter, to diagram and simplify the world "out there," to reduce it to parts and quantifiable elements for practical purposes. But he also argues that this kind of intelligence, which has evolved for purposes of action and survival, may be useful for manipulating life, but it selects and diminishes what it apprehends for its practical purposes, and it is not able to understand the movement of life, its dynamism, endless transformation and becoming, and indeterminacy; when scientific techniques are applied to these dimensions of life, something is lost, its complexity and openness are impoverished. Evolving life resists the methods of scientific reductionism, and we need instead knowledges that can apprehend indeterminate unfolding, flux, the mobility and dynamism of evolution, and what Bergson calls *duration*. Grosz takes Bergson's concept of intuition as a possible answer to this problem. Situated between the abstraction and generalization of the intellect and the "sympathetic apprehension and openness to life" of instinct, intuition is linked to an understanding of the absolute, though it is a sympathetic understanding not mediated by representation or symbols, and its absolute is not an eternal essence but a complex interplay of forces. Grosz is following Irigaray's embrace of Bergson's intuition here, in an effort to move toward a feminist epistemology that can stand beside scientific epistemology and is closer to a kind of epistemology of the arts. One might raise an eyebrow at this, but it is certainly a provocative reclaiming of Bergson's philosophy as a way of sustaining the effort to bring ontology back into the picture and of describing a different mode of knowing, one that grasps things that science leaves out.

Finally, Grosz credits Darwin with providing us with a useful theory of time, a theory she believes holds promise for a reimagined politics. The conception of time implicit in Darwinian evolution, she writes, is "an always open-ended movement directed to a future whose parameters cannot be known in advance but whose conditions always and only exist through the continuity between the past and the present" (2004, 96). Open-ended, unforeseeable, unpredictable, nonteleological, dynamic, emergent—this is the understanding of time and the stance toward the future that Grosz would recommend. It is a version of time plausibly extracted from Darwin's theory, according to which evolution operates by unpredictable biological variation and the equally unpredictable environmental change that drives natural selection. But it might not suit strategists of social movements who would want to imagine certain kinds of changes to work toward, or might want utopian imaginings that can serve as ends by which to organize action in the present. And anyone might point out that there is nothing inherently positive in change, dynamism, and open-endedness, an observation that Grosz grants. For Grosz, though, imagining a future in the terms of the present is constraining, a way of forestalling change, or a way of handicapping one's preparedness for the unpredictable by wearing the blinkers of the present and relying on prevailing models and knowledges; the present and what we know in it must be displaced so that we may be transformed into something new, because political struggle is directed to a future we cannot recognize or control.

At the same time, she acknowledges that the present and the future do not happen willy-nilly; they are conditioned by the past. But in the model of evolution, and with the help of Bergson's Darwin-influenced elaboration of it, she finds a means to elude a limiting determination of the future by either the present or the past. In Darwin's theory, the nature of species in the past prefigures and provides the raw material for the present and the future, but does not contain or limit them to a particular end since it is capable of a wide range of variation. And in the same way that natural selection can turn biological variation that had not previously been a benefit to the organism into a means of survival into the future, our past has unactualized, immanent "virtualities" that can be resurrected for future change. "The past produces resources for multiple futures," Grosz writes, "for open pathways, for indeterminable consequences, as well as for those regularities and norms that currently prevail" (2004, 253). And it is the possibility of actualizing a virtuality from the past that has not been actualized in the present—opening up a "nick" or crack in time, an "untimely" capacity that breaks the limits of the present—that she especially values, as a means to bring about change. Though the future is prefigured in the present, it is not contained by the present, and in the realm of the unactualized virtual she sees the promise for

a radical politics that can transform the present into a new future. Politics, she writes, *is* "this untimely activation of the virtuality of the past as challenge to the actuality of the present" (186).

Grosz, then, attempts to dispel the resistance in feminist cultural theory to biology and to the body as *matter*, and she attempts to dismantle the natural/cultural opposition that she believes has stalled and circumscribed feminist theory. Through Darwin, she introduces into this theory a conception of biology and life as a creator of difference, as something that diverges from and overcomes itself, as a dynamic and open system. This is her alternative to constructivism, "in which the transformation of representation is the only serious political issue, and where the body is of interest only in its reflection through discourse, its constitution in representation, or its mediation by images" (2004, 3). What finally is at stake for her is a question of politics, and her hope is to extract a philosophical model from the theory of evolution that will point toward a politics that embraces an evolution-like production of differences, a stance toward the future of experimentation and readiness for surprise, a movement toward a future that surpasses our current hopes and aspirations. All of this is indeed exhilarating, even if it finally invites some pessimism of the intellect.

Elizabeth A. Wilson's *Psychosomatic: Feminism and the Neurological Body* works in the same vein as Grosz's books. Although it is more specialized—focusing on the relations between feminism and neurology—she describes it as a "test case" for rethinking the relation of feminism to biology more generally. And her criticism of the blinkers feminist theory has assumed in reference to biology strikes me as even sharper than Grosz's. Despite all the attention that feminist theory and the humanities have devoted to the body in the past couple of decades, she charges, questions of the material, biological body have been excluded; indeed, the cultural, social, linguistic, literary, and historical analyses that dominate feminist theory have constituted themselves in opposition to the biological, denouncing it and banishing it to a realm outside feminist analysis (2004, 7-8). Bodies exist in this work only as cultural constructions, in staunch defiance of biological models. The "fierce antibiologism that marked the emergence of second-wave feminism" (13) has served to *censure* the neurosciences, barring them from consideration at worst, treating them only as effects of historical, social, and economic determinations at best. Wilson wants to change this. Following the kind of program Smith might recommend, she wants to look for "the potential in the neurosciences for [a] reinvention and transformation" of feminist theory and for a "reorganizing effect on feminist theories of the body" (13-14); she wants to undo the familiar claims that neurology is inherently politically suspect, a discursive ruse for sustaining relations of oppression, a territory suit-

able only for the ideological critique of social and cultural analysis. Like Grosz, she argues against the social constructionist conception of biology as inert; instead it is vibrant, mobile, complex, eccentric, deviant, "wandering," a materiality that can be a resource for feminism. Unlike the other writers under review here, however, Wilson goes farther, to affirm the uses of biological *reductionism*, especially that of psychobiology, as a means to counteract what she sees as a culturalist reductionism, and as a way thereby to transform feminist understandings of the body.

Wilson begins in somewhat familiar territory, returning, as so much feminist theory has done, to Freud, but this time to Freud as biologist of the mind—the Freud interested in the spinal ganglia of the lamprey and the neurological/psychological economies of conversion hysteria and male neurasthenia. And she uses this early Freud to provide a model that accounts for the relations between body and mind that foils biological determinism—and does so, she argues, in a more compelling way than social-cultural analyses that leave the neurological as an inert substrate not worth our attention. Freud's picture of male "neurasthenic melancholia," for example, with its circuits of excitation and libidinal discharge, depicts its elements—nerve, penis, cortex, psyche—as "a relational or distributed network" in which the elements mutually influence and constitute each other, with no part univocally determining the other; neurological matter is as malleable as the anxious psyche, and the two exist only in mutually transforming relation (2004, 20). Wilson thus gives us a model that dismantles the conception of biology as always determining and characterizes it instead as a distributed system in flux. But in addition to this complex, distributed, relational mind-body system she also retrieves from Freud a psychic economy that includes the unconscious biological functioning of the autonomic and enteric nervous systems—which appears to be a significant strategy for Wilson. She describes a psychobiology that, far from simple or inert, is a complex, mutable system of *difference* (Derrida is a persistent, though often underlying, presence here).

However, Wilson also reaches provocatively for reductive scientific models that would connect such complexity to seemingly simpler biological structures and functions. For example, in a way that resonates with Grosz's treatment of sexual difference as both a basic biological *ontological* dimorphism and as something that evolutionarily generates staggering difference, Wilson examines Simon LeVay's controversial study of the nucleus of the hypothalamus, which claimed that the nucleus differs in size between heterosexual and homosexual men—or, more exactly, that the nucleus is larger in heterosexual men and smaller in homosexual men and in women. In "the humanities-bound literature," Wilson notes, LeVay was often criticized for his simplistic model of sexuality, a dimorphic model based on a hetero/homo

opposition and a heteronormative masculine/feminine opposition; sexuality is more various, indeterminate, disseminated, distributed, it was said (2004, 50). But Wilson notes that LeVay's data did indeed cluster in ways that affirmed a dimorphism at the same time that it showed an array of exceptions. And she argues (here especially resonating with Grosz) that the dimorphic divisions are *reticulated* with divergent patterns, partially arresting them and partially generating them. Moreover, in a direct challenge to the "humanities-bound commentaries," she declares her intention "to take seriously the impact—generative and degenerative—of dimorphic ontologies" (58). That is, she chooses to credit an innate, biological dimorphism, but to reconceive it as bound to and generative of divergence, much as the two hemispheres of the brain embody symmetrical and localized organizations but house one trillion divergent synaptic connections. We cannot take sexuality as simply cultural, she argues, nor can we root it simplistically in a biological dimorphism. Rather, we can think of "the neurology/sexuality interface" as "a node in a chiasmatic-reticulating physiological organization" whose combination of simpler structures and complex divergences we can only begin to imagine (62).

For Wilson, if neuroscience has in the past provided us with conceptions that naturalized hierarchies and thus worked in accord with the maintenance of social inequalities, we now can see an alternative, feminist-friendly neuroscience, one that can in fact nudge feminism out of some of its own confining conventions. Put Wilson's book together with Grosz's two books and we have a strong challenge to antibiologism in feminism and a very provocative incorporation of biology into our theorizing, one that unsettles social constructionism itself and promises directions for rethinking the usual assumptions in cultural and literary theory.

"Networks" of one sort or another surface in the writing of Smith, Grosz, and Wilson—paradigms, epistemes, thought styles, evolutionary biology itself, neural networks, distributed networks, and so on. Ira Livingston, in *Between Science and Literature: An Introduction to Autopoetics*, takes such networks as his topic and his way of establishing relations between science and literature—as themselves systems, or systems of systems. He takes networks also as his model for organizing his book, which is an idiosyncratic mix of autobiographical rumination, theoretical explanation, poetry, and fiction, guided by the idea that each part of it is a semiautonomous network interfacing and interconnected with the other parts. And the book works to flesh out the idea of complex networks—an idea partly borrowed from the sciences but which, as Livingston argues, resonates first with structuralism, then more adequately with poststructuralism, with its less static, more chaotic, more permeable, and constantly changing systems. Livingston lifts the term

autopoiesis from the neurophysiologist Humberto Maturana, who used it in his book *Autopoiesis and Cognition* to describe the nervous system as a network of interacting neurons, and more generally to describe the dynamics of living systems. But Livingston extends it to the physical world by borrowing from chaos and complexity theory, which sees self-organizing systems operating at all levels, from protein molecules to galactic structures; a fundamental, mathematical law generates the spontaneous emergence of self-sustaining webs. Like a wave or a whirlpool, such a system is a pattern or set of operations that is self-sustaining and not primarily dependent on the materials which comprise it; it is provisional, internally heterogeneous, and open to influxes and effluxes where it interfaces with other systems—thus subject to change due to contradictions and incommensurabilities within itself, or between itself and other systems. As such, the system and its parts are emergent effects of the system itself, and are not willed into being by any transcendent agent: the "auto" (self) which does the making ("poiesis") is a product of that making, rather than a preceding cause, just as this making is "self" organizing in an ongoing process. Such a conception does away with the notion of a transcendent, autonomous, rationally organizing consciousness, and with notions of hierarchy, since the system is distributed, and each system is a node in a wider, rhizomatic, sprawling, tangled web. Gone too are ideas of boundaries and enclosures, because points of contact are always more like interfaces, permeable sites of traffic, sites that *create* traffic *because* differences meet there.

Surely there will be both scientists and humanities scholars who will object to these conflations—between the systems of physics and those of biology, between the systems scientists study and those in the territory of the humanities. Livingston would probably answer that, yes, of course, these systems are different; that is part of the point. He acknowledges the possibility, or "fantasy," that complexity theory would turn all theories into versions of itself, or at least integrate all systems into a larger theory of systems, ultimately putting scientists in charge of the humanities. He seems to prefer, however, the prospect that physics and poetics would become "sister fields," differing systems in a dynamic of exchange (2006, 151-52). At any rate, he sees something to be gained by thinking of systems of particles and forces together with those of biological life, and by thinking of these systems together with social networks, economies, systems of identities and sexualities, webs of culture, the structure and processes of language, and so on. For literature scholars, for example, when a sonnet is conceived in such terms, it can be recognized as a kind of New Critical, self-enclosed and self-referential system, but it must also be thought of as branching off into other texts and systems of meaning, as well as into systems of its production, from the

mechanical to the cultural (85). One may wonder, given this account, whether Livingston's conception of autopoetic systems offers much beyond familiar poststructuralism for an understanding of literature. But to make equations, or at least resonances, between scientific and literary systems serves certainly as a provocation.

Along with the idea that social systems, economic systems, and ideological systems (and more) are both semiautonomous and mutually shaping comes a program for fomenting change. If we exist in a paradigm of complex, self-organizing systems, Livingston writes, the points of difference, pluralism, and contradiction within and between these constantly metamorphizing systems provide leverage for "creative and counterhegemonic possibilities" (2006, 110). Our institutions, disciplines, practices, apparatuses, languages, metaphors, and so on, are yoked together but do not march in lockstep; systems large and small are both stable and unstable, and therefore subject to reshaping. Although he wants to forge a kind of resemblance between literature and science as knowledge systems, he also wants to assert that they are different, giving different kinds of knowledge (with literature, say, providing the kind of self-referentiality banished from science). Exploiting the difference at their interface can precipitate change in both systems, a project Livingston arguably undertakes here.

Scholars and critics from the left have often simply perpetuated—or have been hobbled by—the now-habitual response that any importation of biology, or evolutionary psychology, or cognitive science, is a dangerous return to essentialisms that end in racism, sexism, classism. Grosz and Wilson make clear enough that this has been the case in feminist theory. And this makes their contributions all the more bold and important. As Grosz writes,

> Our continuing studies of subjectivity and the body in the humanities and social sciences inevitably, if we go deeply enough, bring us back to the more complex and unsolved questions of the natural sciences, questions we had perhaps hoped to foreclose, sidestep, or ignore, but that now press upon our most intimate and subjective experiences with more and more urgency. (Grosz 2004, 3)

And yes, there *is* urgency to address the questions that the sciences now put to us, in a way that takes the developments in science seriously but also supplies the kind of knowledge special to the humanities. Each of the writers reviewed here would agree about promoting contacts, exchanges, interzones, and interfaces, between the sciences on the one side and the humanities, feminism, cultural theory, literature, and literary theory on the other. Some kind of commerce between the sciences and the humanities is arguably on the agenda whether we like it or not. Right now, the possibilities for this kind of exchange are obviously in flux, as evidenced by the differences

among these writers. Their differences and their provocations may help us navigate this most difficult of interdisciplinary endeavors and make that disciplinary commerce more like a reciprocal exchange or the beneficial transfer of imports and exports than like conquest. We would do well to read, and heed, them. Let's hope that their writing marks a "thought-system shift" for the humanities, or maybe, to use Grosz's favored vocabulary, an actualization of virtualities that can transport us into, and help us grapple with, our unpredictable future.