SCIENTIZING THE HUMANITIES

Shifts, Collisions, Negotiations

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The title of this essay can be interpreted both narrowly and broadly—and, of course, as either appreciative or critical. It refers most broadly, and more or less appreciatively, to efforts on the part of scholars in humanities disciplines to introduce concepts, methods, or findings from the natural sciences into their home fields, usually in order to illuminate the customary objects of study in those fields: texts and artworks; writers and artists; ideas, human practices, historical events; and so forth. Such efforts are not new but, over the past decade or two, have become considerably more extensive, more programmatic, and more self-consciously science-allied than ever before. "Scientizing the humanities" also refers, more narrowly and rather more skeptically, to efforts that seek, as it is said, to "integrate" one or another humanities field with one or another science. Such efforts are reflected in calls for ongoing collaborations between scholars and scientists in particular fields (for example, between art historians and neuroscientists) and in the growing prominence of hybrid fields or approaches such as neuroaesthetics, literary Darwinism, or cognitive cultural studies. Thus, where literary scholars in the past might have explored Darwin's influence on the late Victorian novel or Gertrude Stein's interest in experimental psychology, they tell now of mammalian mating practices in *Pride and Prejudice*, the triggering of altruistic-punishment mechanisms in *Oliver Twist*, or the teasing of theory-

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of-mind modules in *Mrs. Dalloway*. At their most visionary, proponents of these approaches call for the total and terminal absorption of the humanities into the natural sciences, sometimes with rather millenarian-sounding promises and predictions.

The digital humanities are clearly a related development. Here efforts are not so much to make the humanities more scientific (though that is often an element) as to attune their practices more closely to the increasing power and presence of information technologies. Again, though such efforts are not new, they are considerably more extensive and programmatic than ever before. Where, in the past, a professor of English might have demonstrated the advantages of computer use to a principled Luddite down the corridor, now groups of scholars in literary "laboratories" across North America build software platforms and access, count, chart, and correlate huge databases of digitized materials to various ends, some more consequential than others. One cannot be simply "for" or "against" these developments. What I shall do here is indicate some considerations—historical, conceptual, and pragmatic—that I think are useful for understanding and assessing them.

I

The term that I have been using, *developments*, may appear too tame to many involved in the new approaches. Apocalyptic announcements abound and draw on a general sense, especially among premillennial academics, that a giant hinge has turned in the past decade or so, that our worlds—our students, the university, the culture, our own everyday practices—have, for better or worse, changed radically. The term *revolution* is not the one commonly used, but talk of seismic or tectonic shifts is pervasive. Among the reasons given for the announced upheavals, two are especially prominent. One is the ubiquity of information technologies and their rapidly growing centrality in our lives. The other is the deluge of what is claimed as radically illuminating news about ourselves issuing from the biological and behavioral sciences: news, especially, about our genes, our brains, and our evolutionary histories. I turn below to how this sense of a fundamental shift plays out in the scientizing projects I have been describing, but first I want to say something about the views of intellectual history implied in the discourses that promote them.

There are a number of models of the dynamics of intellectual history, models, that is, of how ideas and related practices, including scientific ones, change. Three of them are especially relevant here. One, a familiar model, theological in origin but associated with popular ideas of science, is of a general progressive movement from darkness to light: onward and upward, from ignorance and error to knowledge and truth. This is the model favored by scientizers inspired

by the idea of "consilience" developed by the sociobiologist E. O. Wilson. In his 1998 book *Consilience: The Unity of Knowledge*, Wilson represents Western intellectual history as a set of increasingly enlightened efforts, moving steadily toward harmony and unity since the seventeenth century, with disruptions from two major counterenlightenment forces: Romanticism and postmodernism, as he names them. Attached to this model of history is the idea of an intrinsically hierarchical organization of knowledge—a chain or ladder of explanatory authority, with physics seen as foundational to all other scientific pursuits and biology seen as foundational to both the humanities and the social sciences. In accordance with this view, the classic Western project of enlightenment will be consummated when the humanities and the social sciences (seen as now carelessly scattered and willfully isolated) join that progression toward harmony and unity so that the destined integration of all knowledge, from bottom to top, can be completed. Thus Wilson writes in *Consilience*: "When we have unified enough certain knowledge, we will understand who we are and why we are here."[1] As Wilson himself acknowledges, this vision amounts to a naturalized millenarianism.[2] The views of science on which it is based have been seriously challenged—many would say rendered obsolete—by a century of empirical work in the history of science.

A second, more historically informed view of the dynamics of scientific change is associated with the work of Thomas Kuhn, especially his book *The Structure of Scientific Revolutions*, first published in 1962. Talk of "paradigm shifts" and "epistemic breaks" by promoters of the new scientizing approaches draws implicitly on this second model, although, being promotional, they tend to retain major elements of the onward-and-upward story that Kuhn sought to displace.[3] A third important model of the dynamics of intellectual history originates in the work of the Polish biologist and medical historian Ludwik Fleck. His classic study *Genesis and Development of a Scientific Fact*, originally published in the 1930s, strongly influenced Kuhn's account.[4] Like Kuhn's, Fleck's account challenges the familiar progressivist story but is more sociologically acute, more responsive

1. E. O. Wilson, *Consilience: The Unity of Knowledge* (New York: Knopf, 1998), 7.

2. Wilson describes himself in the preface to *Consilience* as a former fervent Baptist turned fervent believer in science.

3. In *Graphs, Maps, and Trees: Abstract Models for Literary History* (London: Verso, 2007), the digital scholar Franco Moretti invokes Kuhn's *Structure of Scientific Revolutions* to explain how genres of the novel (he calls them "subspecies," following his own previous evolutionary model) appear in discrete "cycles." His major reference for scientific procedures, however, is Karl Popper, whose *Conjectures and Refutations: The Growth of Scientific Knowledge* (1968) informs the title and supplies many of the details ("hunches" and "hypotheses," "tests" and "experiments," "corroborations" and "falsifications") of Moretti's influential article "Conjectures on World Literature," *New Left Review* 1 (January–February 2000): 54–68, reprinted in Moretti, *Distant Reading* (London: Verso, 2013), esp. 53nn18, 19.

4. Ludwik Fleck, *Genesis and Development of a Scientific Fact*, ed. Thaddeus J. Trenn and Robert K. Merton, trans. Fred Bradley and Trenn (Chicago: University of Chicago Press, 1979).

to cultural history, and also more radical with regard to ideas of knowledge and truth—in a word, it is constructivist rather than realist. People in the humanities are likely to be familiar with this model of intellectual history as it was developed in the tradition of science studies descending from Fleck in the 1930s, to the Edinburgh-based "strong program" in the sociology of science in the 1980s, to Bruno Latour's work (which joined with a parallel French tradition, including the work of Michel Foucault) in our own time.

In Fleck's account, intellectual history—which includes the history of science—is a dynamic field made up of the activities of multiple, distinct "thought collectives." These are groups of intellectually interacting people (such as the members of religious sects or of academic disciplines) and the ideas, discourses, and practices that they share. Scientific disciplines and academic fields of study are, in this account, neither hierarchically organized nor fixed in form. Rather, they are continuously forming and transforming, sometimes merging and sometimes attenuating. Although the activities of fields and disciplines do not, in this account, progress toward any general destiny (either unity or truth), they do issue in significant local achievements, including more or less radical conceptual innovations with relatively stable, broadly appropriated practical applications. There is much to be said for Fleck's views, and I have said more about them elsewhere.[5] They are of interest in the present context because they offer a well-developed alternative to the empirically dubious model of intellectual history that underwrites Wilson's program of pandisciplinary consilience and related calls for integrating the humanities with the sciences.

II

A fundamental consideration in assessing the new scientizing approaches is their relation to the aims and perspectives of the humanities, as distinct from those of the natural sciences and, in the case of the digital humanities, as distinct from those of computer engineering. A recent article by Katherine Hayles is useful in highlighting the issues. Hayles is a longtime advocate of connections between the sciences and humanities, an influential analyst of all things digital, and a major proponent of posthumanism (or, at least, of one of the sets of theoretical perspectives called by that name). The title of the article with which I am concerned is "Cognition Everywhere: The Rise of the Cognitive Nonconscious and the Costs of Consciousness."[6] Readers familiar with the digital humanities scene will recognize an allusion to the idea of ubiquitous computation or, in a phrase

5. Barbara Herrnstein Smith, "Netting Truth: Ludwik Fleck's Constructivist Genealogy," in *Scandalous Knowledge: Science, Truth, and the Human* (Edinburgh: University of Edinburgh Press, 2005/6), 46–84.

6. N. Katherine Hayles, "Cognition Everywhere: The Rise of the Cognitive Nonconscious and the Costs of Consciousness," *New Literary History* 45, no. 2 (2014): 199–220.

used by one of its advocates, "computation everywhere."[7] Part of Hayles's effort in her article is to suggest a comparable ubiquity to cognition, which, in her view, is properly understood to include the information-processing activities of mechanical as well as biological systems. Her major aim in the article, however, is to counter arguments by influential literary scholars to the effect that projects in the digital humanities fail to satisfy certain important disciplinary interests addressed by more traditional methods of study.

"Many print-based scholars," Hayles writes, "see algorithmic analyses as rivals to how literary analysis has traditionally been performed, arguing that digital-humanities algorithms are nothing more than glorified calculating machines."[8] Such objections, she believes, are based on scholars' ignorance of the current capacities of computers, along with an exaggerated sense of the importance of consciousness and of the distinctiveness or worthiness of human cognitive capacities more generally. Accordingly, she devotes much of the article to describing the humanlike things that computers can now do—for example, "learn languages," "draw inferences," "compose music"—and, conversely, to detailing the limits and frailties of human cognition and consciousness as revealed by neuroscience and as compared with the nonconscious operations of computers.[9] Thus she points out that computers used in financial markets can now process information automatically at speeds measured in millisecond differences, thereby providing enormous advantages to the traders using them, and that comparable advantages can now be obtained in the digital humanities, where computers, operating without the "presuppositions or biases" that come with human cognition and consciousness, "allow questions to be posed that simply could not have been asked or answered using human cognition alone."[10]

Hayles does not explain why literary scholars should be glad to be able to pose and answer questions—presumably about works of literature, individually or in sets of various kinds—that they would not have asked or could not have answered using their own (merely) human cognitive capacities. The reason commonly supplied by digital humanities advocates is that "knowledge"—or, with emphasis, "real," "objective," "factual" knowledge—is thereby increased.[11] But the

7. See Stephen Wolfram's blog "Injecting Computation Everywhere," blog.stephenwolfram.com/2014/03/injecting-computation-everywhere-a-sxsw-update/ (accessed September 4, 2014).

8. Hayles cites Stanley Fish, "Mind Your Ps and Bs: The Digital Humanities and Interpretation," *New York Times*, January 23, 2012, opinionator.blogs.nytimes.com/2012/01/23/mind-your-ps-and-bs-the-digital-humanities-and-interpretation/?_r=0. As far as I can see, however, the article by Fish does not contain the argument that she attributes to him (Hayles writes: "Stanley Fish to the contrary, there are no 'all-purpose' algorithms that will work in every case").

9. I quote Hayles's anthropomorphizing (and, I would suggest, question-begging) terms for the mechanical operations of computers.

10. Hayles, "Cognition Everywhere," 212.

11. Moretti writes, in "Conjectures on World Literature," 48–49: "The trouble with close reading . . . is that it necessarily depends on an extremely small canon. . . . At bottom, it's a theological exercise . . . whereas what we need is

explanation raises a number of other questions: What aims or interests are served by a sheer increase of factual information about some thing or set of things? Does a mere increase of objective, factual information constitute what we usually mean by *knowledge*? And does a mere increase of objective, factual information about various of its objects of study—without connection to any interests or purposes—make sense as a project for any humanities discipline as such?

A proper appreciation of major advances in information technology and neuroscience, Hayles writes, "requires a shift in conceptual frameworks so extensive that it might as well be called an epistemic break."[12] "Today," she cautions, "the humanities stand at a crossroad." One path "reinforces the idea that humans are special, that they are the source of almost all the cognition on the planet, and that human viewpoints therefore count the most in determining what the world means." On the other, better, path, scholars in the humanities would accept an enlarged "idea of cognition to include [the] nonconscious activities" of technical devices as well as of other biological systems.[13] "With the resulting shifts of perspective," she believes, "many of the misunderstandings about the kinds of interventions the digital humanities are now making in the humanities [would] simply fade away."[14]

In seeking to correct what she takes to be misunderstandings of the digital humanities on the part of humanities scholars, Hayles strives to be informative and conciliatory. But her major efforts, I think, miss the point of critics' concerns. Noting the growing significance of what she calls "the cognitive nonconscious," she writes: "One conclusion seems inescapable: the humanities cannot continue to take the quest for meaning as an unquestioned premise for their ways of doing business."[15] The phrasing is odd and suggests some misunderstandings on Hayles's part. I do not think that many humanities scholars see a (or "the") quest for (or provision of) meaning as a central goal (or "premise") of their activities. Nor do they see the inability of computers to come up with the meaning(s) of texts or of anything else as the crucial limit of digital humanities. It is not that computers cannot produce or "interpret" textual "meanings"; in some senses of those terms, they already can or soon will. The problem is that many of the algorithmic performances and productions currently invoked as examples of the achievements or promise of computers lack the type of interest that we find in the performances and productions of fellow humans as such. Calling the computational activities of technical devices "cognitive" and noting their similarity to actions per-

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a little pact with the devil: we know how to read texts, now let's learn how to *not* read them. Distant reading: where distance, let me repeat it, *is a condition of knowledge*. . . . We always pay a price for theoretical knowledge: reality is infinitely rich; concepts are abstract, are poor. But it's precisely this 'poverty' that makes it possible to handle them, and therefore to know."

12. Hayles, "Cognition Everywhere," 218.

13. Hayles, "Cognition Everywhere," 216–17.

14. Hayles, "Cognition Everywhere," 218.

15. Hayles, "Cognition Everywhere," 199.

formed nonconsciously by humans does not erase the sense of a crucial difference between the two or supply the type of interest—attraction, concern, connection, fascination, delight—found specifically in the latter.[16] Contrary to charges commonly leveled by enthusiasts of artificial intelligence, artificial life, and other computational wonders, the interest in question does not reveal a prejudice in favor of carbon- versus silicon-based "cognition," "intelligence," or "life." What makes the actions, performances, and productions of other humans—writers and composers, artists and critics, kings and revolutionaries—especially interesting to us is not our conviction that humans are *superior to* machines and nonhuman animals; it is our recognition that they are *the same sorts* of machines and animals that we ourselves are.

A good part of the interest of the actions and productions of other humans may have to do with our experiencing the world, fairly uniquely among machines and animals, as subjects—experiencing it, that is, with what we call consciousness or a sense of self. Hayles, having no doubt heard such observations from digital-resistant humanists, goes to some trouble to expose subjectivity, consciousness, and a sense of self as "illusions." But the effort is, again I think, misplaced. Recognizing that subjective experiences—one's own and other peoples'—are, as she terms them, "epiphenomena of underlying material processes" does not make them any less interesting as experiences.[17] Nor does it erase the difference that we generally register—perceptually, conceptually, and emotionally—between *experiencing beings* as such and *material processes* as such.

Hayles writes of the "anthropocentric bias" that attends the operations of consciousness in humans, a result, she explains, of our ("illusory") sense of possessing a particular "self" and our concern for its well-being. This bias, she suggests, leads humans to overestimate their importance in the world and their ability to control the complex ecological systems in which they are embedded, with various ecological catastrophes among the consequences. Aside from the curious suggestion of the possibility of a *proper* assessment of humans' importance in the world (who could arrive at such an assessment, and how?), this observation is no doubt true. But the anthropocentrism of the humanities is as definitive as the "astro"-centrism of astronomy or the biocentrism of biology, with the addition, among humanities scholars, of a type of interest in their defining objects of study—that is, human ideas, artifacts, practices, and events—that comes from a particular bond of kinship with the authors, agents, or subjects of those ideas, artifacts, practices, and events.

16. See Alan Liu, "The Meaning of the Digital Humanities," *PMLA* 128 (2013): 409–23. Liu suggests that the significance ("meaning") of digital humanities projects involves their ability—now, he suggests, quite limited—to satisfy our interest in what can be called "meaning."

17. Hayles, "Cognition Everywhere," 202–3.

This discipline-defining anthropocentrism does not require a particularly high regard for all things human. It certainly does not require a refusal to recognize our biological nature or cognitive limits. Hayles argues that the news from neuroscience and due recognition of the ubiquity of "the cognitive nonconscious" together undercut standard views of human rationality and the power of reason. Outside some departments of philosophy, however, it is generally not scholars in the humanities who overvalue rationality. After all, the idea of reason has not had a very good press among writers, critics, and theorists for some time now—one may think of the doubts about it raised (as E. O. Wilson is aware) by the Romantics or of its treatment by Nietzsche or psychoanalytic theory. Nor is it humanists who need to recognize the existence of what Hayles calls "systemic human blindnesses." On the contrary, if we have a concept like hubris and a chastened sense of human capacities more generally, it has come largely from poets, humanistic philosophers, and those who study and transmit their views. Humanities scholars these days generally acknowledge—and many of them stress—the continuities between humans and other animals; and, although a strong suspicion of a not well-understood Darwinism remains widespread, most of them, I believe, would acknowledge that our capacities, impulses, and responses reflect, among other things, the evolutionary history of the species. Scholars in the humanities may be inclined to add that the capacities, impulses, and responses of humans also reflect our relatively complex neural organization and are also shaped by the more or less unique existence, among us, of language and intergenerationally transmitted skills, practices, ideas, artifacts, and institutionalized norms. But most evolutionary biologists and neuroscientists would be inclined to note the same things.

III

Hayles's evocation of a decisive "crossroad" for the humanities recalls a comparable evocation by a literary Darwinist, Joseph Carroll. In an article titled "Three Scenarios for Literary Darwinism," Carroll describes three possible future trajectories for the critical approach that he founded and promotes. In the first scenario, literary Darwinism would remain a minor movement; in a second, more hopeful one, the movement would become mainstream but still only as one among other "'approaches' to literature." In the third scenario, which Carroll urges, the field of literary studies, along with all other humanities fields, would be totally transformed by evolutionary theory and integrated with anthropology, economics, sociology, and political science—all similarly transformed—to make up a new field that he calls "the evolutionary human sciences."[18]

18. Joseph Carroll, "Three Scenarios for Literary Darwinism," *New Literary History* 41, no. 1 (2010): 53–67.

Those familiar with literary Darwinism will recall that scholars pursuing this approach seek to explain why we read poems or novels—and also why authors write them and, sometimes, why fictional characters behave as they do—in the same way that evolutionary psychologists explain virtually everything else that we do—as manifestations, that is, of the operation of putative universal, hard-wired mechanisms that evolved to enhance the reproductive fitness of our Stone Age ancestors. My concern here is not with the assumptions, methods, or claims of evolutionary psychology (I have examined them elsewhere)[19] but with the idea, promoted by Carroll and other literary Darwinists, that those assumptions, methods, and claims should be the foundation of literary studies and, in Carroll's case, of all other humanities disciplines as well.[20]

Toward the end of his article, Carroll observes that the future of literary Darwinism is hard to predict. If his third, integrationist scenario fails to be taken up by humanities scholars, it will be, he writes, because of an entrenched "mind/body dualism" and an ideological "pluralism" based on habit, convention, and scholars' ignorance of science. On the other hand, he continues, if literary studies joins the other evolutionary human sciences, then "the institutional resistance of the postmodern establishment will crumble from within . . . as a result of intellectual dry rot," and a rich and pleasant prospect will open for those who remain:[21]

> Aspiring literary scholars will have open before them a wide spectrum of methodological choices, ranging from the purely discursive, essayistic form of commentary that now dominates the humanities to the rigorously quantitative, empirical methods that now prevail in the sciences. . . . [Graduate students] will not cast about desperately for novelty, taking recourse in superficial verbal variations ensconced in sophistical theoretical ambiguities. They will, rather, wake up like kids at Christmas, delighted with the endless opportunities for real, legitimate discovery that are open to them.[22]

Carroll concludes with the evidently nonironic observation that the third scenario will be hard to achieve but that "it promises discovery, things not yet dreamed of, lying in the bosom of reality."[23]

Carroll has little good to say of literary studies as traditionally or, especially, as currently pursued. Hayles's evocation of forking paths for the humanities has

19. Barbara Herrnstein Smith, "Super Natural Science: The Claims of Evolutionary Psychology," in *Scandalous Knowledge*, 130–52, and *Natural Reflections: Human Cognition at the Nexus of Science and Religion* (New Haven, CT: Yale University Press: 2010), 35–38.

20. Literary Darwinism has received a good bit of critical attention from other scholars. See esp. Jonathan Kramnick, "Against Literary Darwinism," *Critical Inquiry* 37, no. 2 (2011): 315–47, and "Literary Studies and Science: A Reply to My Critics," *Critical Inquiry* 38, no. 2 (2012): 431–60.

21. Carroll, "Three Scenarios," 60.

22. Carroll, "Three Scenarios," 64.

23. Carroll, "Three Scenarios," 64.

none of Carroll's biliousness, but the alternatives she offers are similarly framed. Like Carroll, she finds literary studies terminally deficient, and like him, she is optimistic with regard to the future—and to the fate of current resistances—if the avenue she urges is followed. While, in her account, the cost of taking the wrong path is the "isolation of the humanities from the sciences and engineering," with the right path "the search for meaning [duly understood as "information flows"] then becomes a pervasive activity among humans, animals, and technical devices, with many different kinds of agents contributing to the rich ecology of collaborating, reinforcing, contesting and conflicting interpretations."[24] The traditional methods of the humanities, she observes reassuringly, will have a place amid this interpretive multiplicity and diversity: "The sophisticated methods the humanities have developed for comparing different interpretations then pay rich dividends for other fields and open up to any number of exciting collaborative projects."[25] Once scholars accept the idea that technical devices cognize and interpret all the time, "many of the misunderstandings about the interventions the digital humanities are now making in the humanities [will] simply fade away."[26] She concludes encouragingly: "The humanities can make important contributions to such fields as architecture, electrical and mechanical engineering, computer science, industrial design, and many other fields."[27]

I suspect that the prospect Hayles offers to traditional humanists of exciting collaborations with mechanical engineers and computer scientists would not persuade many premillennial scholars and teachers to give up their privileging of the study of individual texts by individual human beings; but it might well be exciting to a good number of young researchers already at home in the world of information technology—blogs and games, platforms and programs—and already engaged in computational projects. Similarly, the promise that Joseph Carroll offers to graduate students in literature of endless opportunities, via evolutionary psychology, for "real, legitimate discovery" "in the bosom of reality" might attract some of them already captivated by a certain idea of science and of what it is to be genuinely scientific; but it is not likely to end the attraction of a good many of them to "superficial verbal variations ensconced in sophistical theoretical ambiguities"—or to what Carroll hears as such. I return below to the significance of these differences of intellectual training, taste, and temperament.

IV

I want to turn directly now to what I have been calling the historically distinctive aims and perspectives of the humanities. They are not easy to describe, and

24. Hayles, "Cognition Everywhere," 218.

25. Hayles, "Cognition Everywhere," 218. (I have corrected a minor grammatical error in the original text.)

26. Hayles, "Cognition Everywhere," 218.

27. Hayles, "Cognition Everywhere," 217–18.

current celebrations of the humanities tend to be, at best, nostalgic and selective or, at worst, pretty vacuous.[28] Carroll and others maintain that resistance to the new scientizing approaches reflects an obsolete mind/body dualism that places an artificial barrier between the humanities and the sciences.[29] The charge is misdirected but useful for sharpening the terms of the differences at issue. There is, of course, a long-standing, theologically grounded insistence on the distinctness of the realms of "the spiritual" and "the material," and it is often allied with the claim that there are forms of knowledge—"revealed" or "intuitive," for example—that are higher or deeper than scientific findings or with the idea that there are phenomena, such as consciousness or "products of the human mind," that cannot be explained in physical terms. But resistance to the idea of integrating the humanities and the natural sciences does not require any of those hoary dualisms. It is not that there are multiple realms of being but that humans orient themselves to the phenomenal world in multiple ways and that these orientations are reflected in the different aims and practices of the various arts and sciences or what have become, in the West, the various academic disciplines.

One of the ways that humans orient themselves toward the world is by seeking to extend their knowledge of, and strengthen their control over, the physical conditions of their existence. Accordingly, they seek to chart, model, and explain those conditions conceptually and to modify them or intervene in their operations technically. But humans everywhere also seek to develop and manifest themselves as experiencing creatures and, accordingly, are commonly engaged by the experiences, creations, and reflections of their fellow humans. These two are not the only ways that we orient ourselves toward the world; the list could be extended. But they are clearly distinct, and they evoke the different aims and practices that, in the West, have become specialized, or roughly specialized, as the natural sciences and the humanities.

Contrary to the suggestion and conviction of many promoters of consilience, the specific value of the modern sciences does not lie in their ability to deliver "certain knowledge."[30] It lies, rather, in what has evolved historically as a set of conceptual commitments and related practices attached to aims that are, variously, both pragmatic and intellectual. The commitments in question,

28. For the former, see, e.g., Andrew Delbanco, *College: What It Was, Is, and Should Be* (Princeton, NJ: Princeton University Press, 2013); for the latter, see, e.g., *The Heart of the Matter: The Humanities and Social Sciences for a Vibrant, Competitive, and Secure Nation* (Report of the Commission on the Humanities and Social Sciences, American Academy of Arts and Sciences, 2013), www.humanitiescommission.org/_pdf/hss_report.pdf.

29. See, e.g., Daniel Dennett, *Breaking the Spell: Religion as a Natural Phenomenon* (New York: Viking, 2006); and Edward Slingerland, *What the Sciences Offer the Humanities* (New York: Cambridge University Press, 2008).

30. See Wilson, *Consilience*, 7, quoted above, and the dubious suggestion by Harold Fromm ("Reading with Selection in Mind," review of *The Literary Animal*, ed. Jonathan Gottschall and D. S. Wilson, *Science* 311 [February 3, 2006]: 612) that "scholars in the literary humanities have struggled to achieve at least a semblance of the certitude possible in the sciences."

notably naturalism, empiricism, and experimentalism, along with the types of practice they entail, constitute an extremely efficient apparatus for generating models of the operations of the physical world that enable us to predict, control, and intervene in those operations effectively and reliably. To the extent that any human project has those sorts of aims, the apparatus of modern science is probably the most consistently effective means for achieving them.

Scientific theories and accounts also, but less centrally, respond to our desire for intellectually satisfying accounts of the phenomenal world. They are less central in this regard because the experience of intellectual satisfaction is considerably more variable than the observation of pragmatic effectiveness. All may agree that a bridge has been built, and most may agree that an ailing baby has been cured. But an explanation of some complex and humanly significant set of phenomena—say, of art, love, or religion—that some people find uniquely adequate may strike others as absurdly superficial and still others as irrelevant. The more consistent reliability of empirical, experimental, and naturalistic accounts of the phenomenal world in serving pragmatic aims does not make them the only kinds of accounts that we value or the only ones generally recognized as "knowledge."[31]

I have referred to certain aims and perspectives of the humanities as historically distinctive. The word *historically* is crucial here. The humanities are not, of course, an essential or natural kind. They are, rather, clusters of contingently institutionalized custodial, intellectual, and pedagogic practices. For the past four hundred years or so, those practices, as pursued by Western and Western-educated scholars, have included the identification, preservation, description, analysis, explication, dissemination, and often—but not always—celebration of what are regarded, at any given time, as significant human events and cultural achievements.[32] "Research" in the humanities—or, as we say, "scholarship"—is commonly understood as the disciplined pursuit of such practices. "Study" in the humanities is commonly understood as the acquisition of expert knowledge of some discipline-specific body of materials (largely but not exclusively textual) and the development of techniques and skills—for example, archival, philological, musicological, iconological, or analytic—that are required for the disciplined pursuit of such practices. I do not think this description is crudely tendentious. But it does suggest the historically distinctive intellectual character

31. Given a history of dichotomous distinctions between "true knowledge" on the one hand and "mere opinion," "mere belief," or "mere superstition" on the other, it is not surprising that controversies over the relations between the sciences and the humanities continue to be dominated by struggles over the term *knowledge*: who owns it, who can deliver it, whose kind is genuine.

32. *Cultural* in these connections is generally understood as artistically or intellectually worthy, as distinct from strictly physical, merely useful, merely successful commercially, or merely popular. Of course, boundaries between such categories are hard to keep clear, and classifications of individual genres and achievements—as in the cases of jazz, journalism, gymnastics, photography, cinema, or video-game design—are routinely subject to struggle and shifting negotiations.

of the humanities disciplines and their specific institutional, social, and cultural functions.

The argument made by Wilson, Hayles, Carroll, and others promoting the new scientizing approaches is not that study in the humanities should be better informed by the natural sciences or more closely engaged with them. Moves in those directions are, in my view, long overdue and, where they occur, to be applauded. Their argument is, rather, that the study of art, literature, music, philosophy, and so forth should be more "scientific" in method and aim, with desirable method usually described as "quantitative" and "objective," and with desirable aim usually referred to—in pointed contrast with whatever the humanities are thought to seek or achieve—as "serious," "genuine," or (my favorite) "adult" knowledge.[33]

It is true that our aesthetic, critical, and reflective engagements with the world do not produce what is called *scientific* knowledge. But those engagements do have significant effects, including intellectual ones. These effects are not as palpable, demonstrable, immediate, or pragmatically translatable as are the products of our investigative or interventionist engagements with the world, but they can be personally and communally consequential. To the extent that the scholarly and pedagogic practices of the humanities elicit, enable, and shape such engagements, they also can be personally and communally consequential—important, that is, for our continued development, both individually and generationally, as responsive, creative, critical, and reflective creatures.

Traditionally, in the humanities, one "studies" the phenomena of art, literature, religion, and philosophy—that is, human creations, practices, and ideas—in the sense of examining them closely, usually with a view to understanding and elucidating the motives and experiences involved in their production and reception, not usually just to gather facts about them or to register their empirically describable features. *Exploring, describing, and seeking to understand motives and experience*s are fundamentally different from *counting, measuring, and seeking to explain empirically observable phenomena*. Seeking to understand and convey *experiences* is fundamentally different from seeking to explain *behaviors*. The humanities are, in that respect, typically first-person or, in a term from anthropology that I prefer, *emic* (that is, operating from the perspective of participating insiders), rather than third-person or, in the corresponding term, *etic* (that is, operating

33. See Sam Kean, "Red in Tooth and Claw among the Literati," *Science* 332, no. 6030 (2011): 655, for Joseph Carroll's remark that "most [humanities scholarship] today" is "unable to contribute in any useful way to the serious world of adult knowledge." In a September 17, 2011, column in the *New York Times*, the philosopher Alex Rosenberg writes that good naturalists "cannot take [literary studies] seriously as knowledge" if scholars "transparently flout science's standards of objectivity, or if they seek arbitrarily to limit the reach of scientific methods": opinionator.blogs.nytimes.com/2011/09/17/why-I-am-a-naturalist/. Rosenberg adds (evidently enjoying being wicked): "That does not mean anyone should stop doing literary criticism any more than forgoing fiction. Naturalism treats both as fun, but neither as knowledge." See note 30 above for the term *knowledge*.

from the perspective of observing outsiders).[34] Typically partisan rather than impartial, the humanities are an institutional locus not of disinterested interest in humans as one biological species among others but of distinctly self-interested concern for species capable of conscious experience—which, as we know from our interest in animal fables, cartoons, and science fiction, exceeds the species *Homo sapiens* by quite a bit.

Human practices, beliefs, and cultural products can certainly be viewed as natural phenomena.[35] Paintings, poems, and philosophical essays can be compared intriguingly to the material products and bodily displays of other creatures, such as anthills or peacock's tails. Comparisons of this sort are not unusual in the work of sociobiologists and, following them, literary Darwinists.[36] And, of course, human practices and their various products and traces can be investigated empirically and described in strictly quantitative, physical terms, without reference to individual human experiences. Doing so is standard practice in social science fields such as demography or economics and, following them, in the digital humanities.[37] These empirical investigations and quantitative descriptions undoubtedly produce facts about aspects of the usual objects of humanistic study. The question often raised by those resisting the new scientizing and computational approaches is to what extent the production and possession of facts of those kinds serve the aims of the humanities, as historically understood.

Since I do not think the answer to that question is obvious, I want to comment briefly on aims and disciplinary methods. In humanities scholarship, as in any domain of human activity from agriculture to deep-sea diving, methods are commonly developed in connection with the furthering of purposes. Here as elsewhere, however, the relation between method and purpose is complex. Humans are curious, manipulative, inventive, and imaginative creatures, and our purposes are continuously enlarged and transformed by the development of new methods and their associated instruments. Whatever the initial purposes for which an instrument was fashioned—whether stick, bowl, or computer—we

34. I avoid the terms *subjective* and *objective* here because each is loaded and their juxtaposition is explosive.

35. Thus Daniel Dennett's book promoting the cognitive science of religion, *Breaking the Spell*, is subtitled *Religion as a Natural Phenomenon.* For discussion of Dennett's naturalist-exclusivist claims and his related dismissal of the humanities, see Smith, *Natural Reflections*, 76–80 and 139–46.

36. See, e.g., Blakey Vermeule, "Wit and Poetry and Pope, or The Handicap Principle," *Critical Inquiry* 38, no. 2 (2012): 426–30. Vermeule proposes that the neatly turned verse couplets of Alexander Pope can be explained in the same way as the famously gaudy tail of the male peacock: as the product of a seemingly fitness-reducing (or "handicapping") trait—here, a time-consuming and otherwise useless talent for verbal wit—that evolved by sexual selection. The implausibility of the hypothesis suggests that it was meant at least half jokingly.

37. In the field of literary studies, for example, large bodies of digitally archived but not otherwise discriminated textual materials, such as all the novels published in England between 1740 and 1850, are subjected to the sorts of computational processes now called, following Franco Moretti, "distant reading" (see Moretti, *Distant Reading*, 48–49, and note 11 above). On the aims, justifications, and limits of such projects, see Barbara Herrnstein Smith, "What Was 'Close Reading'?: A Century of Method in Literary Studies," *Minnesota Review*, forthcoming.

are likely to discover other useful or interesting things we can do with it, and those novel activities will generate new purposes and instruments, which will require and privilege new skills and talents. For these reasons, the invocation of past purposes and current practices as the sole criteria for assessing new methods in the humanities amounts to a stultifying conservatism. But the resistance to the new scientizing and digitizing approaches often has a more substantive component, namely, that the outcomes of the new methods—the evolutionary explanations, the cognitive redescriptions, the computer-generated statistics and correlations—appear crude, banal, or trivial by virtually any relevant measure of intellectual value. To the extent that advocates of the new approaches ignore such criticism, they produce their own self-immurement and stultification.

The differences I have been noting in the intellectual orientations, disciplinary aims, and social functions of the humanities and the natural sciences are significant, but, as I have emphasized, they are historical rather than intrinsic. Nothing holds them in place but ongoing practices and ongoing relations to the broader social collective. Insofar as those disciplinary differences exist, however, they have important practical implications for the new collaborative or hybrid programs.

V

Individual academic and scientific subfields (eighteenth-century French literature, high-energy particle physics, Lacanian film studies, and so forth) are what Ludwik Fleck called "thought collectives." They are distinguished from one another not only by subject domain (that is, by what part of the phenomenal world they study) but also and no less crucially by implicit systems of linked assumptions, discourses, and technical practices or what Fleck called "thought styles." Kuhn called them (or something like them) "paradigms." I describe them elsewhere as "disciplinary cultures."[38] The awkwardness of the disciplinary newcomer—the art historian bumbling in the laboratory of the neuroscientist, or the neuroscientist bumbling in the gallery of the art historian—is like that of any other cultural immigrant. Becoming acculturated as a neuroscientist or an art historian is not just a matter of mastering a set of canonical ideas, texts, images, or techniques. It is also a matter of knowing a set of tacit but crucial norms: what counts as a well-designed experiment, a useful model, a rigorous analysis, or a subtle interpretation. It is a matter of knowing what matters: the important issues in the field, the significant rival views, which connections are crucial and which

38. See "Disciplinary Cultures and Tribal Warfare: The Sciences and the Humanities Today," in Smith, *Scandalous Knowledge*, 130–52.

irrelevant. It is having a fund of informal know-how acquired through a personal history of active practice as, precisely, an active practitioner.

The existence of highly particular disciplinary cultures creates difficulties for any interdisciplinary venture, even when the conjunction involves closely related but historically distinct fields, such as evolutionary and developmental biology (now joined in the field of "evo-devo"). Thought styles are powerful in shaping perceptions as well as discourses and practices, and there can be chasms of mutual incomprehension between members of different thought collectives, including academic disciplines and the subfields within them (one may think here of clinical and experimental psychology, or of analytic and continental philosophy). The difficulties increase, of course, as the fields involved are more diverse in aim and orientation, and some difficulties are specific to ventures seeking to merge humanities fields with natural sciences or computer engineering.

An especially significant set of problems arises from the long-standing prestige differentials among academic disciplines, which exactly mirror Wilson's hierarchy but in reverse: here, physics is at the top, and fields such as art history or literary studies are at the bottom. (Although there are no *intrinsic* hierarchies among disciplines, there are, of course, de facto dominances.) Consilient engagements between humanities scholars and scientists or engineers would presumably work well in both directions. That is the hope, claim, and promise of the new collaborative ventures. But the prestige differentials here are very steep, and the forces sustaining them draw on other invidious distinctions in the culture of the academy and in the broader culture as well. They are reflected in familiar contrasts between hard and soft disciplines, between real things and mere words, and between serious work and mere play.[39]

Prestige differentials are significant in this context because they exacerbate a number of perennial problems in projects that seek to cross the Two Cultures. One is the tendency of humanities scholars to regard the scientific and technical materials that they import—findings, concepts, and methods—altogether *uncritically*, even when, as is largely the case in the new hybrid fields, those materials are still being developed and are still controversial in their own scientific disciplines. Duly studious humanities scholars may become quite knowledgeable about findings, concepts, and methods in fields such as evolutionary psychology or cognitive neuroscience, and they can be quite adept at summarizing them for fellow humanists. But they are generally not equipped to assess experimental designs, statistical analyses, or the robustness of conclusions in those fields. These evaluative skills come with training and experience working in the fields themselves,

39. See note 32 above for the idea of science as "serious" knowledge and literary studies as "fun." The current elevation of electronic games (the playing as well as the design and designing of them) to a subject of specialized academic study may affect this contrast in some quarters, but the general academic and public perception of science and engineering as serious work and of literary criticism as something lightweight is likely to remain in place.

which, as I have already noted, bring practicing scientists detailed knowledge of current theoretical and methodological issues and important rival approaches. Because scientizing humanities scholars are at a disadvantage in these respects, they often put their money on transient ideas and methods. For example, assumptions and methods central to evolutionary psychology and literary Darwinism have been questioned virtually from the beginning by scientists and theorists in related scientific fields, such as genetics, evolutionary biology, and developmental psychology.[40] Similarly, concepts in the neurosciences that figure prominently in "cognitive" approaches in the humanities—from the significance of mirror neurons for human behavior to the existence of a specific theory-of-mind module—are undergoing extensive modification in those fields.[41]

No less significant for the temper of would-be consilient collaborations are the sorts of differences I have mentioned in regard to the inevitably divergent uptakes of Hayles's and Carroll's hopeful visions. I do not believe that there are two types of people in the world, humanities types and science types. But in interactions between scholars and scientists, or between scholars and engineers, strong differences of personal and intellectual temperament, as well as of talent, taste, and style, are likely to give rise to severe cognitive dissonances in both directions.[42]

VI

Many of the difficulties that I have been tracing here have been noted by others, including scholars and scientists who themselves work in hybrid fields. For example, Johanna Drucker, a historian of graphic design and a major theorist of the digital humanities, calls attention to a fundamental clash between, on the one hand, qualities such as complexity, ambiguity, and indeterminacy that are generally appreciated in the humanities and, on the other hand, qualities such as simplicity, clarity, and predictability that are highly valued in computer engineering and reflected in the binary character of information technology itself. In its "rush to be computational," Drucker suggests, digital scholarship is in danger of forgetting hard-won theoretical perspectives in the humanities, among them constructivism and relativism, which she lists without apology.[43]

40. See, e.g., Susan Oyama, *The Ontogeny of Information: Developmental Systems and Evolution* (Durham, NC: Duke University Press, 2000); and Massimo Pigliucci and Gerd B. Müller, eds., *Evolution: The Extended Synthesis* (Cambridge, MA: MIT Press, 2010).

41. See, e.g., Richard Cook, Geoffrey Bird, Caroline Catmur, Clare Press, and Cecilia Heyes, "Mirror Neurons: From Origin to Function," *Behavioral and Brain Sciences* 37, no. 2 (2014): 177–92.

42. For a candid account of the eruption of just such dissonances in a collaborative project, see Des Fitzgerald, Melissa M. Littlefield, Kasper J. Knudsen, James Tonks, and Martin J. Dietz, "Ambivalence, Equivocation, and the Politics of Experimental Knowledge: A Transdisciplinary Neuroscience Encounter," *Social Studies of Science* 44, no. 5 (2014): 701–21.

43. Johanna Drucker, "Humanistic Theory and Digital Scholarship," in *Debates in the Digital Humanities*, ed. Mathew K. Gold (Minneapolis: University of Minnesota Press, 2012), 85–95.

Similarly, Anjan Chatterjee, a neuroscientist who also conducts research in the hybrid field of neuroaesthetics, writes of the fundamental challenges faced by efforts to bring brain science into the humanities fields traditionally concerned with aesthetics: art history, literary theory, philosophy, and so forth. Chatterjee asks, "When does neuroscience provide deeper descriptive texture to our knowledge of aesthetics, and when does it deliver added explanatory force?" and comments:

> Knowing that the pleasure of viewing a beautiful painting is correlated with activity within the orbito-frontal cortex . . . adds biologic texture to our understanding of the rewards of aesthetic experiences. However, it is not obvious that it . . . advances our understanding of the psychological nature of that reward. For neuroscience to make important contributions to aesthetics, the possibility of an inner psychophysics has to be taken seriously.[44]

The comment is urbane and perceptive. A correlation between someone's report of pleasure in viewing a painting and an image of activity in some area of that person's brain does not explain the pleasure. But it does add "biologic[al] texture" to our understanding of that kind of experience—a nice turn of phrase that reflects the contribution of a certain type of scientific knowledge to a classically humanistic enterprise but also acknowledges its limits.

Connecting an observation of neuronal activity to a reported experience of pleasure is partly a conceptual problem: the classical philosophical conundrum of mediating between third-person observations and first-person experiences, which I have referred to as, respectively, etic and emic perspectives. But making such connections is also a rhetorical problem, a matter of finding some way to articulate—join together—two verbal-intellectual idioms that have evolved historically to serve significantly different ends: on the one hand, the observational, impersonal idiom of the natural sciences, which strives to be informative and appropriately precise; and on the other hand, the phenomenological, experiential idiom of the humanities, which strives to be evocative and appropriately subtle. Negotiating these two perspectives and simultaneously joining these two idioms is not an impossible task.[45] But it requires a kind of intellectual-linguistic tact, the cultivation of which is one of the major challenges faced by the new hybrid approaches.

44. Anjan Chatterjee, "Neuroaesthetics: A Coming of Age Story," *Journal of Cognitive Neuroscience* 23, no. 1 (2011): 60.

45. For important efforts to bridge the first-person/third-person divide, see Jean Petitot, Francisco J. Varela, Bernard Pachoud, and Jean-Michel Roy, eds., *Naturalizing Phenomenology: Issues in Contemporary Phenomenology and Cognitive Science* (Stanford, CA: Stanford University Press, 2000). For discussion of such efforts, see *Constructivist Foundations* 8, no. 3 (2013 [special issue on neurophenomenology]).

VII

What we speak of now as the "natural sciences" and the "humanities" are only relatively stable assemblages of continuously emerging, developing, combining, and differentiating intellectual traditions and practices. Neither is likely to retain its current forms or even its identity in the future. On the contrary, we are witnessing major transformations and attenuations of both in our lifetimes. (The "shifts"—though not quite "tectonic"—are real enough.) As the humanities become increasingly scientized, the sciences themselves are becoming increasingly industrialized and commercialized.[46] Intellectual historians already have reason to ask, "What was 'science'?" Sooner or later they will have reason to ask, "What was 'classics'? What was 'art history'?" and—perhaps especially puzzling—"What in the world was 'English'?"

There is little reason to think the humanities will fold themselves into the natural sciences and, I believe, no good reason to think they should. But there are reasons to think the new hybrid approaches will survive and prosper. For one thing, they are attracting many talented, energetic, and broadly informed young people. For another, considerable institutional resources are already invested in them. Significantly, practitioners have begun to respond to external criticism constructively rather than with defensive hostility and also to engage in discriminating internal criticism rather than indiscriminate mutual puffing.[47] As increasingly mellowed, chastened, and sophisticated products of the new approaches—neuroaesthetics, cognitive cultural studies, digital humanities, and so forth—appear in journals, classrooms, and conferences, they will begin to join other practices in the humanities academy, both old and new, both disciplinary and interdisciplinary.

In Fleck's model of intellectual history, disciplinary transformations, though continuous and sometimes radical, are not always revolutionary and never total. As new approaches make headway, established ones commonly continue for some time, typically transformed—sooner or later—by the most significant new methods and ideas. At Duke University in the 1990s, even as its English department became notorious for relativism, reader-response criticism, and queer theory, members of its faculty were preparing editions of Faulkner's novels and Carlyle's correspondence and teaching texts in Middle English. Texts are still taught there in Middle English, although now with quite different emphases. The activities that I have described as historically distinguishing the humanities disciplines from the sciences—namely, identifying, preserving, elucidating, and dis-

46. For description and discussion, see Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* (Chicago: University of Chicago Press, 2008); and Philip Mirowski, *Science-Mart: Privatizing American Science* (Cambridge, MA: Harvard University Press, 2011).

47. For chastened responses, see Lisa Zunshine, ed., *Introduction to Cognitive Cultural Studies* (Baltimore: Johns Hopkins University Press, 2010). The contrast is to chest-thumping works like Brian Boyd, Joseph Carroll, and Jonathan Gottschall, eds., *Evolution, Literature, and Film: A Reader* (New York: Columbia University Press, 2010).

seminating significant cultural achievements and the record of significant human events—are not the only things that humanities scholars do, and no humanities scholar does them all of the time. But they are activities that are valuable for the human collective at large and that humanities scholars do more or less uniquely and more or less effectively. If academic scholars no longer do them, one must hope they are done by other agencies, human or nonhuman, formally or informally. I do not think the historically distinctive activities of the humanities disciplines will disappear. But they may be dispersed: not housed in a distinct quarter of the academic world and perhaps not housed in the academy at all. Many of those activities were performed in the past outside the academy—for example, domestically, or by clergy or hired tutors. Many have already been transferred largely to electronic venues—for example, to online courses, blogs, and websites—and one may anticipate further dispersals to venues of that kind.

There is much in what I have described here to give us pause and perhaps to make us weep. Two further considerations, however, can be heartening. First, there is good reason to think that, even with the attenuation of "print culture" and the flat-out disappearance of "classics," "English," and even "philosophy," humans across the globe will still be inclined to recall, savor, and ponder what fellow humans have done, made, and articulated, no matter how—or via what medium—it is transmitted. Second, although desegregations and new mixtures typically elicit fears of a homogenized or mongrelized future, cultural and biological history remind us that hybrids often turn out to be sturdier than their ancestors and, indeed, to be especially favored in surprising ways. The traditional Western disciplines, both the sciences and the humanities, are being severely shaken up by important intellectual and technological developments, and the attendant collisions of aims, styles, and perspectives can be locally painful. But the disciplines—again, all of them—are also being put together in myriad new ways. The new disciplinary configurations are not, in my view, moving toward ultimate harmony or unity. But they may be opening out to intellectual landscapes more interesting than most of us imagine.