# UC Davis
## UC Davis Previously Published Works

**Title**
Postdisciplinary Liaisons: Science Studies and the Humanities

**Permalink**
https://escholarship.org/uc/item/79r6n535

**Journal**
Critical Inquiry, 35(4)

**ISSN**
0093-1896

**Author**
Biagioli, Mario

**Publication Date**
2009

**DOI**
10.1086/599586

Peer reviewed

# Postdisciplinary Liaisons: Science Studies and the Humanities

## Mario Biagioli

The disciplinary predicament of science studies offers a useful vantage point for reconsidering some of the recent debates on the crisis of the humanities and the university.[1] In these discussions, the decline of the humanities is often connected to the increasing cultural and economic

1.  Among the many books on the crisis of the university (and the role of the humanities in the university) Sande Cohen, *Academia and the Luster of Capital* (Minneapolis, 1993), and Bill Readings, *The University in Ruins* (Cambridge, Mass., 1996) are particularly incisive. The perceived commercialization of the university is also discussed in David C. Mowery et al., *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer before and after the Bayh–Dole Act in the United States* (Stanford, Calif., 2004); *Capitalizing Knowledge: New Intersections of Industry and Academia*, ed. Henry Etzkowitz et al. (Albany, N.Y., 1998); *Academic Capitalism: Politics, Policies, and the Entrepreneurial University*, ed. Sheila Slaughter and Larry L. Leslie (Baltimore, 1997); Roger L. Geiger, *Knowledge and Money: Research Universities and the Paradox of the Marketplace* (Stanford, Calif., 2004); *Challenges to Research Universities*, ed. Roger G. Noll (Washington, DC, 1998); Derek Bok, *Universities in the Marketplace: The Commercialization of Higher Education* (Princeton, N.J., 2003); *Shakespeare, Einstein, and the Bottom Line: The Marketing of Higher Education*, ed. David L. Kirp (Cambridge, Mass., 2003); and Jennifer Washburn, *University Inc.: The Corporate Corruption of American Higher Education* (New York, 2005). Useful historical perspectives on the current predicament of the humanities are offered in *The Humanities and the Dynamics of Inclusion since World War II*, ed. David A. Hollinger (Baltimore, 2006).

dominance of the technosciences. I want, instead, to make a case for a stronger alliance between the humanities and science studies—one that could develop better tools for understanding the practices of the sciences while enhancing the relevance and visibility of the humanities.

One can draw the disciplinary boundaries of science studies in a variety of ways. In the present context, I take them to include the history, sociology, philosophy, and ethnography of science, technology, and medicine, as well as studies of the relationship between science and literature, science and law, and science and visual studies.[2] I cannot offer a comprehensive map showing how these various disciplines converged into science studies, but it is striking that several of them gained institutional recognition around World War II or soon thereafter. Comparative literature departments in the U.S. stem mostly from the immigration of European literary scholars, and area studies emerged from cold war concerns with understanding the cultures of foreign enemies and allies.[3] The history of science entered academia around the same time as a direct response to a perceived need for the appreciation of science and technology stemming from the dramatic role it played in World War II and would continue to play in the cold war.[4] Thomas Kuhn's *The Copernican Revolution* (1957) (which then led to *The Structure of Scientific Revolutions* [1962]) was the direct product of those pedagogical efforts.[5]

But unlike other disciplinary products of World War II, such as area studies or comparative literature, science studies has not been directly challenged by the emergence of postcolonial and cultural studies (with which it shares some research questions), nor has it been negatively impacted by changes in immigration patterns into the U.S. that have shifted

2. A brief survey of these issues is in Mario Biagioli, "Introduction: Science Studies and Its Disciplinary Predicament," in *The Science Studies Reader*, ed. Biagioli (New York, 1999), pp. xi–xviii.

3. See Gayatri Chakravorty Spivak, *Death of a Discipline* (New York, 2003), pp. 1–23.

4. It benefited also from other World War II-related dynamics, such as the immigration of scholars from Europe (George Sarton, Edgar Zilsel, and various members of the Vienna Circle) and the perceived need to address the relationship between science and the democratic order in the face of the success of Nazi science (Robert Merton).

5. See Noel M. Swerdlow, "An Essay on Thomas Kuhn's First Scientific Revolution, *The Copernican Revolution*," *Proceedings of the American Philosophical Society* 148 (Mar. 2004): 64–120.

M A R I O  B I A G I O L I  is a professor of the history of science at Harvard University. He is the author of *Galileo's Instruments of Credit: Telescopes, Images, Secrecy* (2006) and the coeditor, with Peter Galison, of *Scientific Authorship: Credit and Intellectual Property in Science* (2002).

some of the attention away from European-based cultural production to that of other regions, especially the Pacific Rim.[6] Similarly, science studies has not been hurt by the restructuring of funding and research priorities following the end of the cold war, shifts that have greatly impacted other fields, like, say, Russian studies.

An explanation for science studies' fortunate position is that the relevance of science has kept increasing after the collapse of the Berlin Wall, the shift of attention from Europe to the Pacific, Southeast Asia, or the Middle East. If around 1950 the popular imaginary placed science close to the military and away from the home, today's technoscience frames our everyday life at all levels, down to our notion of the self.[7] It also provides the infrastructure, and often even the content, of the global economy. Taken together, these elements create a context in which science studies, unlike most of the humanities, does not have to struggle to make a case for the definition or relevance of its subject matter. As a field or constellation of fields, we may have disagreements over methodology, but we do not need to define what counts as technoscience because, for better or for worse, scientists and engineers do that for us.

### From Discipline and Canon to Collaborations and Problems

Letting the practices of scientists stand for what counts as science is, no doubt, a sign of the power differential between science and science studies. Literary studies has some effect on which writers are (or are not) to be considered literary authors, but science studies has virtually no authority over the definition of who is a scientist or what science is today.[8] This is not, however, a significant constraint because science studies is primarily concerned with how science works rather than with what it is. For the same

6.   Kuhn-style history and philosophy of science and the sociology of scientific knowledge had enough of a cultural-ethnographic sensibility to make their relationship to postcolonial and cultural studies friendly rather than confrontational.

7.   See Brian Rotman, *Becoming Beside Ourselves: The Alphabet, Ghosts, and Distributed Human Being* (Durham, N.C., 2008).

8.   The only instances in which science studies claims some authority in these matters relate to contexts—such as the past or other cultural traditions—that do not fall within the disciplinary jurisdiction of contemporary scientists. In fact, it is common for science studies to expand the definition of what scientist or knowledge means when talking about practitioners who are either dead (as when we claim that early modern practical mathematicians and engineers should be treated as bona fide participants of the scientific revolution) or belong to other cultures (as when we argue that ethnobotany or some traditional healing practices should be considered scientific). It is also interesting that when science studies deals with definitions of knowledge or science we usually expand rather than narrow those boundaries. Part of that reflects a certain bias for inclusiveness that comes with our methodological outlooks, but it could also signal the fact that we do not have the authority to exclude. For instance, we would hardly feel entitled to say that a Nobel Prize winner is *not* a scientist.

reason, disciplinary taxonomies and boundaries are not crucial to science studies—a trait shared by the sciences themselves.

The fast-paced rise, decline, and recombination of scientific disciplines and departments indicates that Kuhn's concept of paradigm is no longer descriptive of most current scientific practices (which, in fact, are increasingly modeled through notions such as networks, assemblages, experimental systems, trading zones, and so on). Kuhn's paradigm is simply too holistic a construct and puts too much emphasis on the intellectual and social cohesion of a group and on the uniformity of its training to match the remarkably diverse and mutating scenarios of contemporary research.[9] Similarly, Foucault's notion of discipline has been an effective tool for the analysis of some institution-specific sciences (like medicine), but it is less apt to capture the more fragmentary and nimbler knowledge-making scenarios we observe today. The sciences are moving toward organizing their practitioners around *problems*, not disciplines, in clusters that may be too short-lived to be institutionalized into departments or programs or to be given lasting disciplinary labels.

If these new research configurations hardly fit the traditional taxonomy of disciplines, they also challenge the organization of academic spaces and the traditional divide between academia and business, thus showing that definitions of a "site" of knowledge production have become as ephemeral as that of a discipline.[10] Some collaborations, such as those in particle physics, are indeed centered on large labs populated mostly by physics PhDs, but clinical studies and trials can involve hundreds of practitioners who not only come from different disciplines (biology, statistics, clinical practice, and so on) but are also spread over continents, often without knowing each other personally.[11] Other large-scale collaborations may skip physicality altogether to operate in virtual space, through so-called cyberinfrastructure.[12]

9. Paul Feyerabend's initially controversial *Against Method: Outline of an Anarchistic Theory of Knowledge* (London, 1975) has aged substantially better than other postwar models of scientific change because of its image of science as characterized by nimble and opportunistic tactics, shifting practices and goals rather than an enterprise graspable through one-fits-all models like Kuhn's paradigm.

10. For an early discussion of these changes, see Paul Rabinow, *Making PCR: A Story of Biotechnology* (Chicago, 1996).

11. See Biagioli, "Rights or Rewards? Changing Frameworks of Scientific Authorship," in *Scientific Authorship: Credit and Intellectual Property in Science*, ed. Biagioli and Peter Galison (New York, 2003), pp. 253–79, and Galison, "The Collective Author," in *Scientific Authorship*, pp. 325–55.

12. See the issue of *First Monday* on "Developing Cyberinfrastructure for Collaboration and Innovation," *First Monday* 12 (June 2007), firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/issue/view/240

Although still closer to a joke than to an empirical description, the saying that "departments are where scientists go to die" does capture some aspects of a real trend. Problem-oriented research clusters in the sciences are indeed cross-disciplinary, but not in a way that is familiar to most of us in the humanities.[13] We tend to think of cross-disciplinarity in terms of an individual researcher enriching his or her skills by engaging with texts and scholars from other disciplines. Something comparable happens in the sciences when individual practitioners retrain and move from one discipline to another as, say, between physics and genetics. Much more often, however, the sciences produce cross-disciplinarity *within groups*, not individuals, by bringing differently specialized researchers together around a problem.[14] In these scenarios, the keyword is *collaboration* (not discipline or field), with each collaboration potentially instantiating a different and temporary cross-disciplinary setup.

While science studies does not have the scale or the resources (or the desire) to replicate the modus operandi of the sciences, it is still very much affected by it since such practices constitute science studies' object of study. In this sense, we could say that science-studies practitioners are not so much held together by institutional ties or shared canons as by being symbiotically (or parasitically) tied to the sciences and their changing research questions. "Held together," however, is probably not the right image. The cohesion of the field is more an appearance, a by-product of different scholars from different backgrounds pursuing the same problems or facets of scientific practices at the same time.

The proliferation of disciplinary arrangements and modes of collaboration that escape both Kuhn's holistic group-based model and Foucault's notion of discipline has not only rendered the idea of a disciplinary canon or paradigm inapplicable but has expanded the meaning of novelty. Like literary scholars and historians, science-studies practitioners may think of the new in terms of a novel reading of known sources or an unknown cache of manuscripts. But, in addition to that, they also encounter the new in terms of emergent objects and practices brought about by the development of the technosciences themselves.[15] Perhaps in science studies the

13.  An exception is Cathy Davidson and David Theo Goldberg's call for an interdisciplinary humanities model that is "problem- or issue-oriented rather than field-specific" (Cathy Davidson and David Theo Goldberg, "Engaging the Humanities," *Profession* [2004]: 45).

14.  While the different size of the community in the humanities and the sciences could be taken to be the determinant factor here (that is, the humanities cannot be as specialized as the sciences because the pool of researchers is smaller), I believe that the key difference has less to do with size than with the choice to focus on specific problems.

15.  The work of Hans-Jörg Rheinberger, Bruno Latour, and Andrew Pickering are good examples of this trend. (For further references, see notes 19, 22, and 23.) The notion of

notion of emergence (and related concepts such as the temporality or "historiality" of things) is coming to assume a role comparable to that of the canon in other humanistic disciplines.

### Modular Cross-Disciplinarity

Even setting aside questions about the practical possibility of translating this model to other institutional and disciplinary ecologies, it is difficult to gauge how much the humanities—at least as we know them today—could gain from adopting it.[16] Nevertheless, I find it useful to think about this model's implications because they foreground a new and distinct pattern of postdisciplinarity that, I believe, is likely to gain broader currency in the future.

A positive feature of this research model is that, while prizing fine interpretive skills and the ability to make sense of new scenarios in the technosciences, it de-emphasizes issues of disciplinary identity. Science studies employs various methodologies to analyze different aspects of scientific practices, and yet these bricolages do not seem to precipitate identity crises. (Conversely, the humanities are not only prone to suffer from crises of disciplinary identity but have occasionally turned identity politics into one of their key subjects.) A study of the modus operandi of contemporary science also shows that one should not assume that cross-disciplinarity or interdisciplinarity needs to be institutionalized in programs or departments.

As practiced in the sciences, cross-disciplinarity is neither a family of disciplines, nor a more comprehensive and richer discipline, nor a new bud or branch of the tree of knowledge. It is a problem-specific collaboration that takes place within a limited temporal window and in places that may have little to do with standard departments and institutes. These cross-disciplinary collaborations are expected to produce important results but not necessarily to have a lasting institutional life. What matters

---

emergence has also attracted much interest outside of science studies in several theoretically oriented branches of the humanities—from philosophy to feminist studies. Common sources are the work of Gilles Deleuze, a resurgent interest in Henri Bergson, and certain rereadings of Darwin. Examples of this trend are Elizabeth Grosz, *The Nick of Time* (Durham, N.C., 2004), and Manuel de Landa, *Intensive Science and Virtual Philosophy* (London, 2002).

16. The science model is hardly applicable to the humanities because we usually decouple our research from the training of graduate students. Instead, some scientists' teaching takes the form of running labs where they train graduate students while conducting their own research. Therefore, not only do they have more time to engage in collaborations but they can also mobilize more resources (such as their labs and graduate students) for such projects.

the most is to maximize the quality of one's skills and to expand their range so as to be able to move from one fruitful collaboration to the next.

Some aspects of this research model could prove useful for the humanities as well. For instance, rather than establishing more interdisciplinary programs (which have the tendency to institutionalize specific forms of interdisciplinarity), it could be more useful to develop "modular" PhDs to provide students with a wider range of interpretive skills enabling them to take up a variety of intellectual and professional trajectories (including some which they may have to make up as they go). A limited experiment in this direction has taken place in my department—an unplanned experiment triggered, grassroots-style, by students' curiosity for approaches or topics that could not easily fit into the traditional history of science. Some of them have chosen to pursue double PhDs (history of science and English; history of science and architecture; history of science and physics; history of science and medicine) or PhDs in history of science together with professional degrees in law or medicine.[17]

The idea is not to obtain a broad interdisciplinary PhD but rather a modular degree built from recognizable disciplinary blocks assembled at specific times around specific research interests.[18] Having two PhDs gives scholars more intellectual and professional options at the beginning of their careers, but also more mobility down the line. Not only can they branch out from two disciplinary platforms, but they can also enter (or exit) research areas depending on what seems relevant (or what has ceased to be exciting) at a given time. They have more lines of flight.

The intellectual advantages of this option go hand in hand with the realities of the academic profession. Double PhDs carry higher (and more specific) cultural capital than degrees granted by cross-disciplinary programs, whose graduates are always at risk of falling into the cracks of traditional academic hiring taxonomies. Finally, fully integrated into at least one department, graduates who hold double PhDs obtain the credibility necessary for promoting further cross-disciplinary work and hires.

### Topical Assemblages

I now want to return to the title of this essay and discuss how science studies and the humanities may help each other, both intellectually and

---

17.  A double PhD, however, is an option suitable only for intellectually mature and self-reliant students and for institutions with generous graduate funding policies—not to mention some curricular flexibility.

18.  The introduction of "designated emphases" and "graduate secondary fields" in PhD degrees at, respectively, the University of California and Harvard represent trends similar to the one I discuss here.

institutionally. My interest in the possibility of extensive connections between science studies and the humanities reflects a perception that the most promising approaches in science studies today do not borrow as much from the social sciences as they do from the humanities. This marks a new trend because, until recently, sociological or sociophilosophical models have largely dominated the field.

Since the mid-eighties, we have witnessed an increasingly systematic critique of the nature-society dichotomy through the work of Donna Haraway, Bruno Latour, Hans-Jörg Rheinberger, Andrew Pickering, and others.[19] This trend has questioned the previous exclusive attribution of agency to humans and social groups by foregrounding, instead, the role of the nonhuman (from living organisms to experimental apparatuses, inscription devices, and various instances of materiality). It has also placed an emphasis on the notion of temporal emergence, attributing it not only to human agency but to things themselves.[20] As they no longer privilege explanations based on the features, values, and behaviors of social groups, these "posthuman" trends within science studies no longer draw their interpretive tools from sociology, social anthropology, or Wittgenstein's later work—the standard toolbox of Kuhn and the Sociology of Scientific Knowledge (SSK).[21] Some are quite eclectic (as in Latour's case) while others (especially Pickering) draw explicitly from continental philosophy and Deleuze's work in particular.[22] Furthermore, Rheinberger's "experimental system"—a key interpretive framework in recent history and philosophy of the life sciences—is openly rooted in Derrida's notion of writing.[23] And while other contemporary science-studies practitioners

19.  See Donna Haraway, "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s," *Socialist Review* 15 (Mar.–Apr. 1985): 65–107; Bruno Latour, *The Pasteurization of France*, trans. Alan Sheridan and John Law (Cambridge, Mass., 1988); Hans-Jörg Rheinberger, "Experiment, Difference, and Writing: I. Tracing Protein Synthesis," *Studies in History and Philosophy of Science* 23 (June 1992): 305–31 and "Experiment, Difference, and Writing: II. The Laboratory Production of Transfer RNA," *Studies in History and Philosophy of Science* 23 (Sept. 1992): 389–422; and Andrew Pickering, "The Mangle of Practice: Agency and Emergence in the Sociology of Science," *American Journal of Sociology* 99 (Nov. 1993): 559–89.

20.  See the interesting debate between Galison, "Context and Constraints," and Pickering, "Beyond Constraint: The Temporality of Practice and the Historicity of Knowledge," in *Scientific Practice: Theories and Stories of Doing Physics*, ed. Jed Z. Buchwald (Chicago, 1995), pp. 13–41, 42–55.

21.  For a synopsis of the project of SSK and the historiography it has spawned, see Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (New York, 1998).

22.  See Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford, 2005), and Pickering, "On Becoming: Imagination, Metaphysics, and the Mangle," in *Chasing Technoscience: Matrix for Materiality*, ed. Don Ihde and Evan Selinger (Bloomington, Ind., 2003), pp. 96–116.

23.  See Rheinberger, "Experimental Systems: Historiality, Narration, and Deconstruction,"

have less specific philosophical reference points, they do share a systematic commitment to moving beyond the nature-society dualism inherited from both the social sciences and anglophone philosophy of science.[24] Posthuman, emergence-oriented science studies might prove to be one of the few ways to circumvent the dichotomy between realism and relativism that has crippled so much academic discourse in the last twenty years.

It makes sense, therefore, for science studies to view the humanities as a natural fellow traveler and likely collaborator. Not only do we share a familiarity with key philosophical resources and theoretical outlooks but we have a mutual interest in the materiality of inscriptions (both textual and visual), as well as a certain openness to recognizing nonhuman agency in such inscriptions—an openness gained from critiques of authorial agency, from philosophical analyses of what writing is and does, and from empirical studies provided by historians of print culture.

It comes as a real surprise, then, to find virtually no awareness of the exciting convergences between science studies and the humanities in statements on the future of the field published by prominent practitioners in the MLA's *Profession* or in the *Chronicle of Higher Education*.[25] While science and its epistemological authority is often invoked as a term of reference against which to weigh any future role for the humanities in the modern university, Barbara Herrnstein Smith was alone, at the 2005 MLA Presidential Forum on the "Future of the Humanities," to present science studies as providing an opportunity to reconfigure the relationship between the humanities and the sciences along more productive lines.[26]

Much more frequently, humanities practitioners cast science (typically treated as a monolith rather than as an assemblage of very diverse knowledge-making practices) as the cause of rather than the solution to the crisis they see gripping their field. It is not difficult to understand where that view may come from when one looks at the humanities' shrinking levels of student enrollment, faculty hiring, and research funds. Still, it is

---

*Science in Context* 7 (Spring 1994): 65–81 and *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube* (Stanford, Calif., 1997).

24. Examples include *Genetic Nature/Culture: Anthropology and Science beyond the Two-Culture Divide*, ed. Alan H. Goodman, Deborah Heath, and M. Susan Lindee (Berkeley, 2003), and *States of Knowledge: The Co-Production of Science and Social Order*, ed. Sheila Jasanoff (London, 2004). Most literature listed in note 32 below fits this category.

25. Even more so given the growing success and visibility of the Society for Literature, Science, and the Arts (SLSA) and its journal, *Configurations*.

26. See Barbara Herrnstein Smith, "Figuring and Reconfiguring the Humanities and the Sciences," *Profession* (2005): 18–27 and *Scandalous Knowledge: Science, Truth, and the Human* (Durham, N.C., 2005), pp. 108–29.

important to challenge it because it frames the relationship between the humanities and the sciences in ways likely to turn such a crisis into a permanent predicament.

Like the humanities, the sciences have not been spared cuts in federal funding in the last decade, but, unlike the humanities, they have managed to remain a dominant presence on campus. They keep providing substantial overheads from federal grants and royalties from patents licensing, and they are now developing more and more partnerships with the private sector. And, thanks to the technophilia that permeates contemporary culture, the sciences look cool, too; the figure of the hacker snatches some of the aura traditionally associated with that of the artist. By contrast, the humanities look less sexy in their posttheory phase, they produce few goods one can attach a dollar sign to, and they rely on a narrower range of external support (mostly private foundations and individual donors). Even the institutions we proudly take to be the humanities' feather in the cap—humanities centers—may look diminutive and peculiarly unspecialized to scientists.[27]

Education being the main "product" the humanities has to offer (a product whose value is both long-term and hard to quantify), it is highly unlikely that they will ever be able to match the sciences in terms of clout and resources. There is not much we can do about that. What we can do, however, is avoid being epistemologically intimidated by the sciences—a problem I see as much more serious than concerns about finances and institutional clout. The philosophers' early and somewhat stodgy disdain for the reductivism of the scientists' method has given way to either the endemic epistemological defensiveness of the humanities or to the science-envy of the social sciences. While the former stance often reflects attempts to defend old-fashioned academic privileges, the latter is equally predictable and unhelpful, but it has caught on. Administrators do say that the humanities produce knowledge and engage in research, but it is not clear what they exactly think when they utter or write those words.[28] The different teaching loads of science and humanities faculty provide mundane evidence that not all "research" is valued equally.

A central claim of this essay is that the sciences are here to stay and that

27.  I am a strong supporter of humanities centers and have only heartfelt gratitude for those colleagues who have worked so hard at developing them. Still, I find it difficult to repress a lingering feeling that while these centers are a great source of pride for the humanities, they may also be a sign of their ghettoization. It is important, I think, to use the resources of humanities centers not only to support conversations among the humanities but also to enable collaborations between the humanities and other fields and disciplines.

28.  On the genealogy of the notion of research in science and the humanities, see William Clark, *Academic Charisma and the Origins of the Research University* (Chicago, 2006).

their influence on campuses is not likely to diminish. While some professional schools, like law and business, have stable institutional ecologies that are largely independent of the sciences, the long-term role (or perhaps even the survival) of the humanities and the softer social sciences will depend, I believe, on their ability to develop a sustainable relationship with the sciences beyond that of teaching young scientists how to read and write.

By "sustainable relationship" I do not mean a stable or uniformly friendly association. The science wars have happened once already, and there is no guarantee that they will not flare up again. Rather than seeking some kind of disciplinary kinship between the humanities and the sciences—a naïve project, I believe—we should keep an eye out for points of contact or shared problems. We could then work at those locations for as long as the contact lasts and then move on to other points of intersection. These intersections are not going to be between science and the humanities in general but between specific lines of work in some scientific and some humanistic disciplines, for some period of time. Such collaborations may not even appeal to scientists and humanities practitioners for the same reasons. They don't need to. It's not important to define how these emergent intersections should look and why collaborations should emerge around them but rather to keep an eye out for them. And when they seem to happen, it is important not to frame them through the dichotomies—the "two cultures" image being a particularly influential one—that have framed previous conceptualizations of the relationship between science and the humanities.

When the then quasi-departing president of Harvard addressed several humanities professors at the celebration of the twentieth anniversary of the humanities center, he claimed that the humanities' key contribution to academia was to teach students about beauty—especially to science students who might otherwise miss out on it. Larry Summers's views have a classical pedigree. One could have found his sentiment expressed in nearly identical terms in eighteenth-century Parisian salons, where rough-edged mathematicians were introduced to the rules of civility and polite conversation to enable them to move on to careers in the social elite of the Académie des Sciences. What is most surprising is not that, in some quarters, the perception of the role of the humanities has changed little since the ancien régime but that a nontrivial portion of the profession seems to share Summers's belief that the humanities are, if not about beauty, at least about objects and texts as such. Emerging in the midst of the "crisis of the humanities," such a stance is, I think, a sign of defensiveness.

It is as if humanities practitioners have decided that it would be wise not

to attract negative attention to themselves. If we do not challenge the sciences we might be left relatively alone and perhaps spared some of the more painful cuts. If we focus on ethics rather than knowledge, culture rather than nature, rhetoric rather than truth, we might be able to coast along. We should therefore return to serious stuff like real history, thick descriptions, and the human. External observers may have thought that, for a couple of very good decades, continental philosophy had given the humanities intellectual pride and visibility (and, of course, the critics and enemies that come with that territory). But theory is now treated as some kind of original sin that those in the humanities will have to pay for for the rest of their lives and perhaps beyond that.

I consider myself a pragmatist and see nothing inherently problematic in the notion of retrenchment, especially if it is considered a temporary move to prepare a more proactive stance. But the humanities may be sliding, by default, toward retrenchment as a long-term strategy—a retrenchment that is largely framed by the assumption that success of the sciences is the cause (or at least the emblem) of the humanities' crisis. In addition, such a strategy goes against the most important results achieved by the humanities in the last thirty years. It would take a rather acrobatic loss of memory to forget that we have exposed, in some detail, the epistemological problems of any kind of historical writing, that we cannot continue to talk about thick descriptions and culture as anything more than virtual wholes, that the human is not demarcated but rather inextricably connected to the technological and the animal, that groups, communities, and identities are easy (and perhaps comforting) to imagine but impossible to connect to stable boundaries and distinctions, or that knowledge is too simple a category to properly explain how scientists successfully defend their claims or how engineers develop new technologies and products. It is equally puzzling to see how—in a stark example of category hopping—the passing of all of the authors of French theory is commonly read as the passing of the theory itself (as if people stopped appreciating opera when Wagner or Verdi died).

If a century ago the scientist was seen as someone who should have a well-rounded background in the arts and the humanities, today's science students seem to do well even without foreign languages—not to mention culture. I agree with Bill Readings that the inculcation of culture was a key task of university education at a time when the university was symbiotically connected to (and was expected to support) the nation-state but that it has lost much of its role in today's "university of excellence."[29] But if the

29. See Readings, *The University in Ruins*, pp. 70–88, 119–34.

inculcation of culture is becoming less of a priority in the contemporary university, then a strategy of retrenchment would not only end up casting the humanities as little more than service departments to the sciences but would do so at a time when the sciences may need fewer and fewer such services.

### Doing Humanities in the Field

Given what the future may have in store, it would seem wiser for the humanities to embrace a strategy of expansion rather than retrenchment. In particular, it would be necessary to rethink the relationship between the sciences and the humanities outside of a framework informed by traditional notions of disciplines and epistemological hierarchies. That is an extraordinarily difficult project, one likely to involve the unthinking of notions of both knowledge (the alleged domain of the sciences) and culture (the alleged domain of the humanities) and their replacement with something quite different. The better news is that such questions could be tackled not in their generality but within the material scenarios of time-specific collaborations between the sciences and the humanities around specific problems.[30]

As a starting point, it would be useful to encourage humanities students to look at science in ways that are not framed by the dichotomy between criticism and praise—the dichotomy that informed the science wars.[31] Criticism of the sciences (in the sense of exposing science's cultural, political, gender, and economic dimensions) has become so predictable as to provide only vanishing intellectual returns (though still remaining quite relevant in political terms, as shown by critiques of biased policies about global warming). The defensive praise of science or the ritualized acknowledgment of the epistemological inferiority of the humanities is not going to help either. Because the sciences don't have much use for praise from the humanities, such gestures only manage to infantilize the humanities themselves.

One could try to avoid such constraining conceptualizations of the relationship between science and the humanities by doing humanities in the field, that is, by using the traditional tools taught in humanities depart-

30. Failing to engage the sciences would be more than a missed opportunity, as sociobiologists and evolutionary psychologists like E. O. Wilson and Stephen Pinker are already "engaging" culture and human behavior in a manner they deem scientific. See Herrnstein Smith, *Scandalous Knowledge*, pp. 130–52.

31. See Latour, "A Few Steps toward an Anthropology of the Iconoclastic Gesture," *Science in Context* 10 (Spring 1997): 63–83 and "Do You Believe in Reality? News from the Trenches of the Science Wars," *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass., 1999), pp. 1–23.

ments to make sense of emergent scenarios associated with techno-scientific developments. As ethnographers of science have already demonstrated how many opportunities there are for this kind of work—and how remarkably rewarding it can be—there is no reason why this approach may not be taken up by other departments as well.[32] Doing humanities in the field may require the development of additional scientific skills, but such a retraining can be local and strategic, adding a few courses—not years—to a graduate program. This would only require some risk-taking on the side of the students, which is not likely to be a problem, and some flexibility around curricula and canons on the side of departments, which may be something of a problem.[33]

Possible research clusters and venues for doing humanities in the field are many. I offer only a few suggestions, knowing that they cannot encompass the whole range of possibilities:

1. *Literary technologies of science.* Courses on the *representation* of science in literature have become quite popular today. Taking a step further, faculty in literature departments could team up with science studies practitioners to train students to analyze the *literary construction of scientific claims*, that is, to look at science *as* literature, not just science *in* literature. This includes the argumentative structures, semiological devices, and constitutive metaphors of scientific texts—not only articles, but also textbooks, grant applications, patent applications, instruction manuals, and so on.[34] With the addition of perspectives from the history of the book and the sociology of print culture, literary skills could be directed to the study of the publication system of science—the role and structure of peer review

32. The pioneering works of Latour, Steve Woolgar, Karen Knorr Cetina, Sharon Traweek, and Michael Lynch have been followed by a wave of science ethnographies that include, but are by no means limited to, *Cyborgs and Citadels: Anthropological Interventions in Emerging Sciences and Technologies*, ed. Gary Lee Downey and Joseph Dumit (Santa Fe, N.Mex., 1997); Rabinow, *French DNA: Trouble in Purgatory* (Chicago, 1999) and *Making PCR*; Hugh Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (Berkeley, 1996); Michael M. J. Fischer, *Emergent Forms of Life and the Anthropological Voice* (Durham, N.C., 2003); Cori Hayden, *When Nature Goes Public: The Making and Unmaking of Bioprospecting in Mexico* (Princeton, N.J., 2003); Adriana Petryna, *Life Exposed: Biological Citizenship after Chernobyl* (Princeton, N.J., 2002); Charis Thompson, *Making Parents: The Ontological Choreography of Reproductive Technologies* (Cambridge, Mass., 2005); Peter Redfield, *Space in the Tropics: From Convicts to Rockets in French Guiana* (Berkeley, 2000); Sarah Franklin and Celia Roberts, *Born and Made: An Ethnography of Preimplantation Genetic Diagnosis* (Princeton, N.J., 2006); and Kaushik Sunder Rajan, *Biocapital: The Constitution of Postgenomic Life* (Durham, N.C., 2006).

33. Overall, humanities departments seem to be more rigid about their course requirements than history of science or science studies programs. It seems that, feeling marginalized on many levels, the humanities take pride in controlling the curriculum as if it were their last line of defense.

34. See *The Literary Technologies of Science*, ed. Biagioli and Colin Milburn (forthcoming).

practices, the peculiarity of the author-function in science, and the nature of scientific credit and its currencies.[35] These are issues of great concern for scientists, policy makers, and administrators.

2. *Emergence studies.* It is now difficult to remember that less than two decades ago it would have been unthinkable to predict what biotechnology was to become and the pervasive changes it would bring about. A decade or so later, the same could have applied to nanotechnology. But it is not surprising that—involving a mix of science and science fiction, results and promises—the dynamics through which these fields emerge and (sometimes) become bona fide technoscientific disciplines have been studied most perceptively by ethnographers, science studies, and literature practitioners.[36] It should not be difficult to sustain and develop that trend.

3. *Law and science* has proven to be a productive area of overlap among science, law, the social sciences, and the humanities.[37] Furthermore, the humanities were behind the development of authorship and copyright studies well before such topics started to receive the attention they command today.[38] The trend is continuing,[39] and the humanities (especially anthropology and postcolonial studies) remain well equipped to shape policy discussions about more recent, grayer areas of intellectual property doctrine—for instance, traditional knowledge and emergent scientific objects.[40]

4. *Web studies, new media, open source communities, digital humanities.*

35.  See Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago, 1998), and *Scientific Authorship.*

36.  See Stefan Helmreich, *Silicon Second Nature: Culturing Artificial Life in a Digital World* (Berkeley, 1998); Richard Doyle, *Wetwares: Experiments in Postvital Living* (Minneapolis, 2003); *Nanoculture: Implications of the New Technoscience*, ed. N. Katherine Hayles (Bristol, 2004); and Milburn, *Nanovision: Engineering the Future* (Durham, N.C., 2008).

37.  See Tal Golan, *Laws of Men and Laws of Nature: The History of Scientific Expert Testimony in England and America* (Cambridge, Mass., 2004); Jasanoff, *Science at the Bar: Law, Science, and Technology in America* (Cambridge, Mass., 1995); Lynch, "Circumscribing Expertise: Membership Categories in Courtroom Testimony," in *States of Knowledge*, pp. 161–79; Ken Alder, *The Lie Detectors: The History of an American Obsession* (New York, 2007); and the section "Focus: Science and the Law" in *Isis* 98 (June 2007): 310–50.

38.  See the seminal volume *The Construction of Authorship: Textual Appropriation in Law and Literature*, ed. Peter Jaszi and Martha Woodmansee (Durham, N.C., 1994).

39.  For an example of the intensely cross-disciplinary scholarship on intellectual property in science, technology, literature, and the arts, see *Making and Unmaking Intellectual Property*, ed. Biagioli, Jaszi, and Woodmansee (forthcoming).

40.  The work of Marilyn Strathern has been seminal to recent reconceptualizations of intellectual property in general. See Marilyn Strathern, *Property, Substance, and Effect: Anthropological Essays on Persons and Things* (London, 1999). Ethnographic and anthro-legal approaches have also proven very productive in analyzing the borders of intellectual property; see Hayden, *When Nature Goes Public*; Rosemary J. Coombe, Steven Schnoor, and Mohsen Ahmed, "Bearing Cultural Distinction: Informational Capitalism and New Expectations for Intellectual Property," *UC Davis Law Review* 40 (Feb. 2007): 891–917; Alain Pottage, "Too Much

These are areas of technoscience that have been studied with success by humanities practitioners since their inception.[41] The emergence of new media has added to the disciplinary mix, drawing participants from computer science and engineering, the visual arts, science studies, literature, philosophy, and film and media studies.[42] Similarly, new internet-based forms of collaborative sociability are quickly attracting the attention of ethnographers and science-studies practitioners.[43] Finally, a very recent arrival on the academic scene—the digital humanities—is generating a remarkable amount of interest, especially among younger scholars.[44] The pace of development in these areas guarantees that there will be an indefinitely large amount of topics for humanities-trained scholars.

   5. *Scientific ethics, bioethics, medical ethics, informed consent, the working of institutional review boards, animal rights, and so on.*[45] Without reverting to the human, students from the humanities could put their understanding of the posthuman to work to engage with practical ethical questions related to new scenarios brought about by the technosciences. With additional training, PhDs in the humanities would be well suited to work on ethical issues raised by the sciences (more so than ethicists with back-

Ownership: Bioprospecting in the Age of Synthetic Biology," *Biosocieties* 1 (June 2006): 137–59; and Michael Brown, *Who Owns Native Culture?* (Cambridge, Mass., 2003).

   41.   See Sherry Turkle, *Second Self: Computers and the Human Spirit* (New York, 1984) and *Life on the Screen* (New York, 1995).

   42.   Within the fast-growing body of literature on these topics, see Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago, 1999); Mark Hansen, *New Philosophy for a New Media* (Cambridge, Mass., 2004); Wendy Hui Kyong Chun, *Control and Freedom: Power and Paranoia in the Age of Fiber Optics* (Cambridge, Mass., 2006); Alexander Galloway, *Protocol: How Control Exists after Decentralization* (Cambridge, Mass., 2006); Lisa Gitelman, *Always Already New: Media, History, and the Data of Culture* (Cambridge, Mass., 2008); Eugene Thacker, *The Global Genome: Biotechnology, Politics, and Culture* (Cambridge, Mass., 2006); Galloway and Thacker, *The Exploit: A Theory of Networks* (Minneapolis, 2007); Kriss Ravetto, "Shadowed by Images: Rafael Lozano-Hemmer's Art of Surveillance" (forthcoming in *Representations*); and *Configurations* 10 (Spring 2002) and *Configurations* 10 (Fall 2002), a two-part special issue entitled "Makeover: Writing the Body into the Posthuman Technoscape."

   43.   See the various ethnographic contributions to *CODE: Collaborative Ownership and the Digital Economy*, ed. Rishab Aiyer Ghosh (Cambridge, Mass., 2005), and Christopher M. Kelty, *Two Bits: The Cultural Significance of Free Software* (Durham, N.C., 2008).

   44.   See the website of the HASTAC consortium, www.hastac.org, and Davidson and Goldberg, *The Future of Learning Institutions in a Digital Age* (forthcoming 2009).

   45.   The literature of scientific ethics is too vast to attempt to map here, but it is interesting that recent reconceptualizations of the animal, and therefore the reframing of discussions about animal rights, have come from the humanities. See, in particular, Cary Wolfe, *Animal Rites: American Culture, the Discourse of Species, and Posthumanist Theory* (Chicago, 2003); Akira Mizuta Lippit, *Electric Animal: Toward a Rhetoric of Wildlife* (Minneapolis, 2000); and Haraway, *When Species Meet* (Minneapolis, 2008).

grounds in analytical philosophy, which provides few tools to handle the hybrid nature of most contemporary scenarios).[46]

6. *Science, visuality, imaging techniques, and so on.* Such analyses should not be limited to the relationship between canonical art and canonical science (for example, Leonardo and anatomy) but expanded to encompass the study of the widespread production and role of all sorts of imaging techniques in science (both still and moving images).[47] They could also venture in the direction of science-based art, like bio-art and tissue art.[48]

7. *Environmental studies.* There are already a number of good examples of humanities practitioners' engagement with environmental issues, and the trend could be easily expanded, especially as ecology and the environment become more integrated in the research agenda of postcolonial studies.[49]

8. *Scientific fraud and misconduct.* Literary scholars and art historians have all of the skills necessary to both assess and question the authenticity of texts and objects and to engage in theoretical discussions about the meaning of *authenticity*, *copy*, and *fake*. Furthermore, the attribution of authorship and the detection of fraud are among the oldest tasks claimed by the humanities (consider the Donation of Constantine).[50] There is no

46. The case of the Icelandic genome is a good example of an emergent ethical problem that is tackled, in real time, by historians and anthropologists of science. Paul Rabinow, Gísli Pálsson, Mike Fortun, and Skuli Sigurdsson have occupied quite different but visible positions in the debate. See Gísli Pálsson and Rabinow, "The Icelandic Controversy: Reflections on the Transnational Market of Civic Virtue," in *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*, ed. Aihwa Ong and Stephen J. Collier (Oxford, 2006), pp. 91–103; Skuli Sigurdsson, "Yin-yang Genetics, or the HSD DeCODE Controversy," *New Genetics and Society* 20 (Aug. 2001): 103–117; and Mike Fortun, *Promising Genomics: Iceland and DeCode Genetics in a World of Speculation* (Berkeley, 2008).

47. Among the vast literature, see *Representation in Scientific Practice*, ed. Michael Lynch and Woolgar (Cambridge, Mass., 1988); *Making Art and Picturing Science*, ed. Caroline A. Jones and Galison (New York, 1998); Lorraine Daston and Galison, "The Image of Objectivity," *Representations*, no. 40 (Autumn 1992): 81–128; Dumit, *Picturing Personhood: Brain Scans and Biomedical Identity* (Princeton, N.J., 2003); Brian Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago, 2006); and the special section on "Science and Visual Culture" in *Isis* 97 (Mar. 2006): 75–132.

48. See *Signs of Life: Bio Art and Beyond,* ed. Eduardo Kac (Cambridge, Mass., 2006); "Parasite Visions: Alternate, Intimate, and Involuntary Experiences," www.stelarc.va.com.au/articles/index.html; and www.tca.uwa.edu.au/atGlance/pubMainFrames.html

49. For a starting point, see Lawrence Buell, *Writing for an Endangered World: Literature, Culture, and Environment in the U.S. and Beyond* (Cambridge, Mass., 2001), and Dana Phillips's critique of ecocriticism in *The Truth about Ecology* (New York, 2003). See also Peder Anker, *Imperial Ecology* (Cambridge, Mass., 2002); Latour, *Politics of Nature: How to Bring Science into Democracy*, trans. Catherine Porter (Cambridge, Mass., 2004); and Verena Andermatt Conley, *Ecopolitics: The Environment in Poststructuralist Thought* (London, 1997).

50. For instance, see Natalie Zemon Davis, *Fiction in the Archives: Pardon Tales and Their Tellers in Sixteenth-Century France* (Stanford, Calif., 1987).

reason not to use these skills to study scientific fraud and misconduct both as intellectual categories and as sets of practices.[51]

No doubt, many other examples could be added to this list. Taken together, these clusters and lines of research indicate the abundance— perhaps the overabundance—of opportunities not only for engaging the technosciences but also for articulating collaborations with scientists confronting the same issues. More importantly, all of these opportunities show that they are precisely that—opportunities—not disciplines or fields. While it is impossible to predict the impact of these topics on received departmental structures and curricula in the humanities, the stakes seem too high to worry about academic hardware. What matters the most is to keep the game in play, not the canon in place, and see how it looks from where it goes.

51. See Daniel J. Kevles, *The Baltimore Case: A Trial of Politics, Science, and Character* (New York, 1998).

Mind, infinite; finite copies of the
fulfilled intentions of an, 102

Symbols, which embody actual things with more direct and enhanced import than do the things themselves with their distractions, imposition, and irrelevances, 83