Chapter 3
Cultural Boundaries: Settled and Unsettled

Thomas F. Gieryn

Realms of knowledge meet at the boundaries—cultural boundaries. Sometimes they clash, and at other times they do not. When scientific knowledge bumps up against religion, or against politics, ideology, market logics, common sense, or poetry, the result may be explicit and often passionate debate over the exact location of the boundary and the implications of drawing the line here or there for issues of power, authority, allocations of resources, and truth. But not always. Sometimes the cultural boundaries that separate realms of knowledge sit there peaceably, with little manifest attention from anybody, structuring everyday practices without noticeable contestation or doubt. Whether cultural boundaries become the occasion for clash or for reconciled juxtaposition depends on where one chooses to look. That is, different kinds of *places*—physical sites, with bounded geographic location and distinctive recognizable physical form—either open cultural boundaries to contestation or prevent such an overt clash from happening.

Swidler's (1986) distinction between settled and unsettled historical periods can usefully be applied to cultural boundaries, such as those between science and religion. Settled boundaries are stable and secure, institutionalized and routinized, structuring and enabling as though on autopilot, needing little or no manifest attention from the people who live inside them with little hesitation or scrutiny. Unsettled boundaries move into the foreground of discursive consciousness. Their location and even their existence become a matter for people to negotiate explicitly as they reflect on the potentially wide-ranging implications of a boundary becoming real here or there. Settled boundaries, by contrast, have that reality. They exist in a tacit but durable and imposing state, and they shape behavior, interpretive understandings, and allocations of valued resources. Unsettled boundaries are up for grabs, the focus of dispute and contestation among social actors each trying to arrange cultural territories and landmarks into a map that best suits their interests and purposes. Only in an unsettled state does the intersection of realms of knowledge result in a clash over their boundaries. The invisibility of settled cultural boundaries precludes manifest consideration and argument.

The potency of scientific knowledge—its assertion of objective truth, its promise of progress, its image of political and moral neutrality—has incessantly brought it into contact with other spaces in the culturescape (Gieryn, 1999). Whether or not

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that contact is marked by clash or quiet coexistence depends, in part, on the physical places where the encounters between cultural spaces are reified. One nonobvious place of science in the United States is the Federal Building and Courthouse in Harrisburg, Pennsylvania (see Fig. 3.1). It was the site of the 2005 trial known as Kitzmiller v. Dover Area School District, where Judge John E. Jones III ruled that intelligent design (like creation science more generally) is religion and not real science. The court also found that members of the Dover School Board hid their religious intentions as they sought to incorporate theories of intelligent design in the science curriculum of their public schools, in violation (the judge ruled) of constitutional separations of church and state (the Establishment Clause). A more obvious place of science is the James H. Clark Center at Stanford University (see Fig. 3.2), home to the University's Bio-X Initiative, a prize-winning building designed by Norman Foster and named after the founder of Netscape. It opened in 2003, bringing together 40 to 50 faculty scientists from medicine, the life sciences, engineering, computer science, and physics to work in gleaming new labs and offices on problems of bioinformatics and new medical therapies.

The Harrisburg Federal Courthouse is indisputably the setting for a clash of knowledge: science versus religion, the next round (indeed, the trial was sometimes referred to as Scopes II). This place put the limelight on the cultural boundary between science and religion, repeatedly erasing and redrawing it as adversaries sought to use the force of law to secure legitimacy for boundaries that served their interests best. By contrast, Stanford's Clark Center renders the cultural boundaries

Fig. 3.1 The U.S. Federal Building and Courthouse in Harrisburg, Pennsylvania

Fig. 3.2 The James H. Clark Center, Stanford University

of science in a geographical and architectural form that suppresses the possibility of clash. It is a setting for watching science as its boundaries get settled both in and through the building itself, without dispute or apparent stakes. Scientists go about their daily research without giving much explicit thought to how the design and location of this building materializes and stabilizes cultural boundaries between science and various other realms of knowledge, sets of practices, and institutions.

Exactly what happened inside Judge Jones's courtroom in Harrisburg in fall 2005? Simply put, a clash of knowledge took the form of "boundary-work," that is, "discursive attributions of selected qualities to scientists, scientific methods and scientific claims for the purpose of drawing a rhetorical boundary between 'science' and some less authoritative residual non-science" (Gieryn, 1983, p. 782). Boundary-work consists of strategic and practical demarcations of science carried out by scientists, would-be scientists, journalists, judges, and ordinary folk. It is pursued not just by philosophers of science like Karl Popper (whose famous demarcation criteria are deployed often in boundary-work, as rivals exploit Popper's reputation to justify their rhetorical games of inclusion and exclusion). Boundary-work is triggered by contested credibility, where adversaries use cartographic depictions of cultural differences to legitimate their claims to authority (over knowledge of human origins) and control (over the contents of what gets taught in school science classes). In these discursive contests, advocates on each side construct a space for science by selectively attributing qualities and potentials to "science" in a manner that makes them appear to be squarely inside.

For example, Eric Rothschild, attorney for the plaintiffs, stated the following in his opening remarks on Day One of the Dover trial:

> There is no data or laboratory work demonstrating intelligent design. It is not a testable hypothesis. It misrepresents established scientific knowledge. Let's be perfectly clear: there is no controversy in the scientific community about the soundness of evolution and that intelligent design is not a scientific topic at all. (*Kitzmiller v. Dover Area School District*, 9/26/2005)

Later, Rothschild added:

> Science does not consider supernatural explanations because it has no way of observing, measuring, repeating or testing supernatural events.… No matter how many stones intelligent design throws at the theory of evolution, the only alternative it presents for the development and diversity of life … is a miracle, an abrupt appearance, an act of supernatural creation. That, by itself, establishes intelligent design as a religious argument, not a scientific argument, for the creation of biological life that cannot be taught to public school students. (*Kitzmiller v. Dover Area School District*, 9/26/2005)

This is classic boundary-work: Selective characteristics are attributed to science for purposes of distinguishing it from a "lesser" knowledge-producing activity. Inside the rhetorically constructed boundaries of science, one finds several cultural landmarks. Science is based on data, laboratory work, observation, measurement, and consensus among all scientists over provisional explanations of natural phenomena. Outside the boundaries of science, Rothschild said, one finds divine miracles, supernatural events, and religion. The features that Rothschild attributed to science may or may not correspond to what actually goes on in laboratories or peer-reviewed journals "first time through," and that is not really the point. The boundaries of science he constructed in court are later representations that cannot be analyzed in terms of their accuracy but rather only in terms of their immediate practical and strategic utility for plaintiffs' interests in getting discussion of intelligent design out of Dover High School science classes.

For sociologists, there is no absolute cultural space for "science," nor are the boundaries around that space universal or transcendent (or, in some sense, epistemologically necessary). Clashes involving scientific knowledge are unending. In the Dover trial, boundaries became discursive weapons used by adversaries to pursue their goals at that episodic moment, in that specific place, amid that particular clash (with its long path-dependent history). Of course, those people defending the legitimacy of intelligent design as part of the school science curriculum did their own boundary-work. Patrick Gillen, attorney for the defense, observed in his opening remarks:

> Intelligent design theory is really science in its purest form, the refusal to foreclose possible explanations based on the claims of the dominant theory or the conventions of the day. … It shares the attitude of those who worked in the field of quantum mechanics, who posited the wave-particle duality, despite the fact that to some it smacked of supernaturalism. … Dover's modest curriculum change embodies the essence of liberal education, an education that frees the mind from the confines, the constraints, the conventions of the day and, in so doing, promotes the curiosity, the critical thinking, the quest for knowledge that has served our country so well. (*Kitzmiller v. Dover Area School District*, 9/26/2005)

Gillen's challenge is to draw the cultural boundaries of science so that intelligent design appears to have a defensible location inside. Notice that the defining features of science are vastly different from those deployed by Rothschild for the plaintiffs.

To Gillen and the defense, science is about openness to new and even untested theories, resistance to dogma (this was seen as ironic by those for whom intelligent design is religion!); science is about curiosity and critical thinking. Is science therefore to be defined by the knowledge that scientists accept as legitimate because of its observable and measurable support, or is science to be defined by its process of endless searching and skepticism of received wisdom? Emphatically, it is not the job of sociologists to answer this question (as though they, like Popper, could become referees for the endless contest of deciding who and what is really scientific). In identifying the cultural boundaries such as those that were drawn and redrawn at the Dover intelligent design trial, sociologists are to watch how boundary-work serves the professional interests of scientists seeking to retain exclusive and authoritative jurisdiction over the domain of natural truths and how it serves the interests of Dover parents and school board members seeking to insert their beliefs about biological origins and diversity into the science curriculum.

The opening remarks by Rothschild and Gillen at the *Kitzmiller v. Dover* intelligent design trial launched one recent skirmish in the centuries-old clash of knowledge involving science and religion. Adversaries constructed different boundaries and spaces for science as they sought a legal mandate for including intelligent design in school science classes—or for excluding it. To be sure, in choosing to watch science as it takes place in the Harrisburg Federal Building and Courtroom, the sociologist arrives at a conclusion that is hardly a startling revelation. The very idea of a law court compels the architecturally orchestrated co-presence of adversaries in the spatial presence of a judge (or jury) who will produce a binding verdict. It is easy to miss the critically important role of this *place*, a courtroom, in fomenting a clash between science and religion. But there are plainly other places where science happens (religion, too), and they are typically located, designed, and built in a way that minimizes the likelihood of a clash of knowledge.

Boundary-work does not happen all of the time, nor in all places. Depending on where one happens to look, the boundaries between realms of knowledge—or, more broadly, between cultural systems—exist politely, never triggering the clash and contestation so heated inside the Harrisburg courthouse during *Kitzmiller v. Dover Area School District*. Only occasionally (and in identifiable conditions like courtrooms) do the cultural boundaries between science and non-science become the object of actors' explicit discursive practices, destabilized (or defended) in the pursuit of credibility and legitimacy. Only occasionally does science become a contingently constructed space, with boundaries that are only as durable as their immediate discursive utility in contests for power and control. For the rest of the time, nobody bothers to ask, or *needs* to ask whether this is science or not. So, what preempts boundary-work? What averts the clash of knowledge? In places other than those built purposefully to force adversaries to confront their differences face-to-face, the boundaries of science (or religion) are settled. They are so thoroughly institutionalized and stabilized that "everybody knows" what science really is. The line between science and other domains of culture is treated unproblematically, as though it were a given, as though it were fixed for all working purposes.

Simply put, what social conditions obviate the need for people even to wonder about the cultural boundaries of science, much less dispute them? What allows scientists (and others) to get on with their lives with the presumption that everybody already knows what science is and is not. To find answers, sociologists must look in other kinds of places where science occurs, in buildings that ensure the institutionalization and routinization of cultural boundaries that just "are" (rather than being contingently constructed rhetorical objects of contestation). Science assumes a more settled state (for example) at Stanford's Clark Center, a spectacularly beautiful research facility that, in the materiality of its bricks, glass, and mortar, answers the question "What is science?" even as the people who work there (and those looking in) have little warrant to ask.

The Clark Center was hailed as "Laboratory Building of the Year" in 2004. Its 245,000 gross square feet cost about $147 million and has a maximum occupancy of 700 workers. The building consists of three separate wings, rectangular on the outside perimeter but concave on the inside to create an open-air courtyard. It has three stories and a basement. All of the spaces facing the courtyard have floor-to-ceiling windows and are rimmed with balconies so that anybody can see what is going on in every lab or office. Two wings are mainly for wet-bench experiments; the third is for computational work. The cavernous research spaces have an industrial feel because they are almost completely open and because all of the utilities (electricity, for example) drop down from a fully exposed four-foot ceiling zone. Unseparated by walls or even partitions, members of one research group spread into the next. Inside the vast open laboratory spaces, all of the benchwork, cabinetry, desks, large pieces of heavy equipment (such as a centrifuge) are on wheels so that they can be moved around easily in response to rapidly changing research projects and patterns of collaboration between scientists. Even office pods are on wheels so that they can be situated (temporarily, of course) near or far from benches where experiments are furiously underway. Some of the lab benches are conspicuously painted bright yellow (black is the norm) to signify "hotel space" for visiting scientists, who often come from other universities or corporations for short periods. The Clark Center is located strategically at the intersection of Stanford's other buildings for basic life science research, engineering, and medicine.

According to Stanford's public-relations machine, the Clark Center is "the vanguard of a new era," a "radical lab planning arrangement … that is designed to remodel the landscape of scientific and technological research" (Adams, n.d.). Stanford President John L. Hennessy called it "a building whose architecture mirrors our vision of the groundbreaking work that will go on there" (Baker, 2003). Chemist Tom Wandless said that "it's an experiment in social engineering" (Hall, 2003, p. 6).

What kind of science is the Clark Center trying to engineer by virtue of its strategic location, stunning design, and cutting-edge infrastructure? An answer to that question exposes a different cultural boundary of science—not religion, but politics. The intersection of science and politics has the potential to be as contentious as the boundary between science and religion. However, in contrast to the fracas in the Harrisburg courthouse, all seems calm and agreeable inside Stanford's Clark

Center. Nobody there seems troubled by the difference between "is" (science) and "ought" (politics). Everybody seems too busy with their experiments to worry much about the stuff of politics: allocating scarce resources, planning for a good society, and satisfying the diverse interests of stakeholders through compromise or sheer power. Researchers rarely discuss the larger political implications of their work. Avoiding a clash, they suspend consideration of exactly where the line is to be drawn between science and politics. The search for new knowledge about nature occupies the full attention of those working at the Clark Center, who seem to have little time for politics.

Actually, the Clark Center is full of politics, but in this place politics coexist peacefully with science, and boundary-work recedes almost invisibly into the implicit. Politics are inscribed in the walls and floors of the Clark Center, where they are very difficult to discern through the lenses of architectural beauty or technical efficiency. (There is no question that the place is gorgeous and that it works.) The Clark Center is indeed engineered, just like any other technological artifact, so its visions of a good society, its power and interests, its desires and fears, get built into the architecture of the place (Winner, 1986; see Gieryn, 2002). There is no clash of knowledge in this laboratory building, even though both science and politics are present inside. Scientific research is front stage, and politics lurk in the wings, so deeply embedded in backstage materiality that nobody seems to notice the potential for contention or the need for boundary-work.

Whose politics drove the design of the Clark Center? Which political ambitions were translated into the architecture and materiality of this building, which, in its spatiality, provides one built-in map of the borderlands between science and politics? What is the political definition of science such that this laboratory, the Clark Center at Stanford, becomes the perfect place to pursue it? John H. Marburger, III, is Science Advisor to President George W. Bush, Director of the Office of Science and Technology Policy, and, incidentally, holder of a Ph.D. in applied physics from Stanford University (1967). Marburger's many speeches and interviews offer a cartographic display of the intersection of science and politics. Specifically, he creates a space for science targeted at specific identifiable political goals. Speaking before the Council on Governmental Relations, Marburger (2006) addressed the future of the American research university. He acknowledged that these institutions are in a "volatile state" and face an "indefinite future." These unpredictable circumstances, especially in the absence of "central planning," increase the need for "flexibility to respond to changing conditions." Referring specifically to university investments in new buildings, Marburger stated bluntly that the U.S.'s "decentralized system" for funding research creates "competitiveness for research grants in a target area" and that appealing new facilities can lure "outstanding new faculty who can attract new grants." He proposed a "collective business model" for research universities, warning that there "are bound to be losers" in the anticipated "tilt toward private sector research" that will bring about a "much stronger link between economic productivity and research." At a time when there will be an "increasing intensity of competition for a large and expanding but finite federal research funding," Marburger looked to increasing the share paid for by the "private sector, particular by industries that

benefit from technologies that build on the scientific products of the universities." In a speech at Rensselaer Polytechnic Institute, Marburger (2003) emphasized the "entrepreneurial" nature of scientific research these days, encouraging scientists to "take risks" and noting that the "commercialization" of fields like nanotechnology offer "natural bridges to interdisciplinary collaboration."

It is difficult to miss the free-market logic that drives Marburger's politics of science. Research is very nearly reduced to the quest for technological innovations that will restore America's global market competitiveness. That faith in market competitiveness colors Marburger's thinking about the future of the American research university, which must struggle for scarce funding by adopting flexible, interdisciplinary, problem-oriented (or targeted) research agendas in an entrepreneurial spirit and by producing knowledge commodities with commercial potential. To be sure, this emphasis on the commodification of science is only one among many ways to trace the boundary between science and politics. For example, Marburger says little about the need for central planning to insure that science is directed toward the public good and that taxpayers' support of research should produce new ideas and products that are subsequently made available freely (or cheaply). Differences of opinion on whether science is a public good or a profitable commodity could, under certain conditions, elicit the same kind of intense debate and boundary-work that took place over intelligent design in the Harrisburg courthouse.

But that debate does not happen inside Stanford's Clark Center, where the settled boundaries between science and politics are so deeply embedded in "necessary" architectural and infrastructural designs that nobody notices them anymore. The Clark Center was conceived of and built to maximize the values and goals expressed in Marburger's rhetoric. Marquee architect Norman Foster was hired to design a signature building to lure scientists with proven abilities to obtain grants. The open floor plan is the pinnacle of decentralization and flexibility, for space can be opened up or shut down quickly and cheaply in response to whatever line of inquiry suddenly seems promising commercially. There are no walls to divide scientists into discipline-bound silos. Yellow "hotel" lab benches welcome transients from industry, benefiting both Stanford and corporations through the immediate exchange of ideas and interests. The Clark Center stands at the junction of pure and applied research, proximate to work in basic sciences, engineering, and medicine.

Nobody asks about the alternative visions of science that got left outside the Clark Center. The building itself provides one ready and convincing answer to the question of what science is, an answer well aligned with the current political economic structure of resource flows on which Stanford, and certainly every major research university, depends. When Norman Foster and Bio-X scientists initially sat down at the design table to sketch out this new jewel of a lab, there was surely abundant boundary-work, for the group faced decisions about what science is (and what its intersections with political economy are). The architect's atelier, like the courtroom, is a place that invites contestation over cultural boundaries that remain in an unsettled state until ground is actually broken for a new building. But now that the Clark Center has been constructed and occupied, it provides only answers (no longer explicit boundary-work). They are visible in the kind of research projects

undertaken there, in the patterns of collaboration and communication within the Center's spaces, in the grants coming in, and in the patents going out. No one has time to ask about the cultural boundaries of science and politics. They have been built-in, settled … with no clash of knowledge.

The places that people build shape the social practices inside. To explain why the juxtaposition of knowledge does not always result in a disputatious clash, one must ask *where* cultural systems encounter each other. Some buildings, through their physical design, ornamentation, and the symbolic understandings associated with them, engender passionate conflict over cultural boundaries. Courtrooms and perhaps architects' studios are examples. Other places bury the potential for argument in arrangements of brick and mortar that settle the boundaries and remove them from explicit discursive struggle. Place segregates contention from calm, allowing the settled boundaries of science to coexist with never-ending clashes over where lines between realms of knowledge should be drawn.

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