Border control at the frontiers of science

Cultural Boundaries of Science: Credibility on the Line
by Thomas F. Gieryn
University of Chicago Press: 1999. 398 pp. $21, £16.75 (pbk)

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> "Science is the systematic enterprise of gathering knowledge about the world and organizing and condensing that knowledge into testable laws and theories. The success and credibility of science is anchored in the willingness of scientists to: (1) expose their ideas and results to independent testing and replication by other scientists; this requires the complete and open exchange of data, procedures, and materials; (2) abandon or modify accepted conclusions when confronted with more complete or reliable experimental evidence. Adherence to these principles provides a mechanism for self-correction that is the foundation of the credibility of science."

> "When one arrives at the mathematical theories on which quantum mechanics is based, one realizes that the attitude of certain physicists in the handling of these theories truly verges on delirium. ... One has to ask oneself what remains in the mind of a student who has absorbed this unbelievable accumulation of nonsense, real hogwash! It would appear that today's physicists are only at ease in the vague, the obscure, and the contradictory."

Thomas Gieryn tells us that specimens such as those above are exercises in "cultural cartography", or "boundary work". The first was hammered out by the Panel on Public Affairs (PPA) of the American Physical Society to help the public distinguish pseudo-science from the real thing. The second was advanced by the mathematician Jean Dieudonné, deploring what physicists try to pass off as mathematics. Both the PPA and Dieudonné are drawing borders around acceptable practice. Physicists find themselves within the borders of the PPA's definition, but outside Dieudonné's.

Those engaging in such boundary work may believe that they are trying to distinguish between effective and ineffective ways of acquiring or formulating reliable knowledge. But Gieryn considers that it is not knowledge that is at stake, but epistemic authority — recognition that one is a rightful purveyor of knowledge. If scientists see it differently, this is not because of self-interested deceit: "[M]ore often than not, I suspect, scientists really believe that their representations of science tell it like it is. … Many believe that the epistemic authority of science is *justified* … by the unique, necessary, and universal elements of its practice — behaviors, dispositions, methods, rules, tools, and languages that simply work best to make truth. …[But] credibility in the culturescape is not decided in tinkerings at the lab bench or in the refereeing of a manuscript or in the machinations of instruments, statistics, or logic."

Gieryn offers five case studies of credibility seeking.

- John Tyndall's "double boundary work" in trying to distinguish nineteenth-century science from both religion and engineering. The practical utility of science counted for much in demarcating the first border but little in establishing the second, while science as a flowering of human culture made little appearance on the first border but was much in evidence on the second.
- Whether social science belongs in the same territory as natural science depended on whether one was debating its proposed inclusion in the new US National Science Foundation shortly after the Second World War, or arguing 20 years later about the establishment of a separate National Social Science Foundation.
- The debate in 1836 over whether the chair of logic and metaphysics at the University of Edinburgh should be awarded to an eminent phrenologist or a traditional logician. "In what world of meanings did ... phrenology seem plausible, truthful, useful, scientific, and chair-worthy?"
- The very public 1989 disputation over cold fusion, in which one of the tests of proper science was whether members of the press were or were not granted priority over scientists during post-presentation question periods.
- A long examination of what Gieryn very much enjoys calling the science of "imperial economic botany", which starts in a Cambridge laboratory, and concludes, via the West Indies and after a quarter of a century in India, back in the England of the Second World War, as a crusade for the use of compost over that of artificial fertilizers.

In an epilogue, Gieryn views the recent 'science wars' between scientists and those who study science as more boundary work. (Here I have to report that he errs in taking a remark I once made about the nature of science teaching to be about the nature of science.) It is tempting for a physicist, reviewing a book by an acknowledged social constructivist, to view the book across that particular border, and since Gieryn himself brings the matter up, there is no need to resist.

Am I, then, appalled that Gieryn has, through his scientific studies of science, "come to see such concepts [as 'rational', 'empirical', 'modern' and 'science'] not as a set of rules for proper fact-construction, but as rhetorical tools deployed in the pursuit or defense of epistemic authority, or in efforts to deny legitimacy to rival claims"? No, I am not. He makes a compelling case that the concepts are repeatedly used by scientists in precisely such ways. I do not find this as interesting as he does, but then, why should I?

One of my personal idiosyncracies is that I can't help wanting to know if dispositions really are so localized in the brain that, when highly developed, they can raise bumps on the skull, if deuterium really did undergo fusion in those palladium electrodes, whether children really are healthier if they're raised on organically fertilized food. Questions like these are outside the boundaries of Gieryn's kind of social science. It's hard to tell whether he finds such extraterritorial matters also boring, but they are clearly irrelevant to what interests him professionally.

So, for me, Gieryn's clinical detachment makes him a less interesting storyteller. But I would say the same about the stultifying convention that banishes any hint of human activity from most research papers in fields closer to my own. Indeed, if one outcome of the science wars were to make physicists less uncomfortable with using rhetoric when describing their work, and sociologists less queasy about objective facts, life could become a great deal more entertaining on both sides of the border. ■

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