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Ronald N. Giere. Scientific Perspectivism, Stephen H. Kellert; Helen E. Longino; C. Kenneth Waters (Editors): Scientific Pluralism.

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knowledge in verbal interactions—having been raised in a form of life where color knowledge is pervasive—than the pitch-blind are able to pretend knowledge among those who can perceive perfect pitch. In essence, they develop an empirical program for testing the limits of interactional expertise, examining how far those who don't share practice in a form of life can pass as functioning members.

Because they view knowledge as primarily tacit knowledge, the authors' normative focus is on who possesses knowledge. Indeed, they spend some time assessing how minimal a body one needs in order to know, in a side dispute with Hubert Dreyfus's view that full embodiment is necessary. By contrast, many sociologists might see knowledge in the first instance as disembodied and socially distributed—in minds, to be sure, but also in databases, books, journals, institutional routines, interactional practices, and the like. On this view, there might not be any individuals who know, who can encapsulate the knowledge gained in a domain. Knowledge would tend to be alienated even from the contributions of those who helped construct it. If one followed Hegel rather than Polanyi, a quite different normative evaluation of expert knowledge would result.

WILLIAM T. LYNCH

Ronald N. Giere. *Scientific Perspectivism*. iv + 151 pp., illus., index. Chicago/London: University of Chicago Press, 2006. \$30 (cloth).

Stephen H. Kellert; Helen E. Longino; C. Kenneth Waters (Editors). *Scientific Pluralism*. (Minnesota Studies in the Philosophy of Science.) xxix + 248 pp., figs., tables, index. Minneapolis/London: University of Minnesota Press, 2006. \$50 (cloth).

The best introduction to Ronald Giere's *Scientific Perspectivism* is not the one in the book itself. There he comes across as a Science Wars peacemaker armed with a set of apparently timeless isms—realism, naturalism, perspectivism. Far better to start with a previous collection of essays, *Science without Laws* (Chicago, 1999), where the attractively dissenting character of these isms is much more vivid. The dissent is from the Logical Empiricism that reigned in the American philosophy of science of Giere's youth. He calls on his philosophical colleagues to liberate themselves (his verb) from Logical Empiricism (his capitals) more fully than they have so far. They need, for one thing, to drop the

epistemic privileging of what humans happen to be able to see unaided. An eyeball for Giere is just an instrument for probing the world; knowledge of something eyeballed is not magically more secure knowledge than knowledge acquired via other instruments, otherwise constructed. Here is his realism: we can know, thanks to human-built instruments, about what we cannot eyeball—the “unobserved.” More provocatively, he wants philosophers to stop treating science as a big logical/linguistic puzzle. No more papers on the raven paradox, please. Philosophers interested in science should take their interpretive tools not from the philosophy of language but from science itself. Here is his naturalism: the classiest source of insight into natural science is that part of it that deals with human social/cognitive activity, in its biological, psychological, and sociological dimensions.

Perspectivism is Giere's name for the idea that scientific knowledge is always relative to a point of view, a perspective. Eyeballs, human-built instruments, and theories are all, Giere suggests, perspective-defining systems. We use them to probe the world, and, when we use them well, we learn, up to a point, how the world really is. Yet our probings are always limited by the standpoints that our observational and theoretical instruments define. In *Scientific Perspectivism*, Giere starts with eyeballs, specifically color-detecting human ones. Surveying contemporary color science, he concludes that color as normal humans perceive it arises from an interaction between what is in the world and what is in our (contingently evolved, selectively sensitive) heads. Next he discusses imaging technologies, with examples from cosmology and neuroscience. On the book's cover, and replicated within as one of twelve color plates, is a beautiful color image of the Trifid Nebula. What the image shows, we learn, is not how the Trifid looks when viewed through a telescope on earth or snapped on color film there, but what it would look like if eyeballed from a suitable distance up in space, without atmospheric interference. Producing that image involved a complex procedure, invented by James Clerk Maxwell and updated by the photographer-astronomer David Malin. The result is best described, in Giere's emphatic words, as “an observation of the Trifid from the perspective provided by Malin's three-color process,” not simply as “an observation of the Trifid” (p. 43).

The same sorts of qualifiers ought to tag claims to theoretical knowledge, in Giere's view (and he is fully reflexive about this view on views applying to his own). Even the best-

confirmed scientific theories deliver the world through cognitive filters that might have been otherwise and so would have picked out different features. Giere's chapter on theories is the longest in this short book, and it digests a complex story he has told before, notably in *Explaining Science* (Chicago, 1988), about what theories are and how they relate to, among other things, data, models, hypotheses, the world, maps, kinds, experiments, paradigms, and logico-linguistic hang-ups about truth and reality. Suffice it to say that, for Giere, conceptual building blocks—what he calls “principles”—stand to theories as detection capacities stand to observational instruments, anatomical and mechanical. For theories and instruments alike, what enables our finding out about the world also limits what can be found out, since what enables invariably excludes. Giere puts the abstract lesson concretely in his chapter in the collective volume under review here, *Scientific Pluralism*: “As an instrument may be able to record infrared or ultraviolet, but not both, theoretical principles may deal with mechanical forces or electromagnetic propagation, but not both. Newton's equations, I would say, define a particular mechanical perspective on the world; Maxwell's equations define an electromagnetic perspective” (p. 32).

Scientific Perspectivism closes with a reaching-out-to-the-social chapter on scientific activity as “distributed cognition.” But it is the preceding explicitly and implicitly visual chapters that overlap most obviously with historians' interests. Giere signals an especially suggestive affinity at the start of his chapter on imaging technologies, where, citing Lorraine Daston and Peter Galison, he lauds recent research into how built instruments came, in the name of increasing observational objectivity, to be so widespread. Daston and Galison's historical project on objectivity is, like Giere's, image focused. It is also pluralist. A “plurality of visions of knowledge, understood in the most capacious sense of fidelity to nature, is likely to be a permanent aspect of science,” write Daston and Galison in their recent book *Objectivity* ([Zone, 2007], p. 371). Giere's perspectivism is both an endorsement and an explanation: since instruments and theories probe reality selectively, there will always be excluded alternatives—and potential gains to knowledge in taking them up. But whatever one's historical tastes, *Scientific Perspectivism*, like Giere's *oeuvre* generally, is well worth getting to know. Along with Ian Hacking's writings, Giere's are tonic for anyone who ever felt let down by philosophy of science

in raven mode and wondered what else might be possible.

Giere taught for many years at the University of Minnesota Center for Philosophy of Science, which in 2002 hosted the conference now memorialized in *Scientific Pluralism*. In their supremely conscientious introduction, editors Stephen Kellert, Helen Longino, and Ken Waters place scientific pluralism in its historical and philosophical contexts before summarizing the contributors' findings of plurality in different sciences and proposals as to why it persists. Besides Giere on “perspectival pluralism,” Kellert on disciplines, Longino on the scientific study of behavior, and Waters on gene-centered biology, the volume includes Alan Richardson on logical empiricism, Michael Dickson on quantum dynamics, Geoffrey Hellman and John Bell on mathematics, Esther-Mirjam Sent on economics, C. Wade Savage on the mind/body problem, and Carla Fehr on the evolutionary biology of sex. Although different readers will have their favorite chapters, a standout for the historically inclined will be Richardson's. The logical empiricist dream of unified science, Richardson notes, was the dream of people who sought in science the image of a liberal democratic social order. Before today's pluralists congratulate themselves too vigorously on their preference, they might reflect a little on that connection.

GREGORY RADICK

Edward J. Hackett; Olga Amsterdamska; Michael Lynch; Judy Wajcman (Editors). *The Handbook of Science and Technology Studies*. xi + 1,080 pp., illus., indexes. Third edition. Cambridge, Mass./London: MIT Press, 2007. \$55 (cloth).

This is the third handbook of its kind, at least by its own reckoning. The first edition, which featured Derek de Solla Price as a coeditor, appeared in 1977 and was called *Science, Technology, and Society: A Cross-Disciplinary Perspective*. The second edition, which appeared in 1995 (and on whose advisory board I served), was the first one to bear the name *Handbook of Science and Technology Studies*, but without the definite article that graces the title of the third edition. At first glance, these successive editions recount the disciplinary consolidation of “science and technology studies” (STS). On closer inspection, it becomes clear that whatever consolidation has occurred over the past thirty years, it has *not* been in terms of disciplinary identity.