

Anjan Chakravartty. *A Metaphysics for Scientific Realism: Knowing the Unobservable*. xvi + 272 pp., figs., tables, index. Cambridge: Cambridge University Press, 2007. £45 (cloth).

A Metaphysics for Scientific Realism aims to do two things. The first is to develop a viable realist position that capitalizes on insights offered by entity realism and structural realism while transgressing them. Semirealism comes out as a form of selective skepticism (or selective optimism) that restricts epistemic commitment only to those parts of theories that can be interpreted as describing aspects of the world (i.e., detection properties) with which scientists have managed to be in causal contact. The second aim is to develop a metaphysical framework proper for semirealism: a non-Humean framework based on a dispositional account of causal properties and a network of *de re* necessities. Anjan Chakravartty admits that this is just one option available to scientific realists but claims that it gives semirealism a high degree of internal coherence.

These two aims create a somewhat unstable mix. If semirealism is seen as *inviting* commitment to a non-Humean metaphysics, this might be reason enough to make it unattractive to all those who prefer barren metaphysical landscapes and/or to reinforce the well-known empiricist arguments that antirealism alone can deliver us from metaphysics. If, as seems to be the case for Chakravartty, this rich metaphysical picture is an add-on to semirealism's selective optimism, why not leave it behind, thereby making scientific realism a more inclusive philosophical position?

Part 1 articulates semirealism as an epistemic view. One of its key commitments is to concrete causal structures. These consist in relations of first-order causal properties, which, Chakravartty claims, can account for causal interactions (experimentation, etc.). He also insists (rightly, we think) that one cannot have knowledge of the concrete causal structures without also having knowledge of the natures of things that make them up, and vice versa. Nevertheless, in philosophical contexts the term "structure" is typically meant to imply a contrast between a concrete relational system and its (abstract) structure and that there can be knowledge of a structure without concomitant knowledge of the entities instantiating that structure. Within semirealism, concrete causal structures (and their knowledge) contain everything up to the very natures of particulars. Since nothing is left out, however, we wonder whether one can talk intelligibly about the philosophically ordinary notion of structure.

Be that as it may, semirealism's central tenet is that one should believe only those parts of theories that can be minimally interpreted as referring to "detection" properties. These are properties that are causally (experimentally or otherwise) detected by scientists. Detection properties are distinguished from "auxiliary" ones. These are attributed to particulars by theories, but (unlike detection properties) there is no reason to believe in them since they have not yet been detected (though they might be detected in the future). We pass over in silence certain worries about demarcating detection properties from auxiliary ones via what Chakravartty calls "minimal interpretation" of theories, but this is an area in which certain tensions lurk for semirealism.

Part 2 presents a rich discussion of certain metaphysical views and a lot of insightful arguments. Chakravartty leaves the door open for less metaphysically loaded but realist-friendly conceptions of causation, laws, and properties. His own view, however, is that there are continuous causal processes that are grounded in the dispositional nature of causal properties. Being powers, causal properties fix the laws and cast a net of *de re* necessities. There are various concerns about all these, but we shall raise only a general one. Semirealism has urged commitment to causally detected properties and has clothed auxiliary ones with suspicion. But none of the extra metaphysical stuff in Part 2 of *A Metaphysics for Scientific Realism* (*de re* necessities, ungrounded dispositions, etc.) is detectable. Their role is solely explanatory—notably, they distinguish causal laws from merely accidental regularities (pp. 94–95). So "the deeper metaphysical foundations" of semirealism could well be (and in all probability are) mere auxiliaries. This creates a tension. We are invited to accept a certain set of double standards: while in the case of scientific theories epistemic optimism requires causal contact with the world, thus denying that the theories' explanatory virtues carry epistemic significance, in the case of semirealism's metaphysical foundations the only virtues in play are merely explanatory.

If Parts 1 and 2 of the book deal with epistemology and ontology, Part 3 deals with semantics. Here Chakravartty capitalizes on his outstanding work on models and representation to offer a complex and inspiring account of how models can represent concrete things, though they involve idealizations and abstractions. With respect to idealizations, he draws on certain analogies between representation in the arts and sciences and advances an interesting con-

ception of approximation that has reference (but not truth) and deidealization as its focal points.

Chakravartty's book has clearly pushed the realism debate one step forward. It explores new ways to defend scientific realism, opens up the issue of the connection between scientific realism and metaphysics, and offers a sustained defense of a thick metaphysical conception of the world. It is a first-rate book. There is no doubt that it will be read and read by all those interested in the scientific realism debate.

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Harry Collins; Robert Evans. *Rethinking Expertise*. 160 pp., illus., figs., tables, bibl., index. Chicago/London: University of Chicago Press, 2007. \$29.99 (cloth).

While some have assumed that relativistic approaches in the sociology of scientific knowledge eliminate any grounds for legitimating expert knowledge, Harry Collins and Robert Evans argue that their program provides the basis for a theory of expertise that distinguishes expert from nonexpert judgment. In *Rethinking Expertise*, a work directed primarily against the concept of lay expertise developed by Brian Wynne and Steven Epstein (as well as attributional or relational theories of knowledge common in constructivist approaches), limits are placed on the ability of the public to judge the knowledge produced by scientists. Beginning from the assumption that knowledge is primarily tacit, the authors argue that those who know more than others can't prove it, while those who know less than others can't judge them. Legitimate discrimination flows downward from experts rather than upward from the public.

A corollary is that (tacit) knowledge is a real entity that one either does or does not possess, rather than an ability to pass as knowledgeable, as many constructivists would argue. Knowledge is about doing, not talking. Collins and Evans suggest that a lesser form of expertise, which they dub "interactional expertise"—the province of journalists and science-studies ethnographers—can master the talk but that it brings one no closer to walking the walk like contributory experts, those who are actually specialists in a particular area. Collins's own interactional expertise in gravitational wave physics is tested, by means of expert-judged quiz answers, against the knowledge of other experts in the field. The verdict? He can pass as an expert at the level of discourse, though he cannot carry out scientific work in practice. The tacit knowl-

edge possessed by contributory experts is viewed as a skill gained through practice; thus the more hands-on experience, the better the expert.

While the authors grant that experts need not be credentialed if they have relevant practical experience (in which case they have unrecognized experience-based contributory expertise rather than being "lay experts") and deny that scientists can speak authoritatively outside their narrow field of expertise, their overall position is that nonexperts need to defer epistemologically to those who actually have contributory expertise. How does one know who these experts are? In principle, one could ask how much experience they have, but in practice knowing which experts to defer to is itself something only the core experts know. They possess tacit knowledge of who has tacit knowledge, or "unspoken understandings of who is to be trusted among those who work in the esoteric core of the science" (p. 20). The public (and journalists) who bought into the mistaken view that vaccines cause autism were duped by a charismatic scientist who did not deserve credit. Similarly, patients who dig up health information on the Internet, or even consult primary source medical journals, can't know who deserves to be read and who ought to be ignored.

There is no doubt that Collins and Evans capture something interesting about the self-warranting nature of expert knowledge, but we can question whether that is the best basis for a normative theory of knowledge with empirical foundations, which is what they seek. The fact that experts consistently know whom to pay attention to and whom to ignore may imply that they are knowledgeable about who is in the know, but it may also be that they are prejudiced by their training, paradigm, or interests. Collins and Evans, like Thomas Kuhn before them, take the opposite lesson from the history and sociology of science than some of their followers do. Where many interpreted the fact that paradigms channel inquiry in selected ways as *prima facie* grounds for questioning the authoritative nature of expert knowledge, Kuhn saw the limitations of paradigms as self-imposed by scientists, who would also know when to change paradigms. Likewise, Collins and Evans see no applicable outside perspective, since the form of life that experts inhabit is truly understood only by other participants.

In an interesting chapter where they use empirical, Turing-style tests to distinguish active participants in a form of life from those who merely imitate, the authors show that color-blind people are better able to simulate color