REVIEW

KEEPING IT SEMIREAL

Anjan Chakravartty, *A Metaphysics for Scientific Realism: Knowing the Unobservable*. Cambridge: Cambridge University Press. 2007. Pp. 251. £45.00 HB.

By Dean Rickles

Scientific realism is arguably the default position of most philosophers of science. It is loosely characterised in terms of a commitment to the observable *and* unobservable parts of the world that our theories seem to describe: quarks and gluons as well as tables and chairs. There has been plenty of ink spilt in the debate between realists and anti-realists, but fortunately Chakravartty does not add to it, proposing instead to attack the debate from an angle very different from that which is usually adopted: he investigates the *foundations* of the debate itself in order that philosophers better understand their views' commitments. To this end he proposes to do two things: (1) "investigate the core elements of promising versions of contemporary realism" by laying bare their various commitments; and (2) "develop a metaphysics that makes sense of these commitments" (p. xiii). The latter, argues Chakravartty, is necessary for a proper understanding of what realism involves (in terms of epistemic commitment) since one needs to first know what it *is* that one is being realist about. In this way he hopes to reconnect the epistemology and metaphysics of science and scientific knowledge.

The book comprises eight chapters, divided into three parts, dealing, respectively, with (I) the state of the art in the realism/anti-realism debate, (II) the ontological commitments of realism (i.e. the metaphysics), and (III) the epistemological aspects of realism (including representation, abstraction, and idealisation). I can say right off the bat that he has written an engaging, first-rate book that all philosophers of science would do well to scrutinise.

Chakravartty introduces the varieties of realism as views displaying what he calls 'selective scepticism': only believe in *some* aspects of what theories say. Of course, any realist position will exhibit *some* form of selective scepticism, as will most anti-realist positions (that is, not *all* parts of a theory are ever involved in one's ontological commitments). However, the strategy here is utilised specifically to escape the pessimistic meta-induction (PMI) since the belief-apt aspects will be chosen so as to remain independent of the discontinuities wrought by theory-change. The realist will be sceptical about just those aspects that are left behind in such changes, retaining commitment only to that which is retained or recoverable (in some sense) from the successor theory.

Chakravartty claims that these selectively sceptical proposals come in two broad types: 'entity realist' (= believe in entities that can be *manipulated* and used to *intervene* in the world with observable results) and 'structural realist' (= believe in relational structure over the relata, or entities, that determine the structure). Of course, these appear to be directly opposed to one another. However, Chakravartty develops his own selectively sceptical position, 'semirealism', which synthesises 'the best insights of' entity realism and structural realism (on the basis of mutual entailments he claims hold between them); and he argues that entity realism and structural realism both lead to semirealism when pressure is applied. The vital link is provided by 'detection properties': causal properties leading entity realists to believe in their entities. (These are contrasted with *auxiliary* properties that might be causal but are not detectable and so ought not to be given definite ontological credence). But the relations that structural realists will claim define their structures are, says Chakravartty, nothing but relations between these selfsame detection properties. Knowledge of detection properties, however, cannot help but involve knowledge of the particulars that have them, for particulars are (minimally) compresent properties found together according to certain regularities. This I take to be the central argument of Chakravartty's book (or at least an essential supporting pillar), so I shall focus on this for the remainder of this review – the subsequent chapters of his book develop and defend this basic idea (superbly integrating portions of recent metaphysics and analytic philosophy with philosophy of science, I might add), namely that any defensible form of scientific realism must involve these causal properties and the particulars (minimally understood as above) they reveal and relate.

I think Chakravartty is right in his objection that entity realism must smuggle in belief in theory through the backdoor: (1) on account of the fact the entities' properties pick out the kind of relations they bear and these properties are themselves theoretical; and (2) on account of the fact that our knowledge of entities comes from relations, and these relations are just what theories describe. However, I am not so convinced by the objections to *ontic* structural realism (OSR) that develops in chapter three, nor by the distinction between auxiliary and detection properties and the hard work this distinction is put to. I shall consider these in turn, but given space constraints I can only convey the gist of my worries.

First, I think Chakravartty ties realism, and by extension OSR, too strongly to his idea of selective scepticism, which in turn stems from the desire to avoid PMI. However, as much recent work in the philosophy of physics literature has shown (or at least suggested), there are more or less *direct* ways of motivating OSR that are quite distinct from those bound up with the standard debate between realists and anti-realists. I have in mind a different range of cases here. For example, one can look to aspects of gauge theory and the background independence of general relativity as examples that are used to support structural realist positions that do not make any reference to PMI. Moreover, what these cases appear to suggest is that the notion of a coherent bundle of (space–time) localised causal properties breaks down: either the fundamental quantities violate separability and Humean supervenience (in the case of gauge field theories and, many have argued, standard quantum mechanics) or, as in the case of classical general relativity, the diffeomorphism invariance forbids a notion of quantities being localised at space–time points and seemingly forbids the viewing of monadic properties as fundamental. This would, then, appear to involve a disconnection between realism (*qua* Chakravartty's characterisation) and the theories one is realist about.

This appears to point to the fact that structural realism does not necessarily go in the direction of entity realism, and so does not necessarily lead to semirealism. That said, I do ultimately agree with Chakravartty that the ability to escape PMI is an important part of any realist position, and that this must involve some selectivity. My only issue is with the *motivation* of this selectivity that, as Chakravartty sets it up, is liable to seem rather *ad hoc*. The absence of a discussion of these newer aspects of structural realism is, to my

mind, the only flaw in this otherwise excellent book – though it is one we can perhaps trace to their relatively recent emergence.

Second, the distinction between auxiliary and detection properties is a vital component of Chakravartty's metaphysics for scientific realism. Auxiliary properties are taken to be those that are not involved in detection (say, producing a spark on a scintillation screen), even though they might well be causal (perhaps they are a hidden part of some mechanism leading to a detection property of some other sort). Entity realists are supposed to reject these, purely in favour of detection properties. This is supposed to help entity realists avoid PMI, since detection properties will be *robust* with respect to theory-change whereas auxiliary properties might well be jettisoned (his exemplar case here is the luminiferous ether, thought to play a direct causal role in optical, and later electromagnetic phenomena, yet never detected). Ontological commitment ought then to be restricted to the detection properties. Chakravartty argues that one of the goals of scientific investigation is to *transform* auxiliary properties into detection properties (p. 69). However, Newton thought that he *had* detected absolute space with his bucket experiment. This 'detection' was shown to have a different interpretation with the demise of Newtonian mechanics. But if both auxiliary properties and detection properties exhibit fragility as a result of theory-changes then it seems the distinction is broken-backed. Chakravartty has an escape, of course: one must be able to *manipulate* said object. One cannot very well manipulate absolute space: by definition it is dynamically decoupled from physical processes. However, if we tie our realism to manipulation and intervention in this way then we face the impoverished account that Hacking's bare entity-realism faces, rendering much that is of interest in modern physics and cosmology out of bounds for realists.

Chakravartty wants to synthesise the best of realism and expunge its worst in order to develop the most defensible form of realism possible. This is a laudable goal, but I'm not convinced by the position that results, namely semirealism. However, one cannot fault the basic message of the book: if we want to talk about realism and anti-realism, we cannot ignore the deep metaphysical issues that lurk just under the surface.

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