

## Recalling Habermas-esque experimental realism

Hans Radder, *The Material Realization of Science: From Habermas to Experimentation and Referential Realism*. Revised edition, with a new Postscript, Dordrecht: Springer, 2012. Pp. xix + 205. £XXX.00 HB.

This is a revised edition of Hans Radder's Habermas inspired study of scientific experimentation and realism. The previous English edition (1988) has been out of print since 2004. (The book first appeared in Dutch in 1984.) The author (together with the editors of the Boston Studies in the Philosophy of Science) has deemed it worthy of resuscitation. Perhaps it is. There are certainly a number of lasting elements of continuing interest, some of which indeed strike to the heart of the contemporary debate on scientific realism. But even with the support of some revisions and a new thirty-page postscript, for a mainstream philosopher of science the book falls short of seriously advancing the current debates, feeling quite dated overall and lacking purposeful engagement with the past 25 years of research.

There's more novelty on offer for those looking for an alternative, 'continental' fix on the philosophy of science. An original element of Radder's study is its appropriation of some of Jürgen Habermas's complex ideas to experimentation and scientific realism. To this end the first two chapters provide a critical review of the relevant points of Habermas's philosophy of the natural sciences, truth, and rationality. Radder examines some of the major themes of the German intellectual heavyweight, such as Habermas's "consensus theory" of truth and the notion of "communicative action", central to his pragmatic theory of meaning. For the uninitiated the appraisal of Habermas does not make for an easy read, however. For better or worse, I am not ashamed to admit a dip into a Habermas-for-Dummies text (and even after some trying I can't quite claim to 'get it').

Radder's own views on scientific experiments (Chapter 3) build on, or are inspired by, those of Habermas. Radder analyses experiments as "reproducible, theoretically interpreted material realizations." Here the title concept of *material realization* of science comes to the fore, serving to emphasise the material and technological dimensions of science (as opposed to its linguistic-theoretical dimensions). The concept of material realization of an experiment refers to a set of actions needed to carry out an experiment, such that they can be specified in everyday, science-free language. This concept is put to use in defining a Habermas-esque sense in which propositions from experimental sciences can be taken to be "verifiably true." Radder also insists that a successful experiments should be *reproducible*, which he takes to be

a platitude not in need of an argument.

Chapter 4 provides a “referential realist” interpretation of experimental science. Here Radder develops his conception of *verifiable truth* that can be applied to a singular proposition (*C*) from the experimental natural sciences. Roughly speaking, *C* is verifiably true iff *C* is either a part of a “plausible” theoretical description of a reproducible, materially realizable experiment, or it can be deduced from other verifiably true propositions. (Roughly speaking, a theoretical description is “plausible” if it is accepted by the scientific community.) This sui generis, pragmatic conception of scientific truth clearly presents a radical departure from the usual correspondence idea. In an equally radical turn, Radder completely rejects the traditional idea that realism requires a commitment to a degree of representational success. The overall outcome is a realist position that is “rather moderate” by virtue of implying that a claim of reference “can only tell us *that* a term refers, but not *what* the referent ‘really is’.”

The motivation for such non-representational, solely referential realism springs from radical conceptual discontinuities in the history of science, exemplified by the transition from Newtonian mechanics to relativistic and quantum theories. Due to these conceptual ruptures we can attribute truth—verifiable truth, that is—to scientific propositions only relative to a theoretical description, and there is no way to compare these truths across theories, or to speak of theories approaching *the* truth, as the classic convergent realist would have it. Nevertheless, Radder argues that due to formal and mathematical continuities that accompany these conceptual ruptures there is a sense in which corresponding terms in “irreconcilable” theories (e.g. Newtonian vs. Einsteinian mass) can (co)refer to the same elements of reality. But this (co)reference, like truth, must of course be understood in Habermas-esque terms, in relation to reproducible materially realizable experiments. (The two are connected: the verifiable truth of *C* ensures the reference of the descriptive terms of *C*, but not the other way around.)

Radder’s is a very thin realist position, indeed. All we know of electrons, for example, is that they possess such “aspects” that satisfy his criterion of reference (relating to the reproducible material realization of the relevant experiments). What we cannot do, however, is to “assemble all these ‘aspects’ together into one coherent picture, into an unambiguous representation of reality.” (p. 100) I would suspect that for many readers this strikes as *too* thin, with (co)reference being altogether too cheap to satisfy the canons of realism. For example, for Radder “phlogiston” and “oxygen” (co)refer, and only the relative limitations of the phlogiston theory in its pragmatic and technological aspects prevent it from being “plausible” in a way needed for realist commitment. (p. 106) But perhaps a close comparison of Radder’s position with those occupying the mainstream (anti-)realism debate is somewhat

pointless. However one understands ‘realism’, Radder’s realist position should be appraised in its own terms, by keeping in mind his radical departure from the (nowadays) standard realist semantics.

Chapter 5 illustrates and motivates Radder’s realism in terms of the history and philosophy of quantum mechanics. The discussion initially focuses on the different facets of Bohr’s evolving understanding of the correspondence principle, before taking a stab at the measurement problem. In my view the latter, while interesting, fails to live up to the somewhat glib statement that the “measurement problem, as far as its philosophical aspects are concerned, can be relatively easily analyzed and subsequently solved.” (p. xix) I found the detailed discussion of the correspondence principle, by contrast, the most rewarding part of the book. It is interesting to note how the complexities here directly relate to on-going concerns regarding the classical-to-quantum transition as a historical case against scientific realism. Many of the key issues concerning the inter-theoretic correspondence at stake are still under intense debate today.

One obvious connection—briefly discussed in the Postscript—is to (epistemic) structural realism, which is motivated by the kind of correspondence that Radder carefully examines. According to him, the history of the correspondence principle demonstrates the radical conceptual discontinuity between classical and quantum physics, leaving room only for empirical and “formal” correspondence. For Radder this formal correspondence is enough to locate the (co)referring terms in the two theories so as to make room for his referential realism. While I am far from convinced that a purely *formal* inter-theoretic correspondence can serve to define epistemic commitments worth calling ‘realism’, I see more scope than Radder for construing the theoretical correspondence between classical and quantum physics in a way that transcends a purely formal and mathematical connection.

The new Postscript connects some of the book’s key themes to Radder’s later work, adds some further points and refinements, and briefly draws connections between referential realism and some competing views, such as constructive empiricism and structural realism. Radder makes little contact with the growing literature on the semantics of theoretical terms in the context of scientific realism—an unfortunate omission in my view. It would have also been nice to see a more elaborated engagement with the subsequent literature on experimentation, as much of the novelty of Radder’s focus on the experimental and material dimensions of science has waned since the writing of the book in the early 1980s. The richness of Radder’s original thought recalled in this book would have warranted a more thorough reflection on the ensuing developments on these enduring topics.