

## A Case Study of Case Studies: Scientific Realism and Integrated HPS

By: Anjan Chakravartty

Case studies of past and present science, whether focused on the interpretation of specific theories, or on the nature of theory change over time, are often presented as evidence for or against the viability of scientific realism. One use to which such evidence is put is in evaluating the viability of forms of selective realism: forms that advocate belief in certain “components” of theories, as opposed to their entire descriptive content. The motivation for selective realism often stems from hopes of responding to the so-called pessimistic induction on the history of the sciences, which problematizes realism in the present by pointing to a history of discontinuities in theoretical beliefs in the past. Selective realists (such as French, Hacking, and Worrall, to name just a few) are inclined to invoke components of theories that putatively survive these discontinuous shifts, thus putatively vindicating realism. Historical case studies are used not merely to illustrate such contentions, but as arguments for them. Conversely, cases are also used by critics of these views to suggest that the interpretations of past science suggested are untenable. In this paper I consider the question of how probative historical case study evidence can be in testing forms of selective realism, focusing on three prominent versions of the selective approach (each of which admits of finer-grained variations in the literature): explanationism; entity realism; and structural realism. In each case I suggest that while case studies do serve as a precondition of philosophical analysis, they are not decisive in the way that many participants to debates about selective realism think they are (cf., in this connection, more general considerations concerning the use of historical case study evidence suggested by Pitt, and contested by Grandy). I offer three arguments to support this thesis, each targeting disputes regarding the viability of one of the three selective realist strategies mentioned above.

The first argument concerns debates about the prospects of explanationism: the attempt to ground selective realism in those components of scientific theories that describe what is “responsible for” – that which is indispensable or essential to explaining – the empirical success of a given theory.

Discussions here commonly focus on the question of whether it is possible, by means of considerations of scientific attitudes, methodologies, and practices, to demarcate what is genuinely explanatory (for example, in the caloric theory of heat, as argued by Psillos and contested by authors such as Chang and Stanford). I argue that several worries (familiar, I think, from other contexts of debate) concerning the nature of truth in historical narrative, historiographical objectivity, and unanimity of ontological commitment within scientific communities, problematize the role of case studies in thinking about explanationism. In this section of the paper I draw parallels with and extend arguments of a more general nature found in recent work by Schickore.

A second argument focuses on entity-realist-type strategies for selective realism (as presented by Cartwright, Giere, and Hacking, and developed by a great many since, including Massimi) and their critics. The problematic here is generally framed very specifically in terms of versions of the pessimistic induction and responses thereto. I argue that while historical cases furnish the initial subject matter of investigation, arguments on either side are quickly and naturally transformed into disputes about how best to strike an appropriate balance between emphasizing sense or reference in accounts of the meanings of theoretical terms, and the credibility of forms of meaning holism or contextualism and causal theories of reference and meaning in different contexts of scientific knowledge. Here, disagreements about semantic considerations function as a proxy war for disputes between selective

realists and antirealists, and it is my contention that, very plausibly, it is the commitments to realist and antirealist stances that various interlocutors bring to their historical case studies that drive their semantic commitments, and not the other way around.

A final argument targets structural-realist-type strategies for selective realism and their detractors. The problematic here varies according to the form of structuralist hypothesis at issue, but in each case, I maintain, the tenability of the selective realist proposal rests not, as some authors would suggest, on the historical cases that serve as subject matters for analysis, but rather on a number of logical, conceptual, and metaphysical issues concerning the definitions of the term 'structure' on which different variants of structuralism rest. Through a brief tour of the range of these definitions (from the Ramsey-sentence structuralism of authors including Papineau and Worrall, to the ontic versions of structuralism advocated by authors including Ladyman and French, and including my own favored approach to structuralism incorporating a dispositional analysis of properties of scientific interest), we see that historical cases are a substrate on which these forms of selective realism are imposed. The case studies themselves, however, and contrary to what is sometimes suggested, cannot hope to decide, by means of the historical narratives they present, which if any of these forms of selective realism is tenable.