



# Narrative and evidence. How can case studies from the history of science support claims in the philosophy of science?



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## ABSTRACT

A common method for warranting the historical adequacy of philosophical claims is that of relying on historical case studies. This paper addresses the question as to what evidential support historical case studies can provide to philosophical claims and doctrines. It argues that in order to assess the evidential functions of historical case studies, we first need to understand the methodology involved in producing them. To this end, an account of historical reconstruction that emphasizes the narrative character of historical accounts and the theory-laden character of historical facts is introduced. The main conclusion of this paper is that historical case studies are able to provide philosophical claims with some evidential support, but that, due to theory-ladenness, their evidential import is restricted.

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## 1. Introduction

It is widely accepted that philosophical conceptions of scientific knowledge and practice need to be adequate to the historical record of science. A common method for warranting the historical adequacy of philosophical claims and doctrines is that of relying on historical case studies. Often, and in a wide variety of philosophical areas, reconstructions of selected episodes from the history of the sciences are supposed to exemplify conceptual points or provide philosophical doctrines with evidential support.

For example, defenders of various types of scientific realism have claimed the historical record to agree with their philosophical agendas. The historical fates of the luminiferous ether (Hardin & Rosenberg, 1982; Kitcher, 1993; Psillos, 1999; Worrall, 1994), the caloric theory of heat (Psillos, 1999) and phlogiston theory (Ladyman, 2011) were taken to support realists' claims about the continuity of reference or about the preservation of approximately true theoretical constituents across theoretical ruptures. Yet anti-realism too has claimed to be supported by the historical

evidence. Case studies of historical developments in fields such as quantum mechanics (Cushing, 1994) and hereditary theory (Stanford, 2006) exemplify the (transient) underdetermination of scientific theories. Social constructivists have heavily relied on case studies as well. Attempting to demonstrate to skeptics that even the so-called hard sciences are amenable to sociological analysis, they have presented social explanations of the emergence of the standard model of particle physics (Pickering, 1984), of the early searches for high fluxes of gravitational radiation (Collins, 1985), of the detection of solar neutrinos (Pinch, 1986), and of Millikan's oil drop experiments (Barnes, Bloor, & Henry, 1996). At present, case studies continue to play a role in the philosophical exploration of more restricted issues, such as the workings of scientific modeling practices, the robustness of scientific results, scientific concept formation, visualization in science, and so on.

In most of these areas, historical case studies have been taken to provide philosophical claims with independent evidence. They are sometimes even thought to settle philosophical conflicts, since they seem to allow for an assessment of which philosophical doctrine agrees most with the historical facts. And yet, the idea that history provides the philosophy of science with unproblematic evidence in the form of case studies has an air of naïveté. Problems arise with

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regard to how episodes are chosen for analysis, how we can infer from a limited number of historical cases to a general philosophical claim, what constitutes a historical fact, whether and how historical reconstructions are informed by philosophical commitments, what type of evidence they offer exactly if so informed, and how to deal with the existence of plural, conflicting case studies.

This paper addresses some of these questions. It seeks to clarify what evidential functions historical case studies can play in the context of philosophical debates. It argues that in order to assess case study evidence, we first need to understand the methodology involved in producing historical case studies. It therefore presents an account of the historiography of science that emphasizes the narrative character of historical accounts and the theory-laden character of historical facts. The main conclusion of this paper is that historical case studies are able to provide philosophical claims with some evidential support, but that, due to theory-ladenness, their evidential import is restricted.

The paper has five parts. In the first part I discuss some recent contributions to HPS methodology, most importantly Jutta Schickore's criticism of the so-called "confrontation model". I argue that while the confrontation model is indeed as problematic as Schickore suggests, the intuition that historical case studies provide evidence to philosophical claims need not be equally misguided. The second part presents a narratological account of historical case studies and explores the ways in which historiography is a constructive endeavor. The third part explains in which sense historical facts are theory-laden. The fourth part distinguishes between different evidential functions that historical case studies may be said to fulfill: providing novel information, forcing belief revision, confirming philosophical claims, and adjudicating between conflicting philosophical views. Having distinguished between these four evidential functions, in the fifth part I offer an analysis of how case studies can support philosophical claims despite being theory-laden. I argue that case studies do provide some degree of empirical confirmation despite being laden with theoretical assumptions, but that their evidential import is limited. They can fulfill some, but not all of the evidential functions distinguished. In particular, they fall short of adjudicating between conflicting philosophical doctrines.

Before I begin my discussion, I need to add a word on the focus of this paper. First, this paper is not about the relations between the history and the philosophy of science in general, nor about the many different roles that historical arguments may possibly play in the philosophy of science. There exist various forms in which historical research and material may inform and become relevant to the philosophy of science. Yet in this paper, I restrict my discussion to a specific "genre" of historical writing, namely case studies. Second, my arguments concern the use of case studies for the empirical justification of philosophical claims. There exist other uses of case studies worthy of discussion, heuristic, hermeneutic and illustrative uses for example. In this paper, I do not put a strong focus on such non-evidential uses. I am primarily concerned with empirical justification, and with whether historical case studies can provide it.

## 2. Historical evidence and the confrontation model

The intuition behind philosophical use of case studies is often inductivist. More than merely exemplifying philosophical theses, the use of case studies conveys the expectation that there will be more cases similar to the one described, and that therefore the actual episode under study reveals some general or at least typical features of the scientific endeavor.

Unfortunately, this makes philosophical uses of historical case studies vulnerable to a version of the problem of induction. Given

that the field of history is vast and complex, defending a general philosophical interpretation of scientific knowledge on the basis of a small set of historical cases is objectionable. The cases may have been selected simply because they accord with the philosophical picture defended, while other historical episodes that would be harder to reconcile it with have been ignored. Thomas Nickles warns that history is similar to Bible exegesis: "if one looks long and hard enough, one can find an isolated instance that confirms or disconfirms almost any claim" (Nickles, 1995, p. 141). On the basis of similar considerations, Joseph Pitt detects a dilemma in the philosophical use of historical case studies:

On the one hand, if the case is selected because it exemplifies the philosophical point being articulated, then it is not clear that the philosophical claims have been supported, because it could be argued that the historical data was manipulated to fit the point. On the other hand, if one starts with a case study, it is not clear where to go from there – for it is unreasonable to generalize from one case or even two or three. (Pitt, 2001, p. 373)

The dilemma between top-down manipulation and bottom-up insignificance leads Pitt to claim that even the best historical case studies cannot do any philosophical work. At worst, case studies may lure us into agreement by giving "the false impression that history is on our side" (Pitt, 2001, p. 373). Case study evidence, according to Pitt, is not evidence at all. If we seek to retain the common practice of supporting philosophical views with historical case studies, it seems we ought to find a way to avoid this harsh judgment. We ought to show that Pitt is wrong.

Jutta Schickore develops a criticism of Pitt's dilemma in the context of her discussion of the "confrontation model of HPS" (Schickore, 2011, p. 468). The confrontation model consists of a set of assumptions about the relations between historical research and philosophical analysis that became dominant when the project of naturalizing philosophy of science began to flourish. In the model

accounts of past scientific episodes function like empirical data for the construction of scientific theories. They are the starting point for generalizations about science or the basis for tests of general theories of science. (Schickore, 2011, p. 468)

The model is thus structured by the opposition between general and particular—the philosophy of science formulating general claims on the one hand, the history of science providing evidence about particular cases on the other. Moreover, it assumes that philosophical hypotheses and historical evidence are produced independently of each other, and envisions their relation as a post hoc confrontation.

Although the model usually remains implicit, structuring the rhetoric that surrounds the evidential uses of case studies, there exist some examples that illustrate the model in a particularly clear manner. One such example is Arthur Donovan's, Rachel and Larry Laudan's *Scrutinizing Science* project (L. Laudan, 1989; R. Laudan, L. Laudan, & Donovan, 1988; for critical discussion see Nickles, 1986; Radder, 1997). The project seeks to test existing theories of science against the historical record. Each contribution to the volume confronts the empirical claims that are entailed in a specific philosophical account of scientific change with a historical case study. The methodology is hypothetico-deductivist, with philosophy presenting the hypotheses and history the tests.

Another variant of the confrontation model can be found in debates on scientific realism. Putting forward his famous attack on the no-miracles argument, Laudan presents a list of past scientific theories that were empirically successful at the time but turned out to be either non-referring or false. He makes this list into the basis of a pessimistic projection about the epistemic status of current and future scientific theories. But while he claims that the list "could be

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