

Facing Giere's challenges to the History and Philosophy of Science

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In this paper I want to address two challenges that have been put forth by Ron Giere (1973) almost forty years ago, but which *still* have not received satisfactory answers from those who advocate an integrated HPS approach to the study of science. These challenges are:

G1: How can historical *facts* ground philosophical *norms*?

- “The general problem [in HPS] is to show that philosophical conclusions [about what is rational] may be supported by historical facts and just how this comes about. Until this is done, the historical approach to philosophy of science is without a conceptually coherent programme” (Giere 1973)

G2: What is it about the history of science that the philosopher of science cannot gain when studying contemporary scientific practices?

This is how I shall proceed. In the first part of the paper I shall review hitherto reflections on the PS-HS relationship by Hanson (1962), Lakatos (1970), Kuhn (1970), Laudan (1877), Donovan et al. (1988), and Chang (2004). These reflections fall into three broad camps. The first camp embraces a strong normative view, according to which HPS assesses scientific claims for their cogency and justifiedness. To this camp G1 is irrelevant (since this view has no implications for the HS-PS relationship). Although this approach argues for the combination of HS and PS, it has nothing to say about the *special* status of HS; hence G2 remains unaddressed. The second camp recommends a normatively neutral view: not only is this approach not prescriptive with regard to scientific practices, but it is also silent on how HS could possibly inform PS. It does not seek to address G1. Moreover, although this approach explicitly argues for the role of HS, it (like the first approach) does not argue for the *special* role of HS, i.e. it also fails to address G2. The third camp favors a strong factive view: HS can correct or even falsify PS norms. This view is most severely threatened by G1 and G2, and, as Giere has pointed out correctly, these challenges have not been met yet by this camp.

In the second part of the paper, I shall assess the case-study approach as an attempt to enforce the third view above, i.e., the factive view. I will discuss two exemplars for the case study approach (the London and London model of superconductivity and the case of “mesosomes”), which, given detrimental philosophical conclusions, *prima facie* appear to undermine the fertility of the case study approach. I shall speculate about the reasons for this radical philosophical disagreement and I will conclude that none of these possible reasons constitutes a principled obstacle to the case study approach. Likewise I will show that two popular objections that have been raised against the case study approach (illegitimacy of generalizations and selection bias) lack argumentative force.

In the third part of the paper I will point out that there are at least two positive examples for an integrated HPS approach, where philosophers of science almost unanimously have come to accept that historical evidence set important constraints on philosophical theorizing. These examples concern the Pessimistic Meta Induction (PMI) and debates about the status of novel predictions in theory-appraisal. As to the former, the historical record has undermined a naïve view of scientific progress. As to the latter, historical evidence has undermined the very strong intuition that theories should receive more credit for successfully predicting new facts than for merely accommodating already known facts. Apparently, in these cases, philosophers do accept that facts can inform norms. But are they warranted to do so? In other words, how has G1 been met here? Of course, there is no straightforward sense in which historical evidence could somehow falsify or be directly translatable into philosophical norms about science. Rather, I will argue, these two examples exhibit a mode of HPS according to which *new* methodological rationales are created on the basis of historical evidence, which must still satisfy basic *a priori* constraints we set (often implicitly) on rational behavior. In response to the PMI, for instance, philosophers have constructed more nuanced views of how progress should be understood (e.g., roughly, as the continuously better grasp of the *structure* of the world, rather than its content). Even in these new proposals there is *some* form of progress and scientific development is thus not a (more or less) arbitrary and unrelated sequence of theories, which we (*a priori*) would consider as irrational. Likewise, in response to historical evidence undermining the special status of novel predictions, philosophers of science have developed new forms of what it means for evidence to be novel. According to the most popular form, evidence is novel if it was not used in the construction of the theory that entails it. The new form is consistent with our standards of rationality because it plausibly assumes that theories should not accommodate the data in an *ad hoc* fashion.

This mode of HPS exhibited by the above examples, I want to suggest, can be traced back to the work of T. S. Kuhn. Contrary to the then prevalent Popperian view, Kuhn pointed out that in the history of science theories were regularly *not* falsified when they faced negative evidence. But Kuhn did not conclude that scientific practice is therefore irrational. Rather, he created the notion of “normal science” according to which scientists focus their efforts on a particular set of problems (which can consist of mismatch between theory and evidence) and disregard others. The rationale that the notion of normal science carries with it is that this way of proceeding is *necessary* for the efficiency of science (Kuhn saw the “normal” mode of science as a demarcation criterion for proper science). In other words, Kuhn developed a *rational* explanation for what he observed in the historical record. I call this the *Kuhnian mode of HPS*. I think it is the best response to G1 practitioners of HPS can offer.

The above examples for the Kuhnian mode of HPS also demonstrate that, contrary to G2, HS can contribute to PS *uniquely*. For example, in the PMI, our knowledge of the historical record of science is fundamental for PMI to carry any weight of persuasion.

Without our knowledge of the historical record of science PMI can simply not be made. An almost similarly strong case for the unique role of HS can be made also for new forms of novel predictions and scientific progress that have been developed on the basis of the historical record.