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Testing Scientific Theories

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Preface

Progress in philosophy is often hard to detect—perhaps, the cynic will urge, because it is often non-existent. However, I submit that the volumes of this series demonstrate a steady advance in our understanding of the structure, the function, and the testing and confirmation of scientific theories. The last mentioned topic was the subject of a Center research conference held in June of 1980; many of the papers of the present volume arose from that conference. The focus for the conference was provided by Clark Glymour’s *Theory and Evidence*. The negative thesis of Glymour’s book is that the two most widely discussed accounts of the methodology of theory testing—hypothetico-deductivism and Bayesianism—are flawed, the latter seriously, the former irremediably. Hempel’s notion of instance confirmation comes closer to capturing the sorts of structural relations between evidence and hypothesis which, by Glymour’s lights, lies at the heart of theory testing. But Hempel’s original account was too narrow in not permitting hypotheses stated in the theoretical language to be confirmed by evidence stated in the observational language. Glymour proposed to remedy this defect with the ingenious idea of ‘bootstrapping, which, with some false modesty, he attributes to Reichenbach, Weyl, and others: the basic relation of confirmation is three-place (E confirms H relative to T) and auxiliary assumptions drawn from T may be used in deducing instances of H from E.

As the papers in the first section indicate, the bootstraps may have to be shortened; Edidin and van Fraassen, for example, argue that the hypothesis under test need not and should not be used as an auxiliary. Some Bayesians remain unfazed by Glymour’s criticisms, while others have been led to abandon the assumption of logical omniscience, implicit in most Bayesian learning models, in order to overcome Glymour’s ‘problem
of old evidence.' Glymour, while still rejecting the 'never-never land'
approach of orthodox Bayesianism, has moved to consider how to combine
bootstrapping relations with partial knowledge of probabilities; the appro-
priate tool turns out to be the belief functions developed by Glen Schafer.
It is thus heartening to be able to report that the various opposing camps
learned from each other. I like to think that the interactions initiated by our
conference contributed to this learning process.

All is not bootstrapping and Bayesianism. The volume also contains still
other accounts of the methodology of theory testing. In addition, there are
some valuable historical case studies against which the theories of method-
ology can be tested. And there are some timely discussions of the problems
of testing psychoanalytic hypotheses and hypotheses about the complete-
ness of the fossil record. In short, enough new ideas are germinated in this
collection that I am confident in predicting that philosophers of science will
reap the harvest for years to come.

While this volume was in preparation, Grover Maxwell left us to struggle
on with the problems of philosophy of science without the benefit of his
always gentle and insightful guidance. The editor and authors join in
affectionately dedicating the volume to Grover’s memory.

John Earman
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