Understanding science of the new millennium

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Abstract

Any serious attempt to give an account of the cognitive aspect of science — as contrasted with e.g. its social or cultural aspects — cannot ignore the automation revolution. In the conception presented in this paper the results of computer science are taken seriously and integrated with many of the ideas concerning what constitutes scientific inquiry that have been proposed at least since the early Middle Ages. The central idea is that of reliable inquiry. Science makes explicit and elaborates on the methods of acquiring beliefs in our daily life. The central question a scientific method applied to inquiry needs to face is if it is reliable in getting to the truth. On the reliabilist criteria presented here, if a method is logically warranted to get to the right answer — given data and background knowledge available — and to stick to it afterwards, then it is reliable. This is a normative theory, but the standard of reliability is adjusted to the domain of the inquiry at hand. This paper presents the central tenets of the reliabilist conception of science and briefly outlines the main results underlying it. Roughly, the aim of science is interesting truth about the world around us (scientific realism) and reliabilist epistemology affords us precise answers as to how far science can succeed in this task — given the methods, goals and background assumptions available. The philosophical task to deliver an adequate understanding of science is taken to be continuous with scientific research itself (naturalism), a major part of which is concerned with delivering causal explanations (causality) and can only be carried out with limited resources (computability). Many of the ideas integrated into the reliabilist conception of science and precisely articulated therewith have appeared earlier in both philosophy and science (history of ideas). I conclude the exposition of the ideas integrated into the reliabilist conception of science with discussions of sample case studies where the reliabilist conception of science has been applied to actual scientific research. For obvious reasons none of the grand conceptions of science from the distant past is adequate. Towards the end of this paper I give some substance to the claim that among the few contemporary conceptions of science reliabilist epistemology is the the most comprehensive account. For only it systematically elaborates the ideas of reliability and computability accompanying science from its inception. None of the past or contemporary alternatives to a thoroughly revised understanding of science offered by the reliabilist approach can embrace the recent outburst of new sciences such as computer science, Bayesian statistics and cognitive science. An outline of open problems and directions for future research concludes the paper.

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