Acta Baltica Historiae et Philosophiae Scientiarum
Vol. 10, No. 2 (Autumn 2022)
DOI : 10.11590/abhps.2022.2.09

BOOK REVIEW

Maxwell, Nicholas (2017), *Understanding Scientific Progress: Aim-Oriented Empiricism*, St. Paul, MN: Paragon House, 232pp, ISBN: 978-1557789242

In his book *Understanding Scientific Progress: Aim-Oriented Empiricism*, Nicholas Maxwell intends to solve the problem of scientific progress. For that, he distinguishes between eight relevant issues: the problem of induction, the problem of underdetermination, the problem of verisimilitude, the problem of what it means for a theory to be unified, the question of what rationale we have to prefer unified theories, the problem of the scientific method, the problem of justification of the scientific method, and the problem of scientific discovery. All of which, in his view, have contributed to the doubts that there might not be a way to resolve the more general question of scientific progress. These eight themes are addressed in Chapters 1–11, Chapters 1–3 open the nature of the topic, and Chapters 12–14 take the reader further to the intentions and ideas of enlightenment ideology—how the progress and success of the science can be converted into solutions to societal problems, so that it would lead to a sustained movement towards (modifiable) societal aims such as a civilized world.

With regard to the sixth problem (the problem of method), Maxwell considers it important to formulate a specific conception of science that would enable scientific progress (pp. 3–4) since he shares the view that the latter is largely a matter of implementing a method supporting that.

According to Maxwell, the current failure to solve the problem of scientific progress stems from the fact that so far it has been approached from a viewpoint, widely spread among scientists and philosophers of science, that he calls standard empiricism. This states that "*no permanent thesis about the world can be accepted as a part of scientific knowledge independent of evidence*" (p. 16). Maxwell contrasts this idea with his approach—aim-oriented empiricism that consists of a hierarchical structure of claims or assumptions about science, the first two steps of which are the traditional levels of empirical evidence and theory, but each subsequent level is a more general and increasingly more difficult-to-refute statement of metaphysical content. Such a framework, according to Maxwell, helps to avoid the vicious circle of scientific progress in philosophical approaches that use one metaphysical assumption in addition to the requirements of standard empiricism, as in these cases metaphysical assumption is probably justified by the empirical success of science and the empirical success is reasoned to be the outcome of the metaphysical assumption. (p. 17)

Maxwell justifies the need for upholding the hierarchical thesis system roughly as follows: theoretical physics requires a metaphysical component as a criterion for selecting theories; otherwise, it will drown in an infinite number of empirically equally successful theories (p. 59). So, if we are destined to choose a metaphysical assumption for a theoretical choice anyway, we should do so in the way that would be most promising for science (pp. 65, 108). In the formulation of assumptions it is, therefore, necessary to ensure the principle of intellectual integrity, which he articulates as follows: "Assumptions that are substantial, influential, problematic, conjectural and implicit need to be made explicit, so that they can be critically assessed, in the hope of improving the assumptions that is made." (p. 62)

What, then, would be the most promising way of formulating the assumption? It should be as general as possible so that it does not have to be constantly re-evaluated, and yet specific enough to function successfully as a theoretical selection criterion. These two reciprocal conditions can only be satisfied simultaneously, Maxwell thinks, by arranging the different metaphysical assumptions in a hierarchy (pp. 65–66).

Understanding scientific progress in an aim-oriented-empiricist way involves both enhancing the empirical success of new theories and, as a very important component, critically comparing and developing non-empirical aspects of science so as to increase (valuable) knowledge. This includes the ability to compare (choose) theories according to how well they exemplify the currently accepted blueprint (p. 77), and to more generally assume that each subsequent theory is closer to the truth, in the sense that it embraces a wider range of phenomena and is, therefore, closer to the true theory of everything. It is inevitable that theories remain false, because as long as they are not the true theory of everything, they are false (p. 85). Research conceived as aim-oriented empiricism also provides an opportunity to compare competing blueprints in terms of the degree and kind of unity of them, in addition to just referring to their empirical fruitfulness or the empirical fruitfulness of the theories derived from them (p. 79).

A key feature of aim-oriented empiricism as a method that, in Maxwell's view, explains the explosive growth of knowledge in science is the positive feedback loop between the different levels of the hierarchy. Just as an increase in knowledge at the empirical level helps to develop tools and theories on how to better explore the empirical level, an increase in knowledge also contributes to the development of how to acquire that knowledge. (pp. 142–143)

It is not very easy to determine the place of this book in a broader context because the author does not enter into a genuine dialogue with contemporary philosophers. On the other hand, he addresses clearly classical philosophical questions of science, providing answers based on his approach—aim-oriented empiricism—in such a way as to emphasize one aspect or another of that approach and elaborate on it accordingly. Two philosophers who stand out as referenced authors in this book are Karl Popper and Thomas Kuhn, both of whom are largely considered as representatives of his main object of criticism, standard empiricism. Popper's ideas, however, seem in some sense to form the basis of Maxwell's theory as far as the focus of the problems is concerned. For example, as an "incidental finding" to the solution of the question of scientific progress, Maxwell makes intelligible how scientific discoveries are made, on which Popper is satisfied without a rational approach (pp. 147–153).

I would recommend this book primarily to people whose academic interest is in understanding and interpreting (scientific) progress. In particular, Maxwell's ideas would be of interest to those philosophers for whom the possibility of heuristics in a normative approach to science is important. Furthermore, the book is written in such a way that it is quite accessible also for non-philosophers because Maxwell quite justly follows his more general ideological view, which sees the importance of non-academics alongside academic institutions in creating knowledge. He believes that the aims, as well as paradoxes and contradictions, of science should also be presented in such a way (i.e., without specific jargon) that the non-expert can have a say in setting priorities for the acquisition of knowledge (pp. 166–168). Similar demands can probably be placed on the philosophy and sociology of science. In addition to the philosophical framework, the reader will find in the book examples of theoretical physics, its problems, and its evolution described in a comprehensible manner.

Perhaps even more valuable, however, is this book for people who believe, or want to believe, in the Enlightenment ideal and the ability of a rational worldview to bring about prosperity to humankind, for those who are impressed by the evolution of science and would like to learn from this success to move towards a more civilized world. The framework for the assumptions and their critical evaluation formulated by Maxwell gives new hope for that.

Katrin Velbaum
University of Tartu