PRINCIPIA **23**(9): 529–533 (2019) doi: 10.5007/1808-1711.2019v23n3p529
Published by NEL — Epistemology and Logic Research Group, Federal University of Santa Catarina (UFSC), Brazil.

RESENHAS
REVIEWS

MAXWELL, Nicholas. *The Metaphysics of Science and Aim-Oriented Empiricism*. Cham: Springer, 2019.

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RECEIVED: 15/06/2019 ACCEPTED: 20/06/2019

The Metaphysics of Science and Aim-Oriented Empiricism (Springer, 2019, 228p.), by Nicholas Maxwell, Emeritus Reader at University College London, is a solid and persuasive exposition of the main elements that have marked this author's philosophical career: an original, remarkable philosophical doctrine, and a wide-encompassing proposal for academic reform.

The main strength of this book, from the philosophical point of view, is its cogency in presenting a well-developed, appealing, and rigorous philosophical system pertaining to the metaphysics and the epistemology of science, something that not many philosophers even attempt to do these days.

The philosophical doctrines expounded and defended by Maxwell in this work are physical essentialism, experiential physicalism, and aim-oriented empiricism.

Maxwell's first doctrine, physical essentialism, asserts that physics should describe "necessary connections between successive states of affairs" (p.12). Maxwell uses the no-miracle argument to back the existence of this kind of connections in nature: "if [...] necessary connections do not exist then, [...] [the fact t]hat phenomena continue to corroborate physical theory is nothing short of a miracle" (p.15).

Physical essentialism also indicates that if i) a set of propositions describing or specifying a state of affairs logically entails another set of propositions that describes a subsequent state of affairs, and ii) the propositions of the first set include no more and no less than descriptions of what exists in the state of affairs they describe at the time of its occurrence, then the two states of affairs can be said to be necessarily connected (p.10).

If a set of propositions describing a state of affairs is going to entail a second set of propositions describing a subsequent state of affairs, then laws are going to have to be included in the propositions describing the first state of affairs. But laws could be argued to be something other than things existing in a given state of affairs at a given time (Maxwell does not present any argument for this position), in which

case the propositions that include laws would be including more than descriptions of what exists in the state of affairs they describe at the time of its occurrence, thus violating ii) (p.11).

This is why Maxwell believes that, if necessary connections are to be established (and if laws are going to be precise enough to fully specify what exists at a given time), then laws should be interpreted essentialistically, i.e., as mere expressions of what it means to attribute certain necessitating physical properties to certain kinds of physical entities (p.11, p.13). For example, to say that a particle possesses the necessitating physical property of Newtonian inertial mass, m, means that, of necessity, it obeys Newton's law $F = ma$. That it does so is built into the meaning of the expression "particle with Newtonian inertial mass". The law is simply an expression of what "Newtonian inertial mass" *means* (p.11). In this way, propositions that describe states of affairs and that entail propositions describing subsequent states of affairs may include nothing more than descriptions of what exists in the states of affairs they describe at the times of their occurrences, thus satisfying ii).

According to Maxwell, physical laws do not include claims that they correspond to reality, so his essentialistic interpretation of laws has the consequence that laws are "purely analytic propositions, devoid of empirical content" (p.11) in the same sense in which "all bachelors are unmarried" is purely analytic, i.e., because all they do is spelling out the meanings of terms.

Next, he answers the question, "how can such a theory be *factual* and *empirical* if all its laws are analytic?" (p.13):

> "The answer is very simple. All the empirical content of the theory is concentrated in some such assertion as: [...] the world is made up exclusively of physical entities with such and such physical necessitating properties". "The entire factual, empirical content of the theory is contained in this [...] statement", "tied to specific phenomena". "It is this existential statement which [may be] empirically falsified". "When an essentialistically interpreted physical theory is refuted empirically, phenomena are shown not to consist of the physical entities postulated by the theory, with precisely the necessitating properties ascribed to them by the theory". "Laws do not get refuted. They are revealed to be (more or less) irrelevant to the world as it is" (pp.13–14, p.27).

What is refuted is the assertion (i.e., the theory) that a certain set of laws corresponds to how the world is.

Maxwell's second doctrine, experiential physicalism, aims at solving the human world/physical universe problem, i.e., "[h]ow can our human world, the world as we experience it, the world of consciousness, free will, meaning and value, exist [...] embedded as it is in the physical universe" (p.49). The classical mind-body problem, Maxwell asserts, is just a particular aspect of this more general problem.

Maxwell's solution is that conscious beings, such as humans, are trebly comprehensible, i.e., comprehensible physically, purposively and personalistically. The first type of comprehensibility is given by physical explanations, a highly restricted, specialized kind of explanations that simplify reality, ignoring all of its aspects except for its causally efficacious aspect, i.e. "that aspect that exists, at any instant, that determines, necessarily, what exists at the next instant" (p.10). Purposive comprehensibility is given by purposive explanations, i.e., those having to do with aims and goals, even if these are unconscious, as in the cases of non-complex animals and robots. The third type of comprehensibility is given by personalistic explanations, i.e., "purposive explanations that attribute desires, feelings, sensations, perceptions, conscious intentions, decisions, beliefs, plans, motives and so on to the acting person or animal in question, all these conscious processes playing a crucial role in the explanation of the person's actions" (p.68). According to Maxwell, these three types of comprehensibility are all mutually compatible — in fact, all of them coincide in the case of human beings —, but personalistic explanations are not reducible to physical explanations (experiential physicalism is a non-reductive form of physicalism that accepts that non-physical features and things exist, simply because physics is a discipline that is not designed to explain everything about everything in the universe).

The key idea that leads to Maxwell's third doctrine, aim-oriented empiricism, is that we should recognise that "physics makes a big, persistent, implicit, metaphysical assumption about the world", namely that it "has some kind of underlying unity" and therefore "all disunified theories are false". That physics does make this assumption is evident by the fact that it "only ever accepts unified theories even though endlessly many disunified rivals can always be concocted to be even more successful empirically". Maxwell approves the assumption of unity in nature because if it were not made, then "physics would be overwhelmed by endlessly many empirically successful disunified theories". But "because this implicit metaphysical assumption is both influential and profoundly problematic, it is essential, in the interests of intellectual rigour, that it be made explicit, [...] so that it can be critically assessed", "so that alternatives can be developed and assessed, in the hope of improving the assumption" (pp.v–vi, p.83, p.87, p.90, p.92).

Maxwell then presents aim-oriented empiricism, which includes a full-fledged hierarchy of assumptions that are made in physics (and, by extension, in natural science), from relatively unproblematic ones up the hierarchy (i.e., that the universe is knowable, and that we can learn how to better learn about it) to more revisable assumptions as we move downwards in the hierarchy. He makes suggestions about how all these assumptions interact with each other, both in the theory and in the practice of science, and how to try to improve them. He indicates that the relatively unproblematic assumptions are accepted on pragmatic grounds, because in accepting them, "we have nothing to lose, and may have much to gain in seeking to acquire

knowledge" (p.99), due to the fact that these assumptions are "more nearly such that their truth is required for science to be possible at all" (p.4). "In this way, a framework of relatively unproblematic assumptions and associated methods is created, high up in the hierarchy, within which relatively problematic assumptions and associated methods, low down in the hierarchy, may be critically assessed and improved, in the light of what seems best to promote the empirical growth of scientific knowledge and other factors" (p.4). Maxwell argues that actively seeking to improve the most problematic of these assumptions should be "an integral part of physics itself" (p.83).

The Metaphysics of Science and Aim-Oriented Empiricism expounds its main theses confidently and knowledgeably, and also indicates their differences with the positions of many other well-known authors. Of particular interest is Maxwell's critique of structural realism, which he calls a "desiccated" form of scientific realism (pp.112–25). It is clear that this volume is the fruit of almost an entire lifetime of reflection; the book seems to function as an effective abstract or summation of over half a century of work. Nevertheless, this characteristic leads the author to consistently refer to his published corpus for better expositions and justifications of some of his theses, which at some points can make the reader think that the book, taken in isolation, contains insufficiently warranted propositions. For example, this reviewer was left wondering why Maxwell believes that a unified physical theory is likely to lead us to progress in our acquisition of true scientific knowledge, if he claims that the existence of underlying unity in nature is a mere conjecture which "may well be false" (cf. p.83, p.91). At one point (p.168) the text even reads that this conjecture is "very likely to be false" (although this is probably an unintended shortening of the expression "very likely to be false in the specific form adopted at any given stage in the development of physics", which appears in p.126). Also, the claim that economics and sociology are not sciences (p.185) should be argued for.

Regarding its exposition style, *The Metaphysics of Science and Aim-Oriented Empiricism* could benefit from being less repetitive at several points. Also, as Maxwell admits, he "complain[s] at book length" (p.167) about the reception that his work has received, which can have a discouraging effect on the reader.

Part of the attractiveness in Maxwell's work is, undoubtedly, due to its combination of philosophy with a proposal for a more useful and concerned academia leading to a better world for us to live in (although this mixture could be discouraging for more narrowly-interested philosophical readers).

Maxwell's academic reform proposal, outlined in Chapter 5, is centred in the suggestion that institutions of high learning should be "rationally designed and devoted to helping us solve our conflicts and problems of living so that we may make social progress towards a better, wiser world" (p.85). In the process, he insists, scholars and academicians should shift their main aim from mere knowledge-seeking to the pursuit of what he calls wisdom, i.e., "the capacity, active endeavour and desire to

realize what is of value in life, for oneself and others, wisdom including knowledge, technological know-how and understanding, but much else besides" (p.84). The book is obscure as to why aim-oriented empiricism would implicate Maxwell's academic reform proposal.

One last thing that caught this reviewer's attention is Maxwell's apparent contention that global calamities such as war, extreme inequality, poverty, ill-health, injustice, and deprivation are rather new to human history, having been "made possible by modern science and technology" (p.174). This is a common trope among anti-science and anti-technology obscurantists (and Maxwell is not one of them), but it is easily falsified by historical knowledge. In any case, it is true that modern scientific knowledge and technology have had the effect of enlarging the magnitude of some of these calamities, and that since we humans developed nuclear arsenals, for the first time in our history some of our global problems threaten the very continuation of civilization. In Maxwell's sensible opinion, this outcome is due to us having had sufficient knowledge without having had enough wisdom.

In conclusion, *The Metaphysics of Science and Aim-Oriented Empiricism* is definitely a piece very much worth reading for every metaphysician and philosopher of science. Throughout it, Maxwell earnestly pleads with the philosophical community to reflect on his contribution more seriously and thoroughly, and it does seem that his work deserves much more attention than it has received hitherto.