Wenceslao J. Gonzalez: New Approaches to Scientific Realism. de Gruyter: berlin, 2020, 458 pp., 115,95€ (hardcover), ISBN: 9783110662467

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This review provides an outline of the collection *New Approaches to Scientific Realism*, edited by Wenceslao Gonzalez. In particular, it questions whether the contributions to this edition can claim to be novel. The edition includes an introductory chapter and eighteen texts by well-known philosophers, such as Peter Achinstein, Alexander Bird, Donald Gillies, Theo Kuipers, Alan Musgrave, Thomas Nickles, Ilkka Niiniluoto, Howard Sankey, and John Worrall.

My evaluation depends on what an "approach" actually means. Should it be defined as (1) a *way* of dealing with or thinking about a subject or (2) as a *proposal or suggestion* concerning the subject? Let us call these two senses *approach*$_1$ and *approach*$_2$. A fresh *idea* or *view* may constitute a novel approach$_2$ even if it does not employ a new way of dealing with or thinking about the subject. Approaches$_1$ – such as logical and conceptual analyses, the study of historical cases or that of cases from contemporary sciences, as well as pragmatic and cognitive approaches$_1$ – have been applied in different chapters of this collection. None of these approaches$_1$ are unprecedented. That said, among the approaches$_1$ of the chapters, I would like to highlight the cognitive approach$_1$ of Thomas Nickles's chapter and the formal approach$_1$ of Theo Kuipers's. When I read the book, the approaches$_1$ of these two chapters struck me as their noticeable features. Although neither of these approaches$_1$ are essentially novel, in contrast to those of the other chapters, they are not

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commonly pursued in the literature on scientific realism. For this reason, these two chapters provide relatively fresh ways of dealing with the subject, which are worth mentioning. The cognitive approach$_1$ has been implemented before by scholars such as Ronald Giere (1988) and Joseph Trout (2002) in their discussion on science. Nevertheless, Nickles's employment of this approach$_1$ is distinctive because it reveals cognitive biases that underlie arguments for (strong versions of) realism. Kuipers's formal approach$_1$, in which the logical formulations of all claims and arguments are stated, is not inventive either. Still, his use of this approach$_1$ in the context of contemporary philosophy of science, which has experienced the historical turn provoked by historicists such as Thomas Kuhn and Imre Lakatos, can be distinguished from that of, for example, logical positivists. In the following I review the approaches$_2$ – suggestions, ideas, views – provided in this edition, and comment on them.

The book comprises eight parts, some of which are quite heterogeneous. Thus, in what follows, I will review and discuss the chapters one by one. In the introductory chapter, Gonzalez gives an overview of the debate about scientific realism and the aims and content of *New Approaches*. A worthy aim of the book that I want to emphasize here is "to enlarge the […] analysis of science to reach new topics and novel disciplines". The disciplines discussed in this collection include (mathematical) physics, medicine, archaeology, economics, political sciences, and communication studies (cf. the disciplinary contexts considered in Saatsi, 2018, part IV). The attention to cases outside the realm of natural sciences is precious. Human knowledge is not only about natural reality. It concerns historical, social, and artificial reality as well. For instance, our knowledge of the history of humanity heavily relies on whether we believe in archaeological stories, or our epistemological analysis of the Internet elucidates whether news on social media can be objective.

In the second chapter, Peter Achinstein argues that real entities are not required to be observable; realist physicists are justified to infer the truth of claims about the existence and properties of unobservables from observable facts. Although persuasive, this kind of criticism against antirealism à la Bas van Fraassen's constructive empiricism is a little repetitive (for a comparable criticism, see, for instance, Chalmers 2011). For me, a brief discussion of black holes forms the most interesting part of this chapter (pp. 40-41). This case is much more up to date than the other one in this chapter: Jean Perrin's experiments on the existence of molecules, which is also studied in Chalmers (2011).

Alexander Bird criticizes Peter Lipton's claims to solve three problems of his interpretation of inference to the best explanation. Instead, Bird argues, on the basis of Kuhn's concept of an "exemplar", that good scientific explanations can be truth-conducive. While Bird's criticism of Lipton is to the point, his Kuhnian proposal looks inadequate. It is unclear how scientists can discover reality by solving problems. Bird insists that his intent is only to show that "our scientific processes *can* be truth-conducive" (p. 66). However, is this not a trivial claim? Even ardent antirealists do not claim that scientific explanations *cannot* be truth-conducive or *cannot* be sensitive to reality.

Howard Sankey's chapter deals with the tension between science and basic common sense, the latter being our everyday perception that we enact when dealing with the world. According to him, basic common sense includes instrumentally-mediated observation, which provides the evidential basis for science. "If we reject common sense, we must reject observation as well. Thus, without common sense, the evidential basis for science disappears" (p. 73). Sankey is right that this problem is largely ignored in usual discussions on scientific realism. Even so, the problem is central to the so-called phenomenological approaches to philosophy of science. Sankey would

agree with Edmund Husserl's (1970) criticism of objectivism, and his proposal that a tenable version of scientific realism should be compatible with a realism about common sense is comparable to Don Ihde's (2011) realist view.

Anastasios Brenner's chapter is an extensive survey of scientists' and philosophers' views on "prediction". He argues, first, for the pluralistic view that the predictive power of a theory depends on its (historical) context, and second, for the realist claim that predictions allow us to update our ontologies continually.

Thomas Nickles's chapter introduces several cognitive illusions "that make strong realism seem more plausible than it is" (p. 104). Nickles's cognitive approach$_1$ sheds new light on the realism debate. I only want to add that strong realism is not the only conception that maintains cognitive biases. (Strong) Antirealists may also suffer from different kinds of biases. An example could be van Fraassen's antirealist interpretation of instrumentally-mediated observation. His cognitive bias towards observation with the naked eye can be criticized in a similar manner (see Radder 2006, pp. 15-16).

Alan Musgrave defends the basic logical claim that a contradiction can result in anything against the non-standard logical views of dialethists and paraconsistentists. Furthermore, he explains that the avoidance of logical contradictions is essential to scientific progress: "All the great advances in human thought have been inspired by the desire to get rid of contradictions and find the truth" (p. 142). I think realists and antirealists could both agree with Musgrave that scientific progress depends on seeking to remove contradictions. Antirealists, nonetheless, disagree that this process leads to finding the truth.

In studying Theo Kuipers's chapter one might experience difficulties, not necessarily because of its formal approach[1], but mainly because, to understand the chapter fully, one should be familiar with Kuipers's previous work on "nomic truth approximation". Nomic truth, for Kuipers, is the truth about the demarcation between physical possibilities and impossibilities. His account of truth approximation explains the process of modifying theories by revising their models (which represent certain possibilities) and postulates (which exclude certain possibilities) in order to consider new empirical evidence. The objective of this chapter is to take into account the distinction between an observational and a theoretical level in his view of nomic truth approximation.

In his chapter, John Worrall's bold claim is that "structural realism is the only defensible realist game in town" (p. 169), because other forms of realism, such as entity realism and selective realism, are either untenable or reducible to structural realism. My impression, after the study of Worrall's chapter, is that he has added few arguments or clarifications to his previous work on structural realism. His arguments against entity realism and selective realism are somewhat outdated, as he does not address recent developments in both debates (on recent accounts of entity realism, see Egg 2014, Eronen 2015, Nanay 2019, and Khalili 2022, chapter 4; on selective realism, see Vickers 2017). Nor does he discuss other forms of realism such as perspectival realism. A further worry concerns Worrall's defense of "realism without reference". Does this doctrine entail that true theories may not *refer* to anything? If yes, how can theoretical sentences whose terms are non-referring be true? These questions are not adequately addressed in this chapter. Furthermore, Worrall presupposes that realism without reference is equal to structural realism, while David Papineau (2010, p. 383) rightly distinguishes between these two doctrines. Moreover, the meaning of a "structure" is (still) ambiguous in Worrall's account. Is the structure

of a theory constituted by its mathematical formalism or by its Ramsey-sentence? The Ramsey-sentence, according to Worrall, "is expressed purely in observational language" (p. 202), while a mathematical language can hardly be considered observational. Accordingly, his claim that the "mathematical structure of Fresnel's classical wave theory is given by its Ramsey sentence" (p. 203) can be objected (see also Cruse 2005).

Ladislav Kvasz argues for a structural realism in which structures are unequivocally mathematical. He argues that Isaac Newton provided a general framework for mathematical representation of the dynamics of measurable quantities. Other mathematicians and physicists have developed their equations within this general framework, and thus this framework is preserved in the course of theory change. Non-structural terms such as caloric and the ether serve only to specify mathematical structures. Furthermore, innovations within this framework, for instance, the transitions from the Newtonian to the Lagrangian and Hamiltonian mechanics, present novel representations of reality. Kvasz's claim would be more cogent if it explained how quantum field theory and general relativity are understandable within the Newtonian framework.

Through Ilkka Niiniluoto's chapter the reader becomes familiar with interdisciplinarity, multidisciplinarity, transdisciplinarity, and crossdisciplinarity and their historical emergence. In my view, a promising line of argument for realism is based on concepts such as unification, inductive systematization, and (William Whewell's notion of) consilience, which play pivotal roles in the interdisciplinary research Niiniluoto explains in this chapter. The cooperation of several disciplines in investigating the same subject can assure us that we are in the right direction to correctly understand it.

Wenceslao Gonzalez's chapter explains his pragmatic realism, a realist alternative to (Nicholas Rescher's) pragmatic idealism. From this viewpoint he discusses the role of prediction in complex systems, for example, in economics. Gonzalez makes several distinctions, for example, between structural and dynamic complexities (p. 272) or between external and internal obstacles to scientific prediction (p. 276). It remains unclear, however, how these distinctions can actually work in a concrete case of prediction in a complex system.

Donald Gillies's chapter argues that causation has always an anthropomorphic aspect; causal laws are confirmed by human actions in experimental and observational conditions (given current technological facilities). He raises two criticisms against James Woodward's nonanthropomorphism. First, Woodward allows miraculous interventions. Second, Woodward's definition of interventions does not include examples of interventions in their usual sense. Instead, in cases such as "the moon causes the tides", where human interventions are impractical, Gillies suggests Russellian eliminationism, according to which functional laws such as the law of gravity should be used in lieu of causal laws. Furthermore, he advocates the Wittgensteinian view that meaning is specified by use in social practice, and thus "intervention" should possess its usual sense of our everyday practice, thereby having a human face. Although Gillies's suggestions are thought-provoking, his criticism of Woodward is quick and insufficient. First, he offers no arguments for the claim that physically impossible, i.e. miraculous, interventions are not allowed. Second, his example of a "simple medical intervention" (p. 298) against Woodward's definition of intervention begs the question. Gillies presupposes that intervention should have its usual sense, while Woodward defines it as a technical term.

Tomasz Placek claims that physics presupposes determinism, and therefore it is biased against alternative evolutions of a system. Physical theories are constructed to give predictions, so

physicists follow strategies to maintain determinism. Placek's argument could have been more compelling if he had discussed the most prominent case of indeterminism in physics: Heisenberg's uncertainty principle.

Amanda Guillan presents an overview of Nicholas Rescher's view of objectivity and fact as realist components of his pragmatic idealism. According to this overview, Rescher is ontologically a realist, epistemologically an idealist, and methodologically a pragmatist. In my view, Rescher's view is akin to perspectival realism, a recently much-discussed account, which is unfortunately neglected in *New Approaches*.

Anthony O'Hear addresses the question of whether we should trust everything experts tell us. Based on Karl Popper's fallibility criterion and Kuhn's conception of normal science, O'Hear argues that a consensus among scientific experts, in particular in economic and political issues, is always insecure. Hence, he advises treating experts' claims with "gently critical skepticism" (p. 363). This advice is necessary for societies drowned in expertise. I suspect, however, it carries adverse effects on societies that already dismiss rational procedures, for example, those that are being governed by political, economic, military, or religious oligarchies. Scientific experts can play a critical role in these societies. They may restrict the oligarchic source of power, and facilitate processes derived by some kind of reasoning rather than by oligarchs' exclusive interests.

Matti Sintonen explains that archaeology is an interdisciplinary study that belongs both to the humanities and to natural science. Archaeology tells the story of *human* beings in the past three million years. Furthermore, archaeologists interpret decayed objects as products of *humans* with certain intentions and desires. Thus, archaeology is allied to the humanities, but not to armchair humanities. Theory building in archaeology is under empirical control. Archaeological theories

can also receive support from other empirical sciences, such as linguistics, anthropology, musicology, ethnology, and religious studies.

Based on a critical analysis of Alexander Wendt's view of political structures, Adrian Miroiu argues that nation states are real structures. Despite Wendt's account, which results in the personhood of states as well as other social structures such as firms and universities, Miroiu tries to restrict his realism to states. The reader should note that he uses structures in the sense of social institutions rather than mathematical relations, the sense of structural realists.

Maria Jose Arrojo addresses the possibility of objective communication through media. Section 5 of her chapter asks a question, relevant to our everyday life: Can we avoid the spread of fake news on the Internet? Arrojo concedes that the task of journalists to present objective knowledge encounters difficulties. Still, she is optimistic about the possibility of true communications through the "scientification" of this professional task. But it remains unclear how journalists can make their profession more scientific or how ordinary citizens can follow scientific patterns to avoid misinformation and fake news.

Lastly, two remarks about the contributors. First, it is quite common to introduce all the authors somewhere in a collection of chapters; however, a list of contributors, and their background and present affiliations, is notably lacking in *New Approaches*. Second, the ages of the contributors are unbalanced. Most of them are senior researchers, including several retired professors, whose mature reflections are valuable; nevertheless, a contribution of a greater number of junior scholars could have added new lines of argument to this collection.

To conclude, while one will not find many innovative approaches[1] in the *New Approaches* volume, the presented suggestions, ideas, and views contribute modest, but still significant insights to the

scientific realism debate. Furthermore, several of the chapters discuss topics and problems – relevant to interdisciplinarity, complexity, expertise, archaeological objects, political structures, and the Internet – that are not usually found in standard works on scientific realism. Thus, the collection points to interesting trends for the debate, and has the potential to attract researchers in the field who wish to expand their knowledge about these new topics and problems.

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