

## HOW *NOT* TO CRITICISE SCIENTISM

JOHAN HIETANEN, PETRI TURUNEN, ILMARI HIRVONEN,  
JANNE KARISTO, ILKKA PÄTTINIEMI, and HENRIK SAARINEN

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**Abstract:** This paper argues that the main global critiques of scientism lose their punch because they rely on an uncharitable definition of their target. It focuses on epistemological scientism and divides it into four categories in terms of how strong (science is the only source of knowledge) or weak (science is the best source of knowledge) and how narrow (only natural sciences) or broad (all sciences or at least not only the natural sciences) they are. Two central arguments against scientism, the (false) dilemma and self-referential incoherence, are analysed. Of the four types of epistemological scientism, three can deal with these counterarguments by utilizing two methodological principles: epistemic evaluability of reliability and epistemic opportunism. One hopes that these considerations will steer the discussion on scientism to more fruitful pastures in the future. For example, there are interesting methodological considerations concerning what evaluability or reliability and epistemic opportunism entail.

Keywords: scientism, transcendental argumentation, self-referential incoherence, epistemic opportunism, epistemic evaluability, scientific imperialism.

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### Introduction

Discussion on scientism has lately gained more exposure in philosophy and theology.<sup>1</sup> Originally the term “scientism” was introduced to common parlance by those who were critical of excessive trust in the natural sciences (e.g., Hayek 1964, pt. 1), and even today scientism is largely understood, especially by its critics, as an offensive towards philosophy, theology, or other fields outside natural science. A relatively common understanding of its goal is, in some sense, the reduction of all valid knowledge to certain fields of science (e.g., Peels 2018). Through this angle it is not difficult to understand why such a significant part of the discussion on scientism is carried out by its opponents. Here, however, the danger of bias is imminent. If the opponents of a view are its main theoreticians, then it is rather probable that the principle of charity will be violated at some point.

<sup>1</sup> See, e.g., Boudry and Pigliucci, eds., 2017; Feser 2014, 9–24; Ladyman and Ross 2007; Mizrahi 2017; de Ridder, Peels, and Woudenberg 2018; Rosenberg 2012; Stenmark 2001; Williams and Robinson 2015.

Despite the fact that scientism is often defined in a disparaging manner, some authors have recently adopted it as a badge of honour (see, e.g., Rosenberg 2012; Ross, Ladyman, and Spurrett 2007). Given the predominant status of the debate, the topic is riddled with misconceptions.

In this paper, we seek to rectify this situation. We start by going through some uncharitable definitions of scientism. Then we focus on epistemological scientism and divide it into four types. We consider two central global arguments against scientism and show that of the four varieties, three can go on unscathed. We also suggest two methodological principles a proponent of scientism can appeal to: epistemic evaluability of reliability and epistemic opportunism. This shows that there are viable forms of epistemological scientism.

Since epistemological scientism can be defended by utilizing certain methodological principles, further critique of scientism has to take some stand on those principles. An opponent of scientism has to consider whether reliability has to be something we can evaluate and whether knowledge should be reliable. An advocate of scientism, for her part, needs to show that scientific practice in fact upholds these principles. The debate regarding scientism thus transforms into a debate on the methodology of science.

### **Uncharitable Definitions of Scientism**

In its current usage, scientism is commonly taken to be a pejorative term. This understanding extends to the most general definitions of scientism in dictionaries as well. For instance, Merriam-Webster's two definitions for scientism are:

1. methods and attitudes typical of or attributed to the natural scientist;
2. an exaggerated trust in the efficacy of the methods of natural science applied to all areas of investigation (as in philosophy, the social sciences, and the humanities).

Scientism is most often blankly dismissed because of the immediate undesirable consequences its well-known definitions imply. In more in-depth discussions similar problems have consistently arisen because the critics of scientism and other commentators systematically understand the term in an uncomplimentary fashion. For example, Susan Haack has characterised scientism as an “over-enthusiastic and uncritically deferential attitude towards science, an inability to see or an unwillingness to acknowledge its fallibility, its limitations, and its potential dangers” (2013, 106). Indeed, the most common definitions of scientism typically take it to, in one way or another, exceed the proper limits of science. Hence, scientism is often considered to amount to unwarranted or unjustified trust in natural science in some way.<sup>2</sup>

<sup>2</sup> Stenmark's (1997; 2001, chap. 1) and Sorell's (2002, 9) definitions of scientism are also problematic in this sense. For lists of other uncharitable characterizations of scientism see Pigliucci (2015; 2018).

It is good to note that when the opponents of scientism are defining scientism, they usually have in mind something closer to *scientific imperialism* (Boudry and Pigliucci 2017, 4; Boudry 2017, 32). Scientific imperialism, according to John Dupré, is “the tendency for a successful scientific idea to be applied far beyond its original home, and generally with decreasing success the more its application is expanded” (2001, 16).<sup>3</sup> Occasionally, the critics of scientism even explicitly state that it is a form of scientific imperialism (e.g., McGrath 2011, 78; Kitcher 2017, 110–12). We return to the differences between scientism and scientific imperialism in our concluding section.

Despite the prevalence of the disparaging definitions of scientism, some have started to endorse the term as a badge of honour (see, e.g., Rosenberg 2012; Ross, Ladyman, and Spurrett 2007). This would not be intelligible without a more neutral definition of scientism. It is nonsensical to think that someone would declare: “According to the view I defend, the *proper* limits of science should be exceeded.” For instance, Peter Atkins has, instead of proclaiming overblown faith in science, merely claimed that “science is the *best* procedure yet discovered for exposing fundamental truths about the world” (1995, 97, italics added). It is along these lines that a more fruitful definition of scientism lies.

We think that the most plausible forms of scientism are epistemological.<sup>4</sup> Indeed, it seems that most proponents of scientism accept an *epistemology first* attitude, according to which epistemology should determine or at least guide one’s ontological or other commitments.<sup>5</sup> Such epistemological scientism is usually defined by its opponents as the conception that *only* the natural sciences can obtain genuine or reliable knowledge, just as Peels (2018) has done. As we have already seen, however, Atkins (1995, 97), for instance, merely takes the natural sciences as giving us the *best* methods for studying the world, and James Ladyman has made practically the same claim (Ladyman 2018; de Ridder 2016a, 2:44–7:27).

Before going any further, we should note that all of the definitions presented thus far have been formulated by the critics of scientism. This doesn’t mean that those definitions are necessarily erroneous, but one

<sup>3</sup> Not all define scientific imperialism as something negative, as Dupré does. For a neutral definition see Mäki (2013). In addition, some researchers studying scientific imperialism see it as connected *only* with the relationships of scientific disciplines (Walsh and Boucher 2018, 14–15). For more on scientific imperialism see, e.g., Dupré (2001, 16, 74, 82–84, 133); Clarke and Walsh (2009); Mäki, Walsh, and Fernández Pinto (2018).

<sup>4</sup> Numerous conceptual charts regarding scientism and its definitions have been made, some more extensive than others. Rik Peels has perhaps designed the most detailed categorisation of different varieties of scientism (2018); for somewhat similar categorisation see Stenmark (1997; 2001). Since we believe that most forms of scientism are epistemically motivated, however, we will not explore these other options.

<sup>5</sup> See, e.g., Ladyman 2018; Ross, Ladyman, and Spurrett 2007, 16, 28, 40–41; Rosenberg 2012, 6, 24, 166, 169; Quine 1968.

frequent bias in them is that scientism is associated with the primality of *natural* sciences. Peels, for instance, ends up defining scientism as “[t]he view that the boundaries of the natural sciences should be expanded to include academic disciplines or realms of life that are widely considered not to be the domain of science” (2018, 47). So, by definition, a broader conception of scientism, which would include other than natural sciences, is out of the question. Peels even explicitly notes, “I use the word ‘science’ in a rather narrow sense” (manuscript a, n. 1). The reason for the opponents of scientism to define scientism in this narrow way is that, according to them, scientism otherwise loses its bite. If things other than the natural sciences are also viable sources of knowledge, then scientism does not exclude practically anything. Philosophers and theologians could also claim to have equal authority on some issues, as the natural scientist does, and nothing in the end would be affected by the scientific project. We will show, however, that this is not so. Instead, there can be non-trivial conceptions of scientism based on a broader view of science. Therefore, instead of understanding the concept “science” as narrowly referring only to the natural sciences, as it commonly does in the English language, the proponent of scientism can conceive it more broadly as encompassing both the human and the natural sciences. This is the case with the German term *Wissenschaft* and the Dutch *wetenschap*, to mention but two (for more on this see, e.g., Hansson 2013, 64). Accordingly, we think that it is fruitful to divide epistemological scientism into additional subcategories.

First, epistemological scientism can be sorted into *narrow* and *broad* varieties. The narrow versions state that only the natural sciences function as proper sources of knowledge, justification, rational beliefs, and the like.<sup>6</sup> In other words, they understand the term “science” in a restricted sense, just as Peels does, so that it refers only to the natural sciences. The broad version, on the other hand, endorses a wider conception of science that encompasses both the natural and the human sciences. The term “human sciences” includes the humanities, the arts, and the social sciences. One does not have to accept all of the human sciences as proper sources of knowledge in order to be a proponent of broad scientism, only a subsection will do.<sup>7</sup>

<sup>6</sup> The notions “knowledge,” “justification,” “rational belief,” and so on are repeatedly used in the debate, and they are commonly left undefined. They loosely refer to epistemically valuable end products of inquiry, whatever they might be. For the purposes of this paper their vagueness won’t be a problem.

<sup>7</sup> It is interesting to note that Peels too makes a distinction between stronger and weaker varieties of scientism. The weaker versions discard only some sources of common sense, such as metaphysical intuition or introspection (Peels 2017a, 14). Weaker types of scientism can also accept some human sciences, like psychology and sociobiology, as able to produce rational belief and knowledge (Peels 2017a, 12). This Peelsian distinction is somewhat similar to our separation of narrow and strong scientism.

|               | <b>strong</b>  | <b>weak</b>  |
|---------------|--|--|
| <b>narrow</b> | <p>The <b>natural sciences</b> are the <b>only</b> sources of knowledge, justification, rational beliefs, or the like.</p> | <p>The <b>natural sciences</b> are the <b>best</b> sources of knowledge, justification, rational beliefs, or the like.</p> |
| <b>broad</b>  | <p>The <b>sciences</b> are the <b>only</b> sources of knowledge, justification, rational beliefs, or the like.</p>         | <p>The <b>sciences</b> are the <b>best</b> sources of knowledge, justification, rational beliefs, or the like.</p>         |

FIGURE 1. Four types of epistemological scientism

Second, we follow Moti Mizrahi in making another distinction within epistemological scientism, the separation of *weak* and *strong* scientism. Strong scientism declares that *only* science can function as a source of knowledge, justification, and so on (Mizrahi 2017, 353; 2018, 8). By contrast, weak scientism states that science is only the *best* source of knowledge, justification, or the like (Mizrahi 2017, 354; 2018, 8).<sup>8</sup> These four categories can overlap as presented in the two-by-two diagram in Figure 1.

We can find examples of representatives for each of these categories. For the narrow-strong position we have Alexander Rosenberg, who declares that “the methods of science are the only reliable ways to secure knowledge of anything” (2012, 6). He states as well: “If we’re going to be scientific, then we have to attain our view of reality from what physics

<sup>8</sup> Peels also distinguishes between strong and weak epistemological scientism, and his usage of these terms is not congruent with ours or Mizrahi’s. Peels defines the terms as follows: “Whereas weak academic scientism claims that something should be reduced to the natural sciences *in general*, strong academic scientism claims that something should be reduced to *one particular* natural science” (manuscript a, 4–5, italics original). We think that our employment of the terms is more fitting than Peels’s. Moreover, Peels could equally have used the terms “general” and “particular” instead of “weak” and “strong” in his distinction, and this change in phrasing would describe his idea more accurately than his original wording.

tells us about it. Actually, we'll have to do more than that: we'll have to embrace physics as *the whole truth about reality*" (20, italics original). Rosenberg is also the only generally known clear supporter of this variety of scientism. All other potential candidates of narrow-strong scientism have expressed these kinds of opinions only in popular writings. We are not at all convinced that popular science books are reliable sources for the actual intellectual views of the authors, as there might be other motivations for making bold or extreme claims in such contexts, like selling more books or persuading the general public in order to secure more funding. Still, most often, the critics of scientism use precisely popular books as their main sources of scientific sentiments (see, e.g., Stenmark 2001; de Ridder 2014; 2016b; Peels 2018).<sup>9</sup>

For the narrow-weak position we have Mizrahi and Atkins. Remember that Atkins declared science to be the best, though not the only, procedure for exposing fundamental truths (1995, 97). One can see that he refers by "science" only to the natural sciences because he, for instance, takes "the elucidation and control of *nature*" as the goals and criteria of successful science (97, italics added; see also 100–101). Mizrahi, in turn, has stated: "I think that Weak Scientism is a defensible definition of scientism" (2017, 354). He argues that the natural sciences and medicine are quantitatively better than the arts and humanities because, as an example, there are more articles published in the former disciplines, and they statistically get more citations per article (2017, 357–58).

For the broad-strong position we have B. F. Skinner: "What, after all, have we to show for non-scientific or pre-scientific good judgement, or common sense, or the insights gained through personal experience? It is science or nothing" (1971, 157). Skinner's scientism is of the broad variety, as he takes psychology to be a science in good standing. Another example is Jerry Coyne: "Any discipline that studies the universe using the methods of 'broad' science is capable in principle of finding truth and producing knowledge. If it doesn't, no knowledge is possible" (2015, 107). In addition, Richard Dawkins, who is often counted among the proponents of scientism (see, e.g., Stenmark 2001, vii, 10, 13–14, 19, 20, 24), thinks that science can be carried out in the armchair and that some philosophers

<sup>9</sup> Of course, it could be argued that popular science writing is as good a source as any other, even if it would not represent the correct or carefully considered views of the author. For these books are nevertheless public statements that have the goal of influencing their readers. In a way, this is indeed true, and expressing strong and badly argued opinions in texts meant for the general public might be problematic. We fail to see, however, why this would require profound *philosophical* analysis of these publications—from the perspective of, say, epistemology, ontology, or philosophy of science. If some sort of analysis is apt here, it should be, for example, sociological in nature. Popular books, just like informal conversations with friends or colleagues, are not usually philosophically interesting, because it is more or less common knowledge that they are not, in general, carefully argued throughout, nor are they meant to be taken that way.

working on conceptual issues can be counted as scientists (Law 2017, 128; Dawkins and Law 2013, at 39 min. 50 sec.). Hence for Dawkins the distinction between the natural sciences and the human sciences is not a relevant one.

As a third example of the broad-strong position we have Willard Van Orman Quine. He often emphasised that science and philosophy are on the same continuum and that philosophy actually is one of the sciences—as are psychology, economics, sociology, and history (1981, 85; 1995, 49). In addition, according to Quine, “[s]cience is not a substitute for common sense but an extension of it” (1976, 229). And the only substantial difference between the layman and the scientist is that “the scientist is more careful” (1976, 233). In an interview with Sami Pihlström, Quine even explicitly endorsed scientism: “Scientism, in the sense I accept it, merely states that science is our only route to knowledge and truth” (Quine and Pihlström 1996, 9).

We also take James Ladyman and Don Ross as supporting broad-strong scientism. They seem to support strong scientism in their declaration “we believe that no *other* institutional filters on would-be objective knowledge work reliably *at all*” (Ladyman and Ross 2010, 182, italics original). Ladyman’s endorsement of broad scientism is evident from the following quotations: “[H]umane scientism takes science to be authoritative in respect of objective knowledge, including about human beings and society. . . . Humane scientism holds the arts and humanities” (Ladyman 2018, 125).<sup>10</sup> Ross, in turn, has stated: “The social sciences are a formidable cluster of institutions that are not about to be argued out of existence by philosophers. . . . [P]hilosophers have no authoritative ground on which to stand and pronounce doom on the social sciences without appearing ridiculous” (Ross 2018, 226, 227, italics omitted). Here, it appears that Ross does not make strict delineations between different sciences and, hence, adopts a broad conception of scientism.

For the broad-weak position, we have Maarten Boudry: “If the borders between science and everyday knowledge are porous and pragmatic, the same is true for the borders with neighboring disciplines in academia” (2017, 38). Boudry almost explicitly endorses scientism when he states that at least some kind of continuity with science is required for epistemic credibility:

<sup>10</sup> In personal communication, however, Ladyman has stated that the four forms of scientism presented here are not exhaustive, and that he is not inclined to agree with any of them. In fact, Ladyman claims that he endorses a narrow version of scientism that is even weaker than the weak variety of scientism presented here. Ladyman’s weaker-than-weak narrow scientism states that if something can be studied at all, then it can be studied by means of natural science—but this does not necessarily mean that natural science offers the best methods for studying the target in question.

Some may argue that the brand of holistic naturalism [I have] defended . . . is itself a form of scientism . . . , as it appropriates all ways of knowing to science in the broad sense . . . and conceives of science as an infinitely flexible and open-ended endeavor without fixed methods of rules. . . . I will perhaps confirm their worst suspicions. If a factual question is answerable at all, it can be answered using methods that are at least continuous with science. If some epistemic enterprise becomes too detached from science, and thus from the rest of the web of knowledge with which science is connected, that usually does not bode well for that enterprise. (47)

Boudry does not, however, call himself a proponent of scientism, nor does he consider the term “scientism” to be a useful one in the first place (33–34, 46–47). The same is true of Jerry Coyne (2015, 114).<sup>11</sup>

Epistemological scientism comes in many shapes and sizes, as the quotations clearly demonstrate. For instance, a proponent of scientism may take the natural sciences as the *only* sources of knowledge (narrow-strong) or think that the natural, formal, human, and social sciences are merely the *best* sources of knowledge (broad-weak). Yet, the broad and weak versions of scientism are hardly ever discussed in critical commentaries, since the focus has merely been on the narrow-strong form. Indeed, often the critics of scientism refer to some of the mentioned proponents of scientism—for example, Ladyman, Ross, Dawkins, and Skinner—as if they would endorse the narrow-strong variety (Peels 2017a, 11; 2018; Stenmark 2001, chaps. 1–2). It is important to note that even the weak and broad forms of scientism can retain the distinction between science and non-science, as well as the distinction between proper and improper methods of generating knowledge. This is scrutinized in detail in the ensuing sections.

To demonstrate how scientism can be feasible, we will look into two central global arguments against scientism: the (false) dilemma of scientism and the allegation that scientism is self-refuting.

### First Objection: The (False) Dilemma of Scientism

One of the main global objections to epistemological scientism is based on the claim that science is built upon non-scientific grounds (van Woudenberg 2013, 26; Kojonen 2016, 5). For instance, it is argued that certain metaphysical background assumptions, such as presupposing the existence of the external world or other minds, are necessary for science. In addition, some human capacities—such as the senses, memory, inference, and introspection—are often considered to belong to this non-scientific foundation of science (Peels 2017b, 168–69; Midgley 1992, 108; Kojonen 2016, 5.)

<sup>11</sup> See the discussion above on broad-strong scientism.



Due to such dependencies, it is insisted that the proponents of scientism are forced to face the following dilemma:

1. The proponent of scientism has to either reject or accept non-scientific sources of belief, such as senses or memory.
2. If the non-scientific sources of belief are rejected, then all scientific inquiry is rendered unjustified, because science necessarily presupposes them.
3. If they are accepted, then the proponent of scientism has to accept non-scientific sources of belief as justified.
4. Thus, the proponent of scientism has either to reject *all* scientific inquiry as unjustified or to dilute it in the way that would render the thesis of scientism impotent, because science would encompass all sorts of non-scientific grounds of knowledge.<sup>12</sup>

The dilemma is based on a typical transcendental argument: the necessary conditions of science are incompatible with scientism. To summarise, the adherent of scientism has to choose between two poor options: either (1) he has to reject the reliability of scientific knowledge because it is necessarily based on non-scientific sources of belief or (2) he has to accept all sorts of sources of belief as reliable, and this would make scientism lose all of its bite. (Peels does not explicate what the criteria are for being a source of belief. He merely lists some examples of non-scientific sources. What the criteria are is not actually relevant to our argument.)

<sup>12</sup> Peels (2017b) formulates this argument as a *reductio ad absurdum*:

1. Only natural science delivers knowledge.
2. If only natural science delivers knowledge, then non-scientific sources of beliefs do not.
3. Non-scientific sources of belief do not deliver knowledge.
4. Natural science delivers knowledge.
5. In doing natural science, scientists inevitably rely on non-scientific sources of belief.
6. If, in doing science, natural scientists inevitably rely on non-scientific sources of belief, then the results of science are instances of knowledge only if those non-scientific sources of belief produce knowledge.
7. Either natural science does *not* deliver knowledge or non-scientific sources of belief *do* deliver knowledge.
8. Thus, *either* natural science (reliably) delivers knowledge *and* it does not *or* non-scientific sources of belief deliver knowledge *and* they do not.

(C). Therefore,  $\neg(1)$ .

As one can see, Peels does not present the argument as a dilemma. He merely claims that scientism is self-refuting. This is why he does not call this argument a dilemma but instead calls it “the fundamental argument against scientism.” On his interpretation of scientism, scientism states that only scientific sources of knowledge are reliable.

In fact, under closer scrutiny the dilemma turns out to be a false one. The dilemma rests on the claim that science has to rely on extra-scientific sources. In particular, there are two such purported sources. These are (a) non-scientific, possibly metaphysical, background assumptions and (b) non-scientific sources of belief. The problem here is that it is not exactly clear why the mentioned origins of belief are unscientific or why we have to rely on them.

Consider first option (a), the non-scientific background assumptions. The most commonly purported metaphysical, and consequently non-scientific, background assumption is that there is an external world (Midgley 1992, 108; Peels 2017b, 168–69). This is not, however, a necessary assumption for doing science. One does not have to *assume* that science can achieve knowledge of the external world. Science can merely start with the *hypothesis* that some kind of knowledge could be achievable. For all practical purposes, this hypothesis would merely state that there are at least some regularities to be found.<sup>13</sup> This hypothesis could be tested by simply attempting to obtain empirical knowledge with scientific means. If it is impossible to achieve this kind of knowledge, then the efforts would just be in vain. But *hoping* that something is the case is not the same as *believing* that it is the case (Boghossian 2013, 26–27). The scientist can carry out her inquiry *as if* the world were regular, and hoping that this is so, without making any commitments to it actually being the case. Indeed, this is how hypothesis testing is often executed in actual scientific practice. Furthermore, if the test turns out to be successful, then the additional assumption that the obtained knowledge is about a “real” external world is irrelevant.<sup>14</sup> Further argumentation is therefore needed to show that such extra-scientific assumptions are in fact necessary.<sup>15</sup> In particular, if they are claimed to have any effect on actual scientific practice, then this claim should be argued for in detail.

Now consider option (b), the non-scientific sources of belief. We are told that there are clearly non-scientific sources of knowledge, such as senses and memory. It is rather obvious that empirical science rests on input that is generated by our senses (Boudry 2017, 38). Similarly, theoretical research requires the ability to think and remember. Our senses and memory can lead us astray, however, and, consequently, pure sense

<sup>13</sup> Some have distinguished the assumption of the existence of the world from the existence of regularities (see, e.g., Feser 2014, 11). An external world devoid of any regularities could not, however, support any substantial claims as regards its content. If such a world were to have some content, that is, it would be in one way instead of some other, and then it would be regular in being that way. The only claim we can make of such a world is, then, that it cannot be in any particular way. And this would no longer count as a substantial claim, since that was how the world was defined to begin with.

<sup>14</sup> You can do science in a vat too.

<sup>15</sup> The claim that one would have to assume the existence of other minds is analogous and can be similarly dismissed. Philosophical zombies can act equally well as research assistants and professors, as can conscious individuals—and as subjects (or objects?) of psychological studies.

experience and individual memory are often not taken to be scientifically justified sources of belief. One might then think that science relies on something unscientific. But this would be to misunderstand scientific practice.

The previously mentioned human capacities enable science even though they are somewhat unreliable. This does not, however, lead to the unreliability of science through a simple transitive relation. This is because an important component in all scientific endeavour is error correction: checking our sources of information for possible mistakes. And some of the potential flaws are, of course, caused by the partial unreliability of human capacities.

The relation between human capacities and scientific endeavour is not unidirectional. Just as our general cognitive capacities enable scientific research, scientific research enables the improvement of our somewhat unreliable cognitive capacities. The opponent of scientism might object that the process of error correction itself has not been given reliable grounds: it should lean towards some other infallible principles outside our unreliable cognitive capacities. This kind of criticism would be based on a faulty conception of scientific knowledge generation. The process of error correction is iterative: a community of researchers seeks to identify sources of error and fix them in multiple passes, and within each pass, the researchers examine how the corrections improved the reliability of their theory in terms of describing, predicting, and so on. There is no prior guarantee that this process will yield results, but that does not pre-empt the attempt. So, as with the assumption of an external world, a scientist does not have to assume some prior epistemic principles.

This process of error correction contrasts strongly with, for instance, how one notable critic of scientism, Jeroen de Ridder, views epistemology: “[I]t seems that in epistemology, as elsewhere, the principle ‘garbage in, garbage out’ holds. If you start with something that has very little . . . epistemic quality . . . then just by performing some further operations on it . . . that’s not suddenly going to increase the epistemic quality of that belief. . . . I mean how would that happen? Epistemic quality doesn’t just appear out of nothing” (de Ridder 2016a, 18:37–19:08). Here de Ridder is simply mistaken. One can cite numerous examples where the process he outlines leads *exactly* to something very different from “garbage.” Science, of course, is one of them. One efficient illustration of another process of this kind is water purification. Water treatment plants take in sewage water and, through precisely the kinds of processes de Ridder mentioned, produce drinking water out of it. Another example is recycling. By processing initially unusable waste, literally garbage, one can produce raw material that is once again usable. This process is also in effect in virtually all of education—be it public schooling, universities, the military, law enforcement, and so on.

As de Ridder has correctly stated, however, if the material being processed had *no* epistemic or other “value” whatsoever, it could not be processed into something that does. If a substance that does not contain any water in it is fed into a water purification plant, the plant will not be able filter drinkable water out of it. This, however, does not mean that it is impossible to refine even material with very little initial “value.” The same holds for science: common sense needs to have *some* epistemic worth in order for it to serve as a footing for science. But it would be rather problematic to insist that all common sense would be totally unreliable, since we have relied on it for a very long time. Have we really just been that lucky? Furthermore, what we take as common sense does not seem to have well-delimited boundaries and appears to vary greatly in its epistemic status, which seems to strongly indicate that it is not all totally unreliable.<sup>16</sup>

Science is in the business of identifying and distinguishing practices, methods, experiments, instruments, forms of inference, and so forth that do and do not work. It emphasises and refines those that work while weeding out those that do not. In other words, even something with “very little epistemic quality” can be refined to become something of high epistemic quality. Hence, the “it’s all or nothing” reasoning that the critics of scientism so eagerly practise simply does not hold water, not even sewage water.<sup>17</sup>

Science, then, does not need to be able to categorize sources of belief as either scientific or non-scientific. Instead, what is required is that the given source of a given belief can be checked for errors and biases or *epistemically evaluated* in terms of reliability. So, it is not just about being reliable but about *how* reliable and under what conditions. Therefore, non-scientific sources would be sources that cannot be epistemically evaluated or have been evaluated to be totally unreliable.<sup>18</sup> If an opponent of scientism wants to turn the false dilemma into a real one, she will have to argue for why such non-evaluable sources are necessary for doing science.

<sup>16</sup> See, e.g., Gilovich, Griffin, and Kahneman 2003; Gigerenzer, Hertwig, and Pachur 2011; Gigerenzer, Todd, and the ABC Research Group 1999.

<sup>17</sup> De Ridder’s analogy “garbage in, garbage out” comes from computer science, and it is used also in other fields of deductive research, like formal logic. And true enough, if the premises of a deductive argument are false (garbage in), then they do not offer support for the conclusion (garbage out). But empirical science is rarely a purely deductive enterprise. On the contrary, it usually is founded upon ampliative inferences, such as induction and abduction. If science were to be based on pure deduction from apodictic first principles as Aristotle (1984) assumed, then de Ridder’s analogy would hold (for more on Aristotle’s conception of science see *Posterior Analytics* 71b33–72b23, 100a10–b6; *Physics* 184a16–23; *Nicomachean Ethics* 1095b2–4; Shields 2016). After the Middle Ages, however, the Aristotelian view of science has not been particularly popular: scientific inferences are no longer considered to be merely deductive, and premises used need not be certain.

<sup>18</sup> A totally unreliable source might still happen to provide a correct result by pure chance. We cannot know, however, that the result is correct if we do not have some other, reliable, source for obtaining said result.

Some might still object: if this sort of methodological position on allowed sources of beliefs is endorsed, then scientism will become trivial and uninteresting (de Ridder 2016a, 26:10–28:19; Peels 2017b, 172). Such an opposition would be based on the view that scientism is not an informative position, since it does not exclude any possible sources of belief.

We disagree. Even the broad varieties of scientism exclude some sources. There are, for instance, non-evaluatable sources like pure intuitions or divine revelations.<sup>19</sup> In addition, since some sources are evaluatable, there will be differences in how good they are as sources. There are also sources of belief that have turned out to be epistemically worthless, and, hence, they are not considered to be part of good science. So, it's not “anything goes.”

Furthermore, it is not arbitrary which sources we accept and which we do not, since there is an explicit criterion, the epistemic evaluability of reliability, for determining the accepted sources. Of course, it is an interesting question what such evaluability entails, but due to its scope it will have to be relegated to later work. For now, it is sufficient to state that at least in some cases we do seem to be able to evaluate how good or bad some sources of belief are, and that is enough for science to get going—without any excess baggage.

The dilemma, then, is a false one. Science does not need to rest on non-scientific sources to be justified, nor does such scientism lead to triviality. There is, however, a further global argument against scientism that we will consider next.

### **Second Objection: Scientism Is Self-Refuting**

The other major global criticism raised against scientism is that scientism is self-referentially incoherent or self-refuting. The rough idea of the argument is the following: According to scientism, one can rationally accept or believe only those claims, theories, or the like that are formulated by scientific means. Assuming that the proponent of scientism is inclined to follow his own principles, scientism needs to be justified scientifically. The critics of scientism claim that such justification is nowhere to be found and, even more pressingly, that it is impossible to make a purely scientific case for scientism. Therefore, scientism is unable to meet its own standards (Peels manuscript b, de Ridder 2014, 27.)

The structure of the argument can be given as follows:

<sup>19</sup> One can, of course, study what the claimed revelations are like, but their divine nature seems to be inscrutable. The same is true concerning intuitions. To see this, assume that someone claims to know that something is the case purely on the basis of her intuitions. Moreover, assume that there is no way, independent of these intuitions, to check whether she is right. Here we have no means to determine whether the intuitions are reliable or not in the case in question.

1. It is rational to accept scientism only if scientism is justified on the basis of scientific research and nothing else.
2. Scientism is not, and cannot be, justified on the basis of scientific research and nothing else.
3. (C) It is not rational to accept scientism.<sup>20</sup>

The first premise follows from the assumed definition of scientism, according to which it is rational to accept *X* only if *X* is justified on the basis of scientific research and nothing else. The premise is formed by merely substituting the variable *X* with *scientism* itself.

The second premise, in turn, is based on the conception that, at least thus far, there are no real scientific grounds for endorsing scientism. If scientism is to be scientifically validated, then it needs to be a scientific hypothesis that is properly tested and confirmed. The critics of scientism have formulated this challenge in two ways. First, they have pointed out, there is no empirical or formal research by scientists leading to the confirmation of scientism. We call this the weak version of the second premise. Second, some have argued that such research cannot even be done. This is the strong version of the premise. Rik Peels, for instance, has stated that “scientism is not some empirical truth that we can find out by way of setting up an experiment or doing statistical research. Nor does it seem to be an *a priori* truth that can be deduced by mathematical or logical methods from elementary truths that we know *a priori*” (manuscript b, 11). On the basis of this kind of argumentation, the opponents of scientism commonly take scientism to be a philosophical doctrine instead of a scientific one or, at the very least, they believe that scientism is dependent on often unarticulated and implicit philosophical assumptions.

Now, it is immediately clear that a proponent of weak scientism can reject premise (1). The premise states that it is rational to accept scientism only if scientism is justified on the basis of scientific research and nothing

<sup>20</sup> Peels formulates the argument somewhat differently as a *reductio ad absurdum* (manuscript b, 10–11):

1. Scientism is true.
2. If scientism is true, we can rationally believe that it is true.
3. We can, merely on the basis of scientific research, rationally believe that scientism is true.
4. It is impossible to rationally believe merely on the basis of scientific research that scientism is true.
5. It is possible and it is impossible to rationally believe merely on the basis of scientific research that scientism is true.

(C).  $\neg(1)$ .

Although there are dissimilarities in our formulation and Peels's, the differences are mainly superficial.

else. Remember that weak scientism merely declares that science is the *best* way of obtaining knowledge—it does not have to be the only one. This enables the advocate of scientism to use methods like common sense for justifying her endorsement of scientism. Naturally, it is still required that her methods are not in contradiction to scientific inquiry, even if they would not for some reason deserve to be called science.

For instance, let us assume that peer review would be a necessary criterion for science. (We are not claiming that this is actually the case. Peer review is merely used as an example to illustrate our point.) So, when someone is reasoning with common sense, this would not yet count as science, although there wouldn't be anything wrong with his thinking. In other words, knowledge could be gathered without scientific practice (this seems evident when one examines everyday life). But, according to weak scientism, there is no such form of knowledge for which science would not be the best form of inquiry. Valid everyday reasoning could always be turned into science, if it were to be subjected to scientific evaluation—in this example, to peer review. (Assuming that there would be no other required criteria for science or that the reasoning already fulfils all other criteria.) Therefore, by using healthy common sense, scientism can already be justified. Hence, a proponent of weak scientism can rather easily avoid the accusation of self-referential inconsistency.

Now consider premise (2). Perhaps it is easiest to start by challenging the stronger version of the premise, namely, that it is *impossible* for scientism to be justified on the basis of scientific research. This only requires that scientism is viable as a scientific hypothesis. In other words, scientism needs to be a type of claim that *could* have scientifically appropriate evidence against and for it. It seems rather evident that there is at least a lot of *positive* evidence for the epistemic success of scientific methods. Indeed, the proponents and opponents of scientism seem to agree that science enjoys a robust track record of generating knowledge.<sup>21</sup> Having such a record is positive evidence in support of scientism, and such evidence is therefore clearly possible. As Peels correctly remarks, however, in addition to having positive evidence for science as a systematically successful epistemic enterprise, one also needs to present negative evidence against other means of forming and justifying beliefs (manuscript b).

Where the scientific methods are applicable, we can compare how well they fare with respect to some other methods, given some epistemic criteria. Such criteria can be chosen on pragmatic grounds, but they should not be arbitrary. This is to say that different individuals should not systematically end up with differing conclusions by employing the same criteria. With non-arbitrary criteria for comparisons, we can potentially have

<sup>21</sup> Peels manuscript b; de Ridder 2014, 23; Stenmark 1997, 15; Ladyman 2018; Ross, Ladyman, and Spurrett 2007, 7; Rosenberg 2012, 24.

evidence for the claim that the scientific methods are the most or only reliable ones in particular cases.<sup>22</sup> Whether we at present have such evidence is irrelevant for the point that such evidence is nevertheless possible and, consequently, we can treat scientism as a scientific hypothesis. This suffices for avoiding self-refutation. If, however, the required evidence is not yet gathered, then full-blown commitment to scientism would not be justified at present. This is because the inferiority of other epistemic practices would not yet be warranted. Still, someone could consistently adopt scientism as her epistemology, but merely as a working hypothesis.

An adherent of scientism can then argue that a strong version of premise (2) is wrong, because scientism can be presented as a scientific hypothesis. This merely required demonstrating that scientific evidence for and against scientism can be gathered. Despite this, Peels has argued that the criteria presented above would still not suffice for scientism to get off the ground. He asks his reader to

imagine that we had good reason to think that scientific research would always (or often enough) issue in rational belief and that non-scientific sources of belief always (or often enough) deliver irrational belief or at least not rational belief, for instance, because we have good scientific empirical evidence to think that non-scientific sources of belief are unreliable. . . . That would still leave us with [the] question *how* we could *rationally believe* scientism itself. Presumably, in order to *rationally believe* scientism, it would have to be a scientific hypothesis that has been tested and confirmed sufficiently frequently. (Manuscript b, 14–15)

This passage is rather puzzling. Peels holds that even if we had good reason to think that scientific practices were the only ones to produce rational beliefs and its alternatives did not, it would still not suffice as grounds for rational belief in scientism. Scientism, however, can be summed up precisely as the statement that scientific research generally issues in rational belief whereas non-scientific sources do not. How does having a good reason not lead to rational belief?

Presumably Peels supposes that scientism is a philosophical position that includes other claims as well—but he does not explicate the contents of those claims. It remains unclear what other components scientism should encompass, and why scientism could not be defined merely as a view confirmed by the possible evidence Peels states. Furthermore, even if, contrary to the facts, justifying scientism would depend on the reliability of scientific methods, it would still not make scientism self-referentially incoherent, as even Peels himself acknowledges.

<sup>22</sup> For instance, we could compare criteria based on how often they produce knowledge that allows for successful interventions or in terms of the coherence of the produced knowledge claims.



One should note, however, that there is a caveat here. We have thus far discussed only cases where one can apply scientific methods. What, then, about cases where these methods are not applicable? Now, clearly if we cannot use scientific methods, we cannot have evidence for the claim that these methods would have been the best or only ones. The scientific claim regards *knowledge* production, however, so one only has to worry about these sorts of cases if they are genuine cases of knowledge. To make the case for self-referential incoherence, an opponent of scientism then has to first show that we have cases of knowledge where scientific methods are not applicable. Here, further argumentation is needed. If, however, one would indeed manage to establish such a case, why exactly would it count as non-scientific? It would, after all, count as demonstrative, and thus reliable, knowledge, and isn't that exactly what science is after? Why would scientists not incorporate it into science?

This brings us to perhaps the biggest problem with critiques of scientism. Most of the critics argue only against the narrow-strong versions of scientism, which, to be sure, definitely need to be criticized for their strong claims. Indeed, science is not limited to the natural sciences but encompasses other fields as well, such as the social sciences and history. Different objects of inquiry can require different methods: it would not be fruitful to study historical events with a particle accelerator, or to examine the properties of dark matter by means of a discourse analysis. Despite this, both in the human and in the natural sciences often the same abstract principles are used regarding argumentation and inference. General rules of inference are applied in all descriptive research, such as trying to exclude other possible conclusions and making the inferences explicit for evaluation. The same methods of statistical inference can be utilised, for instance, in both sociology and biology. Triangulation, obtaining robust results of the same phenomenon by different means or through independent sources, is always considered to improve the reliability of the study. This is the case with error analysis as well: we know that in physics the process of error analysis is generally well defined. When the scientist knows the target being measured, the instruments used, the theory and equations applied, and the equations for the analysis itself, a quantitative margin of error can be robustly explicated. The systematicity of error analysis in physics, however, does not mean that there is something fundamentally different going on, for example, in gender studies. In such fields scientists seek to understand the frame of reference from which the research is conducted, such as individual biases, the limitations of sample groups, or the possible errors in inference from data to general theory (see, e.g., Sedgwick 2003, chap. 4).<sup>23</sup> The fundamental principles of proper scientific reasoning, such as those just mentioned, are always in place. They are only applied in

<sup>23</sup> We are grateful to Henri Hyvönen for this example.

different circumstances. No well-defined methodological line can easily be drawn between the human and the natural sciences—nor is it necessary. Both of them are sciences in equal degree.

When examining the actual enterprise of science, in all its variety, the only epistemic boundary condition or methodological constraint seems to be *epistemic opportunism*: to use the practices that evaluably work for obtaining reliable knowledge and abandon those that do not.<sup>24</sup> From this perspective, those who define science in the narrow sense, whether they be proponents or opponents of scientism, impose arbitrary constraints that are alien to science. It is not the object of study, the natural or the human world, that defines whether or not valid knowledge can be gathered but the methods that are deemed as proper for the object of interest. If this is accepted, then narrow-strong scientism might fall, but with it also fall the two main global arguments against scientism.

One should note that, assuming knowledge has to be reliable, epistemic opportunism in itself already validates scientism. If science is epistemically opportunistic in the way presented above, it directly follows that science is the *best and only* way of forming evaluably reliable knowledge. That is, if one accepts that science uses or should use the methods that evaluably work for obtaining reliable knowledge, then already by definition science is the only practice for obtaining evaluable reliable knowledge. This is the thesis of strong scientism from which the weak version, of course, follows. In fact, given epistemic opportunism, the distinction between weak and strong scientism effectively evaporates, since the only non-scientific methods are the ones that do not produce any evaluably reliable knowledge. Given epistemic opportunism, Peels is then wrong in claiming that scientism cannot be justified with an *a priori* argument. If the epistemic opportunism of science is accepted, then the idea that science is the only reliable source of knowledge can follow by logical inference alone.

An opponent of scientism could try to argue against this conclusion by two different means. First, he could insist that science is not de facto epistemically opportunistic. Second, he might claim that science *should not* be epistemically opportunistic. We will call the first objection *the descriptive argument* and the second *the normative argument*.

Let us tackle the normative argument first. Since we are considering a normative claim, it can only be justified by another normative claim. Here the claim in question is: science should seek out evaluably reliable knowledge. If this is granted, then epistemic opportunism follows by simple instrumental rationality. Now, one could of course reject the normative claim, but a proponent of scientism need not.

<sup>24</sup> Note that there is no single way for a practice to work; the notion of successfulness is dependent on the objective of the study.

An adherent of scientism can, then, tackle the normative argument against epistemic opportunism. What about the argument that science isn't actually opportunistic? It follows from the problems with the normative argument that the descriptive one is no argument at all. If one were to accept the descriptive argument but not the normative one, one would state that science is currently conducted in a way it should not be conducted. In this case the proponent and the opponent of scientism are in agreement on how science should be practiced. Science, as it should be, would be epistemically opportunistic and still the only and best way of obtaining evaluably reliable knowledge.

To recap, a proponent of scientism can easily avoid the alleged incoherence. Weak scientism can immediately reject premise (1). Furthermore, a strong version of premise (2) can be denied by weak or strong scientism. Finally, at least the broad version of scientism can adopt a view of science that embraces epistemic opportunism and reject premise (2) by logical inference alone. As a conclusion, the argument for self-referential incoherence is faulty.

One might wonder whether adopting epistemic opportunism is going too far in defending scientism. After all, suggesting that philosophy and common sense can be a part of science might sound nonsensical to the foes of scientism. Isn't this exactly what scientism was supposed to oppose? Not necessarily, for remember that scientism does not have to aim at ruling out intellectual fields based on the notions they can be categorized under. Instead, the task can be to see what demonstratively works and what does not (that is, evaluate which practices do produce reliable knowledge and which do not). Whatever label these practices might be filed under bears no relevance for their reliability.

Here, a worry might arise. Have we merely diluted scientism in order to evade the most direct objections to it? This is not so. This kind of scientism already has its supporters, as we demonstrated with quotations in section 2. Some proponents of scientism, like Quine and Dawkins, for instance, are open to the idea that even philosophy can be among the sciences (Quine 1981, 85; 1995, 49; Dawkins and Law 2013, at 39 min. 50 sec.).

It is especially important to stress that the variations of scientism that invoke epistemic opportunism are not all-inclusive. They can bring about significant ramifications to the research of scientific methods. As mentioned before, if one focuses, for example, on obtaining results in terms of reliable knowledge, adopting epistemic opportunism renders questionable research that does not achieve this aim. Thus, we can have informative and interesting scientific views that take epistemic opportunism onboard. And, even if we do not, we can still consider scientism to be a non-problematic scientific hypothesis, which we can have evidence for. Without epistemic opportunism, it can turn out to be a false hypothesis, but that does not make it incoherent.

## Conclusions

In this paper we have discussed the three most common reasons for claiming that scientism is objectionable: the uncharitable definitions of scientism, the suggested dilemma of scientism, and the argument from self-refutation. In section 2, we demonstrated with textual evidence that even though the majority of critical discussion has focused on narrow-strong scientism, the other three versions of epistemological scientism have their adherents. Thus, the critique of scientism has focused on a version of scientism that is with certainty known to be endorsed by only one individual, namely, Alexander Rosenberg. The other three varieties of scientism do not fall prey to the two major arguments that commonly have been mustered against scientism.

In section 3 the dilemma of scientism was proven to be a false dilemma. We explained how metaphysical presuppositions are not a necessary part of science but can be adopted as mere working hypotheses or be discarded altogether as needless. Covering the subject of unscientific sources forming a ground for all intellectual activity (science included), we explicated the process of distilling reliable information from initially somewhat unreliable sources. This was done in particular to show how de Ridder's idea of "garbage in, garbage out" is mistaken. At the end of the section, we addressed the accusation of triviality: the fact that, to use the former wording, epistemic "garbage" can be transformed into something more valuable does not entail that *all* sources of belief are equally good. The reliability of some sources of beliefs cannot be evaluated, and others have been proven to be untrustworthy. Because scientism can exclude such sources, it is an informative thesis.

In section 4 the accusation of self-referential inconsistency was scrutinized. It was shown that it is possible to gather evidence in favour of and against scientism. Hence, scientism can at the very least be taken as a scientific hypothesis, and it is possible to justify it by scientific means. Here we argued too that science is based on epistemic opportunism: endorsing whatever methods that work for obtaining reliable knowledge. If this is correct, then even strong scientism logically follows.

We also showed that scientism need not even be a scientific hypothesis. In weak scientism, science is treated not as the *only* source of knowledge but as the *best* one. Even if scientism could not be accepted as a scientific hypothesis (which, of course, is not the case), it could still be validated by using non-scientific means. In this case, scientism would not be justified in the best possible manner, but it could be justified nevertheless, in the same sense that our everyday judgements can be justified.

Formulating scientism through epistemic opportunism and evaluable reliability might prompt the worry that we are in fact no longer discussing scientism at all. Such worries are unfounded. Scientism is motivated by the following observation: among the differing ways that human beings try to

gather knowledge, the things grouped as “science” are the most successful ones. And suppose that epistemic opportunism and evaluability of reliability are what make science successful. A proponent of scientism then claims that these methodological practices do not merely make science successful but also make it superior compared to other forms of inquiry. Thus, we would be best served in our epistemic projects by employing these means. So, scientism is also very much about the epistemic superiority of actual science.

Still, the opponent of scientism might not be satisfied with this answer. Epistemic opportunism and evaluability are easy to accept, she might admit, but the proponents of scientism seem to be going further than this. For the apostles of scientism appear to claim that only *certain* methodologies fulfil the criteria of opportunism and evaluability, usually the methods of the natural sciences. Hence, scientism is just general form of (natural) scientific imperialism. We have repeatedly argued, however, that this is not the case. Broad versions of scientism do not force the methods of the natural sciences on other disciplines. All fields of science can keep their own practices, so long as they work in a checkable manner. This holds also for the weak varieties of scientism. Adherents to narrow-weak scientism claim that the methods of the natural sciences are the best methods we have, but that in itself does not yet mean that they have to be adopted in all other fields of inquiry. It might even be impossible to do so. Perhaps the natural sciences simply cannot offer an alternative to discourse analysis, although, according to the supporters of narrow-weak scientism, discourse analysis can never produce results as reliable as those produced by the methods of natural sciences.

Nevertheless, it is true that in some cases the sympathizers of scientism have to say that certain ways of conducting research are inapt because they are inevaluable or there are more reliable methods for generating knowledge with roughly the same resources. How is one to tell, in such situations, whether they are instances of reprehensible scientific imperialism or of praiseworthy scientific process? To put it briefly, this is an empirical question. We have to examine, in every case, which methods actually are better for the given goals and ask if they are truly evaluable. So, in the end, it is an empirical matter whether someone is guilty of unacceptable scientism in the sense of scientific imperialism. This cannot be done by global *a priori* argumentation based on merely conceptual information, as Peels, de Ridder, and their colleagues have tried to do. Instead, one has to go local.<sup>25</sup>

Perhaps the opposition to scientism is often motivated by the fact that, in some instances, narrow-strong scientism can be very close or even

<sup>25</sup> Mäki (2013), for instance, has offered criteria for evaluating whether an imperialistic endeavour is progressive or detrimental.

amount to scientific imperialism. Conflating scientism as a whole with natural science imperialism, however, amounts to throwing the baby out with the bathwater. Scientism brings forth important methodological issues that can have important implications for epistemic practices. The three other forms of scientism can avoid the two global arguments considered here. Obviously, this does not imply that they are otherwise equally good positions, but assessing them is not the focus of this paper.<sup>26</sup>

As a general conclusion of our paper, we draw on Peels:

If scientism is to be plausible, it should make a significantly more modest claim, such as the claim that a *specific* nonscientific source of belief, such as belief formation about one's reasons for performing a past action, is insufficiently reliable to count as knowledge; or the claim that natural science *is more reliable* in leading us to knowledge than some of our nonscientific sources of belief; or that the deliverances of natural science are *more rational* to believe than the deliverances of some of our nonscientific sources of knowledge. (2017b, 181, italics original.)

Here Peels is on the right track. We also think that the narrow-strong version of scientism is considerably more difficult to defend than the broad and weak varieties. One cannot simply appeal to evaluable reliability or epistemic opportunism if one also wants to uphold an epistemic difference between different scientific fields. It seems, however, to have escaped the critics of scientism that most of its proponents have already made the amendments that Peels is calling for. Therefore, the real problem with the ongoing discussion is why the more plausible and popular versions of scientism are practically never discussed. As we mentioned in section 2, the definitions of scientism are, for a large part, constructed by the opponents of scientism. This may have something to do with the way the main objections arise from the assigned versions of scientism. Our overarching thesis is that these versions are by no means necessary, and that none of the objections covered in this paper hold up against sophisticated varieties of scientism.

Further critique of scientism along the lines we presented needs to challenge the methodological principles we set forth. This means that one has to consider what inevaluability of reliability would amount to and what the role of reliability is with regard to knowledge claims. This shift

<sup>26</sup> In order to defend narrow-weak scientism one merely needs to explicate some criteria according to which the natural sciences epistemically surpass other scientific forms of inquiry, like the humanities or the arts. For instance, following Mizrahi, one could use such standards as the number of citations or articles published in a given field. Even if this move is possible to make, we are not sure how strong the evidence would be that it would give for the superiority of the natural sciences. For instance, among the most cited individuals in the world are Marx, Aristotle, Plato, Freud, Chomsky, Hegel, and Cicero (Barsky 1998, 3, 227). All of these figures belong to the human sciences (philosophy, sociology, psychology, and linguistics). Still, the massive amount of citations does not prove that the research that these men have produced is necessarily the trustworthiest—or is even checkable.

to methodological issues will one hopes lead the scientism debate to more fruitful pastures in the future.

*University of Helsinki*  
*The Helsinki Circle*  
*Haukilahdenkuja 9 C 33*  
*00550 Helsinki*  
*Finland*  
*thehelsinkiircle@gmail.com*  
*www.helsinkiircle.fi*

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### **References**

- Aristotle. 1984. *The Complete Works of Aristotle*. Edited by Jonathan Barnes. Princeton: Princeton University Press.
- Atkins, Peter. 1995. "Science as Truth." *History of the Human Sciences* 8, no. 2:97–102.
- Barsky, Robert F. 1998. *Noam Chomsky: A Life of Dissent*. Cambridge, Mass.: MIT Press.
- Boghossian, Peter. 2013. *A Manual for Creating Atheists*. Durham, N.C.: Pitchstone.
- Boudry, Maarten. 2017. "Plus Ultra: Why Science Does Not Have Limits." In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 31–52. Chicago: University of Chicago Press.
- Boudry, Maarten, and Massimo Pigliucci. 2017. "Introduction." In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 1–9. Chicago: University of Chicago Press.
- Boudry, Maarten, and Massimo Pigliucci, eds. 2017. *Science Unlimited? The Challenges of Scientism*. Chicago: University of Chicago Press.
- Clarke, Steve, and Adrian Walsh. 2009. "Scientific Imperialism and the Proper Relations Between the Sciences." *International Studies in the Philosophy of Science* 23, no. 2:195–207.

- Coyne, Jerry A. 2015. *Faith Versus Fact: Why Religion and Science Are Incompatible*. New York: Viking.
- Dawkins, Richard, and Stephen Law. 2013. "In Conversation with Richard Dawkins—Hosted by Stephen Law." YouTube video, posted by ThinkWeekOxford, March 13, 2013, 1h. 29 min., URL = [www.youtube.com/watch?v=zvkbIEIAOqU](http://www.youtube.com/watch?v=zvkbIEIAOqU).
- Dupré, John. 2001. *Human Nature and the Limits of Science*. Oxford: Oxford University Press.
- Feser, Edward. 2014. *Scholastic Metaphysics: A Contemporary Introduction*. Lancaster: Editiones Scholasticae.
- Gigerenzer, Gerd, Ralph Hertwig, and Thorsten Pachur, eds. 2011. *Heuristics: The Foundations of Adaptive Behavior*. New York: Oxford University Press.
- Gigerenzer, Gerd, Peter M. Todd, and the ABC Research Group, eds. 1999. *Simple Heuristics That Make Us Smart*. Oxford: Oxford University Press.
- Gilovich, Thomas, Dale Griffin, and Daniel Kahneman, eds. 2003. *Heuristics and Biases: The Psychology of Intuitive Judgment*. Cambridge, Mass.: Harvard University Press.
- Haack, Susan. 2013. *Putting Philosophy to Work: Inquiry and Its Place in Culture*. Expanded edition. Amherst, N.Y.: Prometheus Books.
- Hansson, Sven Ove. 2013. "Defining Pseudoscience and Science." In *Philosophy of Pseudoscience: Reconsidering the Demarcation Problem*, edited by Massimo Pigliucci and Maarten Boudry, 61–77. Chicago: University of Chicago Press.
- Hayek, F. A. 1964 [1955]. *The Counter-Revolution of Science: Studies on the Abuse of Reason*. London: Free Press.
- Kitcher, Philip. 2017. "The Trouble with Scientism: Why History and the Humanities Are Also a Form of Knowledge." In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 109–19. Chicago: University of Chicago Press.
- Kojonen, Erkki Vesa Rope. 2016. *The Intelligent Design Debate and the Temptation of Scientism*. London: Routledge.
- Ladyman, James. 2018. "Scientism with a Humane Face." In *Scientism: Prospects and Problems*, edited by Jeroen de Ridder, Rik Peels, and René van Woudenberg, 106–26. Oxford: Oxford University Press.
- Ladyman, James, and Don Ross. 2010. "Authors' Response" in "Protecting Rainforest Realism." *Metascience* 19, no. 2:179–85.
- Law, Stephen. 2017. "Scientism!" In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 121–43. Chicago: University of Chicago Press.
- McGrath, Alister. 2011. *Why God Won't Go Away: Engaging with the New Atheism*. London: Society for Promoting Christian Knowledge.



- Mäki, Uskali. 2013. "Scientific Imperialism: Difficulties in Definition, Identification, and Assessment." *International Studies in the Philosophy of Science* 27, no. 3:325–39.
- Mäki, Uskali, Adrian Walsh, and Manuela Fernández Pinto. 2018. *Scientific Imperialism: Exploring the Boundaries of Interdisciplinarity*. London: Routledge.
- Midgley, Mary. 1992. *Science as Salvation*. London: Routledge.
- Mizrahi, Moti. 2017. "What's So Bad About Scientism?" *Social Epistemology* 31, no. 4:351–67.
- . 2018. "More in Defense of Weak Scientism: Another Reply to Brown." *Social Epistemology Review and Reply Collective* 7, no. 4:7–25.
- Peels, Rik. 2017a. "Ten Reasons to Embrace Scientism." *Studies in History and Philosophy of Science A* 63:11–21.
- . 2017b. "The Fundamental Argument Against Scientism." In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 165–84. Chicago: University of Chicago Press.
- . 2018. "A Conceptual Map of Scientism." In *Scientism: Problems and Prospects*, edited by Jeroen de Ridder, Rik Peels, and René van Woudenberg, 28–56. Oxford: Oxford University Press.
- . Manuscript a. "A Conceptual Map of Scientism." Unpublished manuscript (earlier version of Peels 2018). URL = [www.rikpeels.nl/files/A%20Conceptual%20Map%20of%20Scientism.doc](http://www.rikpeels.nl/files/A%20Conceptual%20Map%20of%20Scientism.doc)
- . Manuscript b. "Scientism and the Argument from Self-Referential Incoherence." Unpublished manuscript. URL = <http://www.rikpeels.nl/files/Self-Referential.pdf>
- Pigliucci, Massimo. 2015. "Scientism and Pseudoscience: A Philosophical Commentary." *Journal of Bioethical Inquiry* 12, no. 4:569–75.
- . 2018. "Scientism and Pseudoscience: A Philosophical Commentary." In *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry and Massimo Pigliucci, 185–201. Chicago: University of Chicago Press.
- Quine, Willard Van Orman. 1968. "Ontological Relativity." *Journal of Philosophy* 65, no. 7:185–212.
- . 1976 [1957]. "The Scope and Language of Science." In *The Ways of Paradox and Other Essays*, 228–45. Cambridge, Mass.: Harvard University Press.
- . 1981. *Theories and Things*. Cambridge, Mass.: Harvard University Press.
- . 1995. *From Stimulus to Science*. Cambridge, Mass.: Harvard University Press.
- Quine, Willard Van Orman, and Sami Pihlström. 1996. "Orman Quine niin & näin haastattelussa." *niin & näin* 1996, no. 1:7–13. In Finnish.

- de Ridder, Jeroen. 2014. "Science and Scientism in Popular Science Writing." *Social Epistemology Review and Reply Collective* 3, no. 12:23–39.
- . 2016a. "Science Without Isms (Jeroen De Ridder)." YouTube video, posted by Areiopagi, October 31, 2016, 45:20 min., URL = [www.youtube.com/watch?v=0WELnYXvIJ4](http://www.youtube.com/watch?v=0WELnYXvIJ4).
- . 2016b. "Scientism as Pop Epistemology (Jeroen De Ridder)." YouTube video, posted by Areiopagi, October 28, 2016, 50:41 min., URL = [www.youtube.com/watch?v=ZqFAhDxK\\_Tw](http://www.youtube.com/watch?v=ZqFAhDxK_Tw).
- de Ridder, Jeroen, Rik Peels, and René van Woudenberg. 2018. *Scientism: Prospects and Problems*. Oxford: Oxford University Press.
- Rosenberg, Alexander. 2012. *The Atheist's Guide to Reality: Enjoying Life Without Illusions*. 2011. New York City: W. W. Norton.
- Ross, Don, and James Ladyman, eds. 2007. *Every Thing Must Go: Metaphysics Naturalized*. Oxford: Oxford University Press.
- Ross, Don, James Ladyman, and David Spurrett. 2007. "In Defence of Scientism." In *Every Thing Must Go: Metaphysics Naturalized*, edited by James Ladyman and Don Ross, 1–65. Oxford: Oxford University Press.
- Sedgwick, Eve Kosofsky. 2003. *Touching Feeling: Affect, Pedagogy, Performativity*. Durham, N.C.: Duke University Press.
- Shields, Christopher. 2016. "Aristotle." In *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), edited by Edward N. Zalta. URL = <https://plato.stanford.edu/archives/win2016/entries/aristotle/>
- Skinner, B. F. 1971. *Beyond Freedom and Dignity*. Harmondsworth: Penguin.
- Sorell, Tom. 2002 [1991]. *Scientism: Philosophy and the Infatuation with Science*. London: Routledge.
- Stenmark, Mikael. 1997. "What Is Scientism?" *Religious Studies* 33, no. 1:15–32.
- . 2001. *Scientism: Science, Ethics and Religion*. Farnham: Ashgate.
- Walsh, Adrian, and Sandy Boucher. 2018. "Scientific Imperialism, Folk Morality and the Proper Boundaries of Disciplines." In *Scientific Imperialism: Exploring the Boundaries of Interdisciplinarity*, edited by Uskali Mäki, Adrian Walsh, and Manuela Fernández Pinto, 13–30. London: Routledge.
- van Woudenberg, René. 2013. "Limits of Science and the Christian Faith." *Perspectives on Science and Christian Faith* 65, no. 1:24–36.