

What's so bad about Scientism?

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Abstract: In their attempt to defend philosophy from accusations of uselessness made by prominent scientists, such as Stephen Hawking, some philosophers respond with the charge of “scientism.” This charge makes endorsing a scientific stance a mistake *by definition*. For this reason, it begs the question against these critics of philosophy, or anyone who is inclined to endorse a scientific stance, and turns the scientism debate into a verbal dispute. In this paper, I propose a different definition of scientism, and thus a new way of looking at the scientism debate. Those philosophers who seek to defend philosophy against accusations of uselessness would do philosophy a much better service, I submit, if they were to engage with the definition of scientism put forth in this paper, rather than simply make it analytic that scientism is a mistake.

Keywords: inference to the best explanation; epistemological scientism; scientific stance; success of science

1. Introduction

In their attempt to defend philosophy from accusations of uselessness made by prominent scientists, such as Hawking and Mlodinow (2010, p. 5), who write that “philosophy is dead,”¹ some philosophers accuse these scientists of “scientism.” According to Pigliucci (2010, p. 235), the term ‘scientism’ “is in fact only used as an insult.” By “scientism,” Pigliucci (2010, p. 235) means, “the *intellectual arrogance* of some scientists who think that, given enough time and especially financial resources, science will be able to answer whatever meaningful questions we may wish to pose—from a cure for cancer to the elusive equation that will tell us how the laws of nature themselves came about” (emphasis added).² And Sorell (2013, p. x) defines scientism as follows:

[*(SP)*] Scientism is a matter of *putting too high a value* on science in comparison with other branches of learning or culture (emphasis added).

¹ Richard Feynman is rumored to have said that “philosophy of science is about as useful to scientists as ornithology is to birds” (Kitcher 1998, p. 32). See also Weinberg (1994, pp. 166-190).

² According to Kidd (2016, p. 11), “The modern cheerleaders for science that Pigliucci points to—such as Hawking, Krauss, and deGrasse Tyson—are today’s continuants of those dogmatic dithyrambs to science and so often lapse into scientism.”

Along the same lines, Williams (2015) identifies the following tenets of scientism:

1. “only certifiably scientific knowledge counts as real knowledge” (p. 6);
2. “the methods and assumptions underlying the natural sciences, including epistemological and metaphysical doctrines, are appropriate for all sciences” (p. 6);
3. “an exaggerated confidence in science [...] to produce knowledge and solve the problems facing humanity” (pp. 6-7);
4. “the world must really be like the methods of contemporary natural science assume it to be” (p. 7).

Similar definitions of scientism have been offered by Hua (1995, p. 15) and Haack. According to Haack (2007, pp. 17-18), scientism “is an *exaggerated* kind of deference towards science” (emphasis added).

What all these characterizations of scientism share in common is the assumption that anyone who endorses a scientific stance, like the aforementioned scientists who are dismissive of philosophy supposedly do, has an improper attitude toward science, as the phrases “intellectual arrogance” and “exaggerated confidence” suggest. Defining scientism along the lines of (SP), however, is problematic in the following respects:

- (1) (SP) is a *persuasive definition*. To define scientism as “putting *too high a value* on science,” as “an *exaggerated* deference to science,” or as “intellectual *arrogance*” is to express *disapproval* of scientism. Definitions that are “designed to transfer emotive force, such as feelings of approval or disapproval,” are known as persuasive definitions (Salmon 2013, p. 65). In that respect, to define scientism as “putting *too high a value* on science,” as “an *exaggerated* deference to science,” or as “intellectual *arrogance*” is akin to defining abortion as murder.³ Just as a pro-choice advocate would object to defining abortion as murder, since it expresses disapproval of abortion, an advocate of scientism would object to defining scientism as “putting *too high a value* on science,” as “an *exaggerated* deference to science,” or as “intellectual *arrogance*,” since it expresses disapproval of scientism. A persuasive definition like (SP), then, “masquerades as an honest assignment of meaning to a term while condemning or blessing with approval the subject matter of the *definiendum*” (Hurley 2015, p. 101). In other words, persuasive definitions look like honest attempts to define terms but in fact they transfer emotive force, which, in the case of (SP), is a feeling of disapproval. The problem with such definitions is that they “are strategies consisting in presupposing an unaccepted definition, taking a new unknowable description of meaning as if it were commonly shared” (Macagno and Walton 2014, p. 205). Instead of condemning scientism *by definition*, one needs to *show* precisely what is wrong with scientism.⁴

³ Or defining *materialism* as “putting too high a value on” or “an exaggerated deference to” matter in motion. See Ladyman (2011) on the materialist stance.

⁴ Some might think that, surely, there are terms that must be defined in a way that transfers emotive force, since they are supposed to be derogatory terms. But this is mistaken. Take, for example, “Nazism”; arguably, the most horrible of -isms. The Oxford English Dictionary definition of ‘Nazism’ in English does specify that the term is sometimes

- (2) *(SP) is question-begging.* Whether or not it is a persuasive definition, to define scientism as “putting *too high a value* on science,” as “an *exaggerated* deference to science,” or as “intellectual *arrogance*” is to beg the question against anyone who is inclined to endorse a scientific stance. For (SP) implies that anyone who endorses scientism is already making a mistake, i.e., he or she is “putting *too high a value* [as opposed to the proper amount of value] on science,” has an “*exaggerated* deference [as opposed to the right sort of deference] to science,” or is being “intellectually *arrogant*” (as opposed to intellectually virtuous). Instead of making scientism a mistake *by definition*, and thereby beg the question against anyone who is inclined to endorse a scientific stance, one needs to *show* precisely why it is a mistake to endorse a scientific stance.⁵
- (3) *(SP) turns the scientism debate into a verbal dispute.* Just as those who object to scientism can define it as “a matter of putting *too high* a value on science,” as “an *exaggerated* deference to science,” or as “intellectual *arrogance*,” those who endorse a scientific stance can define scientism as putting the proper amount of value on science, as the right sort of deference to science, or as intellectual virtue, and thus “anti-scientism” as a matter of putting too little (or not enough) value on science, as understated deference to science, or as intellectual timidity. In that case, the scientism debate would deteriorate into a verbal dispute insofar as the parties to the debate use the same term but with different meanings.⁶

In fact, it looks like parties to the debate are already talking past each other. For instance, the aforementioned philosophers use ‘scientism’ along the lines of (SP), whereas other philosophers, who “admire science to the point of frank scientism” (Ladyman et al 2007, p. 61), apparently do not think that there is anything wrong with scientism *by definition*.⁷ Like Ladyman et al (2007, p. 9), who find the “scientism” charge poorly justified, Rosenberg (2015) embraces scientism “while taking exception to the ‘unwarranted’ and ‘exaggerated’ part.” For Rosenberg (2011, p. 6), scientism is the “conviction that the methods of science are the only reliable ways to secure knowledge of anything.” That is, like Ladyman et al (2007), Rosenberg describes scientism as a conviction but he does not think that there is something wrong *by definition* with such a conviction. As the title of Rosenberg (2015) suggests, in some quarters of the philosophy of science, ‘scientism’ is not used as a label for an allegedly misguided conviction. Rather, it is used as a label for a variant of naturalism (Stanford 2016).⁸

used as a derogatory term. However, there is nothing derogatory about *the definition itself*, which is “The political principles of the National Socialist German Workers’ Party.” As Loughlin et al (2013, p. 131) put it, “we need a definition of scientism that does not automatically amount to an accusation.”

⁵ Just as “we need a definition of scientism that does not automatically amount to an accusation” (Loughlin et al 2013, p. 131), we also need a definition of scientism that does not automatically amount to a “guilty” charge.

⁶ On verbal disputes, see Chalmers (2011).

⁷ See also Ladyman (2011) on “the scientific stance.”

⁸ Cf. Ladyman (2011) on “the scientific stance.” As an anonymous reviewer rightly pointed out, concerns about circularity can be raised against both naturalism and scientism. As Stroud puts it (1996, p. 43) “one thing that seems not to have been ‘naturalized’ is naturalism itself.” I address these concerns as far as scientism is concerned in Section 4.

To prevent the debate over scientism from degenerating into a verbal dispute, then, we need a non-persuasive, non-question-begging, and principled definition of scientism. After all, the same term cannot be both an insult (Pigliucci 2010, p. 235) and a “badge of honor” (Hughes 2012) at the same time. In other words, “we need a definition of scientism that does not automatically amount to an accusation” (Loughlin et al 2013, p. 131). In what follows, I will attempt to offer such a definition. I will focus on the epistemological dimensions of scientism; that is, on scientism as (purportedly) an epistemological thesis (cf. de Ridder 2014).

To be clear, the focus of this paper is not what self-professed adherents of scientism *actually* say or have said. Rather, the focus of this paper is what an adherent of scientism *should* say. In other words, the aim of this paper is to articulate a defensible definition of scientism to replace the straw man that is (SP). I propose that those philosophers who seek to defend philosophy against accusations of uselessness would do philosophy a much better service if they were to show that the definition of scientism put forth in this paper is incorrect, rather than simply make it analytic that scientism is a mistake. Of course, it is understandable that the aforementioned philosophers make recourse to something like (SP), given that the aforementioned detractors of philosophy rarely provide arguments to support their scientism. Nevertheless, as philosophers, we should be able to do much better than resort to persuasive and question-begging definitions, like (SP).

I should also make clear that the focus of this paper is the “scientism” charge as it is made by some philosophers who seek to defend philosophy from those (typically scientists) who accuse it of being useless. As an anonymous reviewer helpfully pointed out, there are ongoing debates outside of philosophy that are relevant to the question of scientism as an epistemological stance. For instance, Loughlin et al (2013) discuss the implications of scientism in medical practice. They write:

The most disastrous implication of adopting scientism as our only basis for medical enquiry and for the practice of medicine is its relegation of the study of value to a non-rational pursuit. Scientism has helped us to develop a focus on technical approaches that can assist good practitioners, but at its core medicine is a value-laden enterprise (Loughlin et al 2013, p. 142).⁹

I will have nothing to say about the implications of scientism vis-à-vis medical practice, but I will briefly discuss the issue of values in science in Section 4.

2. Strong Scientism

As a first attempt at a non-persuasive, non-question-begging, and principled definition of scientism, consider the following definition, which, unlike (SP), avoids problems (1), (2), and (3) discussed above:

⁹ See also Henry (2010).

Strong Scientism

Of all the knowledge we have, scientific knowledge is the *only* “real knowledge.”

This definition is in accordance with what Cowburn (2013, p. 47) says about scientism, namely, that it is “the belief that scientific knowledge is the only valid knowledge which we have,” with de Ridder’s (2014, p. 25) *Epistemological Scientism* (ES), according to which “Science is the only source of justified belief or knowledge about ourselves and the world,” and with Williams’ (2015, p. 6) first tenet of scientism.¹⁰

Before I proceed to evaluate *Strong Scientism*, a clarification is in order. Like other authors in the literature on scientism, all of whom use the term ‘knowledge’ (see, e.g., Peels 2016, p. 2462), by “knowledge” I do not mean justified true belief or any other analysis of knowledge in terms of necessary and sufficient conditions, for that matter. Rather, “knowledge” is meant to refer to the aim or goal of inquiry or the final product of inquiry.¹¹ In that sense, science produces scientific knowledge, mathematics produces mathematical knowledge, philosophy produces philosophical knowledge, and so on. In the context of the scientism debate, it is taken for granted that all disciplines, i.e., all fields of inquiry, both scientific and non-scientific ones, are in the business of producing “knowledge” in that sense. The knowledge of each discipline, then, is what one finds in the academic publications (journal articles and books) of that discipline. What someone who accepts *Strong Scientism* would deny, then, is that other disciplines produce “real knowledge,” to use Williams (2015, p. 6) terminology, or “valid knowledge,” to use Cowburn’s (2013, p. 47) terminology.

Now, I think that *Strong Scientism* is better than (SP) as a definition of scientism insofar as it is not a persuasive definition. That is to say, unlike (SP), *Strong Scientism* expresses neither approval nor disapproval of the *definiendum*. Moreover, unlike (SP), *Strong Scientism* is not question-begging, since it does not make endorsing scientism a mistake by definition. Despite being better than (SP) in these respects, *Strong Scientism* might seem “too strong.” After all, even though scientific activity involves observation, not all looking is “scientific.” Compare, for instance, the sort of telescopic observations Galileo conducted when he discovered the rings of Saturn with simply lying around and gazing at the night sky. It might seem as if the former is “scientific,” whereas the latter is not, but that such gazing can still produce “real knowledge.” Similarly, even though scientific practice involves reasoning, not all reasoning is “scientific.” Compare, for instance, inferring that no one is home from the fact that the lights are off with inferring that Africa is a likely source of the human mitochondrial gene pool from a genealogical tree. It might seem as if the former is “scientific,” whereas the latter is not, but that such inference can still produce “real knowledge.”

If *Strong Scientism* is indeed too strong, it may be an inadequate definition of scientism. Insofar as there may be other ways of knowing that are not scientific, *Strong Scientism* needs to

¹⁰ See also Peels’ (2016, p. 2462) “epistemological scientism,” which is the view that “only the natural sciences are a reliable source of knowledge.”

¹¹ On scientific knowledge, see Bird (2007) and (2008), Rowbottom (2008) and (2010), Niiniluoto (2014), and Mizrahi & Buckwalter (2014).

be revised. In the next section, I refine *Strong Scientism* and offer an argument for a revised definition of scientism.

3. Weak Scientism

As a second attempt at a non-persuasive, non-question-begging, and principled definition of scientism, consider the following definition, which is an improvement on both (SP) and *Strong Scientism*:

Weak Scientism

Of all the knowledge we have, scientific knowledge is the *best* knowledge.

Like *Strong Scientism*, *Weak Scientism* is not a persuasive definition. That is to say, like *Strong Scientism* but unlike (SP), *Weak Scientism* expresses neither approval nor disapproval of the *definiendum*. Moreover, like *Strong Scientism* but unlike (SP), *Weak Scientism* is not question-begging, since it does not make endorsing scientism a mistake by definition. Unlike *Strong Scientism*, however, *Weak Scientism* is compatible with there being other ways of knowing that are not scientific, for *Weak Scientism* does not state that the scientific way of knowing is the *only* way of knowing. Rather, *Weak Scientism* states that the scientific way of knowing is the *best* way of knowing. In other words, according to *Weak Scientism*, of all the knowledge we have, scientific knowledge is the best knowledge.

I think that *Weak Scientism* is a defensible definition of scientism. By saying that *Weak Scientism* is a defensible definition of scientism I mean to say that *Weak Scientism* can be successfully defended against objections. Although it may be the case that adherents of scientism have offered other (perhaps stronger) definitions of scientism, *Weak Scientism* is the definition of scientism they *should* adopt if they want to have a defensible definition of scientism. In addition, I propose, *Weak Scientism* is the definition of scientism those philosophers who seek to defend philosophy against accusations of uselessness, like the philosophers mentioned in Section 1, should attack if they want to do philosophy a real service.

In the next section, I will consider a few objections to *Weak Scientism* in order to show that, in addition to being a non-persuasive, non-question-begging, and principled definition of scientism, as I have shown above, *Weak Scientism* is a defensible definition of scientism. In doing so, I will spell out the ways in which scientific knowledge can be said to be better than knowledge produced by other academic disciplines. In particular, since one thing can be said to be better than another either quantitatively or qualitatively, I will show in what sense scientific knowledge can be said to be quantitatively better than knowledge produced by other disciplines and in what sense scientific knowledge can be said to be qualitatively better than knowledge produced by other disciplines.

4. In Defense of Weak Scientism

In order to show that a thesis is defensible, one needs to show that it can be defended against objections. In what follows, then, I will consider a couple of objections that can be raised against *Weak Scientism*.

Inspired by an objection to the verifiability criterion of meaning, according to which the verifiability criterion itself cannot be empirically verified (Hempel 1951), some might object to *Weak Scientism* by claiming that there can be no scientific evidence for *Weak Scientism*. This objection can be interpreted in at least two ways:

(O1) It is *epistemically impossible* to produce scientific evidence for *Weak Scientism*.

(O2) It is *viciously circular* to support *Weak Scientism* with scientific evidence.¹²

Insofar as they are supposed to be objections against *Weak Scientism*, I think that both (O1) and (O2) are problematic. The problem with (O1) is that it is false. In general, statements of the form ‘X% of *F*s are *G*s’ can be supported by what would be considered scientific evidence as follows (Salmon 2013, p. 153):

1. X% of sampled *F*s are *G*s.

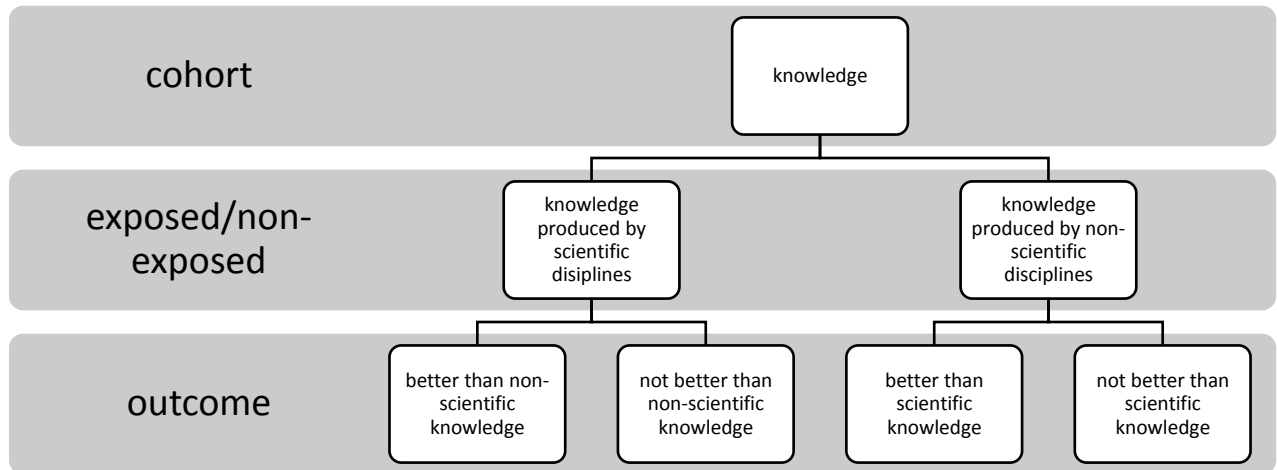
Therefore, probably,

2. X% ($\pm Z\%$ margin of error) of *F*s are *G*s.

This type of argument is known as “inductive generalization from a sample” (see, e.g., Govier 2014, p. 258). Accordingly, we can take a cohort of knowledge claims and conduct a retrospective study as illustrated in Figure 1.

Figure 1. A retrospective study of knowledge claims

¹² I am not using ‘vicious’ here in a virtue-theoretic sense (cf. Kidd forthcoming). Rather, I am using ‘vicious’ in an epistemic sense. As Psillos (2011, p. 25) puts it, “*Vicious* circularity is an epistemic charge—a viciously circular argument has no epistemic force. It cannot offer reasons to believe the conclusion. It cannot be persuasive” (original emphasis).



If we find out that most of the sampled scientific knowledge is better than non-scientific knowledge, then we would have scientific evidence for *Weak Scientism*. That is:

1. Most of the sampled scientific knowledge is better than non-scientific knowledge.

Therefore, probably,

2. Scientific knowledge is better than non-scientific knowledge.

On the other hand, if we find out that most of the non-scientific knowledge is better than scientific knowledge, then we would have scientific evidence against *Weak Scientism*. That is:

1. Most of the sampled non-scientific knowledge is better than scientific knowledge.

Therefore, probably,

2. Non-scientific knowledge is better than scientific knowledge.

In fact, I (2013b) have used a similar method to test the historical premise of the antirealist argument known as the pessimistic induction (see Laudan 1981). According to the pessimistic induction, since most past scientific theories are now considered strictly false, it is probable that our current scientific theories will eventually be considered strictly false as well. Contrary to the historical premise of the pessimistic induction, however, I (2013b) show that it is not the case that most scientific theories (past and present) are considered strictly false by practicing scientists. I propose that *Weak Scientism* can be tested in a similar way.

To this it might be objected that the inductive generalizations outlined above are not arguments that produce scientific knowledge because they ultimately rely on philosophical assumptions. One philosophical assumption that these inductive generalizations ultimately rest on, for example, is the assumption that academic knowledge produced by an academic discipline can be measured. Since these inductive generalizations are ultimately based on philosophical assumptions, it might be argued, they are arguments that produce philosophical, not scientific, knowledge. This, in turn, means that, according to *Weak Scientism*, the knowledge they produce is not as good as scientific knowledge.

This is an important objection that raises many challenging questions the present paper cannot do justice to. For instance, this objection raises the following question: What makes a statement, such as “Academic knowledge produced by an academic discipline can be measured,” philosophical? As Baggini and Stangroom (2005, p. 6) point out, this “question [namely, what exactly makes something philosophy?] is too large to be properly answered [in a book],” let alone a journal article. Sytsma and Livengood (2016, Ch. 2), for example, discuss six competing accounts of what makes something philosophical. This is why, for the purposes of this paper, I have operationalized “philosophy” as simply “what [professional] philosophers do” (Sparshott 1998, p. 20). Arguably, as far as answering the question “What makes X philosophical?” goes, that may be the best we can do (Lauer 1989, p. 16). For present purposes, I hope it is sufficient to point out that, just as the mere fact that an argument (e.g., William Lane Craig’s Kalam cosmological argument) draws on scientific theories (e.g., the Big Bang theory) does not make that argument a *scientific* argument, the mere fact that an argument draws on philosophical assumptions does not make that argument a *philosophical* argument. The aforementioned inductive generalizations, however, not only draw on scientific evidence but also have the *structure* of inductive generalizations from samples, which are inferences commonly made by practicing scientists.¹³

In that respect, it is important to note that the aforementioned critics of philosophy probably have *academic knowledge produced by academic disciplines* in mind when they charge philosophy with being “useless.” For instance, Hawking and Mlodinow (2010, p. 5) write that “*philosophy* is dead” because it “has not kept up with developments in science, particularly *physics*” (emphasis added). Similarly, Weinberg (1994, p. 168) says that, as a “*working scientist*,” he “finds no help in *professional philosophy*” (emphasis added). Moreover, those who level the “scientism” charge against these critics of philosophy also have academic knowledge produced by academic disciplines in mind when they do so. For example, when he defines scientism as “a matter of putting too high a value on science,” Sorell (2013, p. x) compares science to “other *branches of learning* or culture” (emphasis added). Accordingly, it is clear that the debate between scientists who are critical of philosophy and philosophers who charge critics of philosophy with “scientism” is about academic knowledge produced by academic disciplines, as opposed to more basic sources of knowledge, such as perception, introspection, and the like.¹⁴ This is another reason why, for the purposes of this paper, I have operationalized “philosophy” as simply “what [professional] philosophers do” (Sparshott 1998, p. 20). Accordingly, if

¹³ Thanks to an anonymous reviewer for this point.

¹⁴ According to Peels (2016, p. 2462), an “important argument in favour of epistemological scientism is that empirical research has shown that IR [i.e., that introspection is reliable] is false.”

inductive generalization from a sample is a methodology commonly used in science, then it counts as “scientific” for present purposes.¹⁵

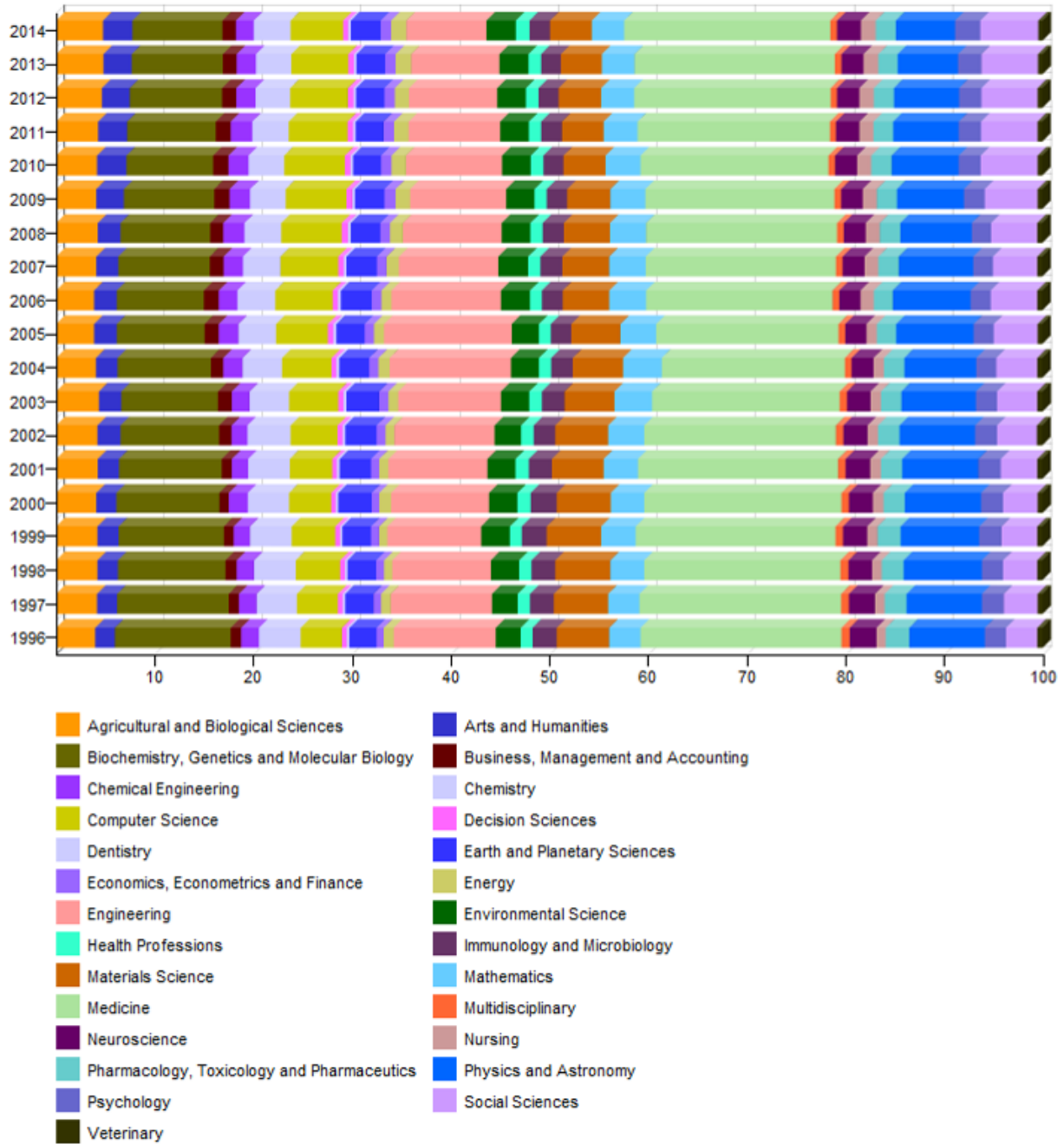
It is also important to keep in mind that *Weak Scientism* does not amount to a denial of non-scientific knowledge. On *Weak Scientism*, there is knowledge other than scientific knowledge; it’s just that scientific knowledge is *better* than non-scientific knowledge. According to *Weak Scientism*, of all the academic knowledge produced by academic disciplines, including scientific disciplines like astrophysics and non-scientific disciplines like philosophy, scientific knowledge is the *best* knowledge we have.

At this point, it might also be objected that ‘better’ and ‘best’ are vague terms. In what sense, exactly, is scientific knowledge supposed to be better than knowledge produced by other academic disciplines? In reply, it is important to note that something can be better than something else either *quantitatively* or *qualitatively*. Is scientific knowledge *quantitatively* better than non-scientific knowledge? If we look at research output (number of publications) and research impact (citation counts) in science compared to the arts and humanities, which are commonly taken to be different from both natural science and social science, the answer is unequivocally *yes*. For instance, a recent study in information science that looks at the growth of science identifies “three growth phases in the development of science, which each led to growth rates tripling in comparison with the previous phase: from less than 1% up to the middle of the 18th century, to 2 to 3% up to the period between the two world wars and 8 to 9% to 2012” (Bornmann & Mutz 2014). In other words, global scientific output doubles “roughly every nine years” (Van Noorden 2014).

When compared to research output in non-scientific fields, it becomes clear that scientific output is *quantitatively* better. Figure 2 shows the research output (specifically, journal articles) of various disciplines in the United States from 1996 to 2014. Research output in arts and humanities comprises only 1% to 3% of total research output, which includes the natural sciences, the medical sciences, and the social sciences. In other words, given that the goal of any scholar or academic researcher, regardless of academic discipline, is to publish, it is clear that scientific disciplines are *quantitatively* better at attaining this goal.

¹⁵ Incidentally, this is why experimental philosophers who conduct experimental surveys and draw general conclusions from their samples of participants are sometimes accused by other philosophers of “not doing philosophy.” For more on the “experimental philosophy is not philosophy” charge, see Alexander (2010).

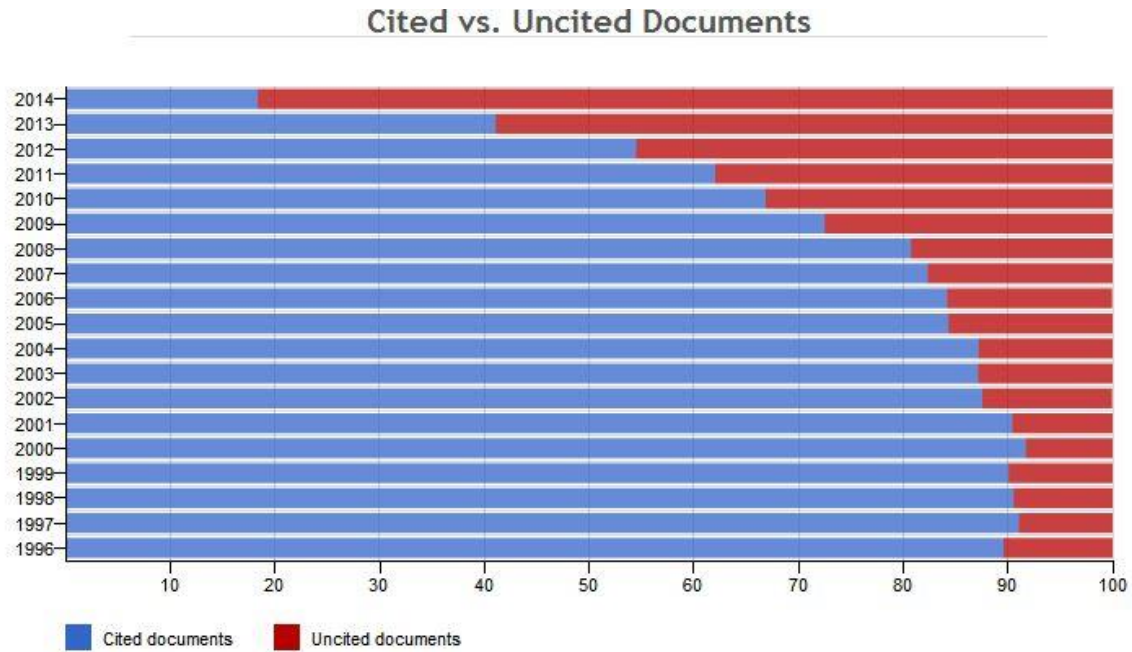
Figure 2. Research output by discipline in the United States from 1996 to 2014 (Source: SJR—SCImago Journal & Country Rank)



To this it might be objected that quantity alone is a rather crude measure. We would like to know if the work being published in scientific versus non-scientific fields is also good work. One way to measure this is by research impact (i.e., citation counts). As far as research impact is concerned, while 12% of medicine articles, 27% of natural science articles, and 32% of social science articles are never cited, 82% of humanities articles are never cited (Remler 2014). This

means that, unlike most medical, natural, and social science articles, most humanities articles “fall stillborn from the press,” as shown in Figure 3.

Figure 3. In 2014, 82% of arts and humanities articles in the United States were not cited (Source: SJR—SCImago Journal & Country Rank)



Quantitatively, then, scientific knowledge is better—in terms of research output (i.e., more publications) and research impact (i.e., more citations)—than non-scientific knowledge.

The sense in which scientific knowledge is *qualitatively* better than other types of knowledge is what philosophers of science call “success.” When philosophers of science talk about the success of science, they typically mean the following:

1. *Explanatory success.* Successful scientific theories provide comprehensive explanations for phenomena that would otherwise seem mysterious.
2. *Instrumental success.* Successful scientific theories allow us to intervene in nature and causally manipulate entities, events, and processes.
3. *Predictive success.* Successful scientific theories make novel predictions that are borne out by observation or experimentation.

As Laudan (1984, p. 109) puts it, “A theory is successful provided that it makes substantially correct predictions, that it leads to efficacious interventions in the natural order, or that it passes a suitable battery of standard tests.”¹⁶

By way of illustration, consider an example of scientific knowledge, namely, Albert Einstein’s theory of relativity. The theory of relativity is explanatorily successful insofar as it provides a comprehensive explanation for phenomena that would otherwise seem mysterious, such as (what we experience as) gravity, planetary orbits, black holes, electromagnetism, and more. The theory of relativity is instrumentally successful insofar as it allows us to intervene in nature as when we use Global Positioning Systems (GPS) to navigate our world and gravitational lensing to look for new worlds. The theory of relativity is predictively successful insofar as it makes novel predictions that are borne out by observation or experimentation, such as the perihelion precession of Mercury, the deflection of light by massive objects, the gravitational redshifting of light, the relativistic delay of light (also known as the Shapiro Effect), and more.

I think that one would be hard pressed to find an example of knowledge from a non-scientific field that is as explanatorily, instrumentally, and predictively successful as the theory of relativity. Take, for example, an example of knowledge from philosophy, which is considered a non-scientific field, such as realism about the external world. According to a survey conducted by Bourget and Chalmers (2014), 81.6% of contemporary philosophers are non-skeptical realists about the external world, which means that they think there is an external world (Bourget & Chalmers 2014, p. 476). Is a philosophical hypothesis like external-world realism better than a scientific hypothesis like the theory of relativity? More precisely, is a philosophical hypothesis like “there is an external world” as *successful* as (or better than) a scientific one like “gravity is a distortion in space-time caused by massive objects”? I suppose that “there is an external world” could explain why (most of us or, at least, most philosophers) believe that there is an external world or why we have sensory experiences as if there is an external world.¹⁷ But a skeptical hypothesis, such as the one according to which we are all merely brains in vats that are connected to computers that create a virtual reality for brains, could explain why we believe that there is an external world or why we have sensory experiences as if there is an external world equally well. At the very least, it is an open question whether the Real World Hypothesis (i.e., that there is an external world) is a better explanation for our sensory experiences than skeptical hypotheses such as the Brain-In-a-Vat hypothesis (see Vogel 2009 and Gifford 2013). From an explanatory point of view, then, the Real World Hypothesis is hardly more successful than even skeptical hypotheses about the external world.

Likewise, it is not clear that a philosophical hypothesis like “there is an external world” is instrumentally successful, let alone as successful as (or better than) a scientific hypothesis like “gravity is a distortion in space-time caused by massive objects.” Does the Real World Hypothesis allow us to intervene in nature and causally manipulate entities, events, and processes? Of course, if the Real World Hypothesis weren’t true, i.e., if there were no external world, then we wouldn’t be able to intervene in nature and causally manipulate entities, events,

¹⁶ See also Leplin (1997) and Douglas & Magnus (2013) on novel predictive success.

¹⁷ For an argument that the Real World Hypothesis is the best explanation for our sensory experiences, see Beebe (2009).

and processes. But that is beside the point. The point is that the Real World Hypothesis itself does not allow us to causally manipulate nature in the same way that the theory of relativity allows us to navigate our world using GPS and observe distant worlds using gravitational lensing. For instance, if we design GPS satellites without taking into account relativistic effects, our GPS devices would fail to perform their navigational function. The same cannot be said about the Real World Hypothesis.

It is also not clear that a philosophical hypothesis like “there is an external world” is predictively successful, let alone as successful as (or better than) a scientific hypothesis like “gravity is a distortion in space-time caused by massive objects.” Does the Real World Hypothesis make any novel predictions? That is to say, have we learned something new that we couldn’t have learned without the vantage point afforded by the Real World Hypothesis? Of course, the Real World Hypothesis, if true, would “predict” that we would have sensory experiences as if there is an external world. But that is not a *novel* prediction. Instead, that is the *explanandum* or what the Real World Hypothesis is meant to explain in the first place.¹⁸

To this it might be objected that non-scientific knowledge is not supposed to be explanatorily, instrumentally, and predictively successful. For instance, the philosophical hypothesis that there is an external world is not supposed to explain anything.¹⁹ Non-scientific disciplines are simply not in the business of explaining things, or so the objection goes. In response, consider the fact that, in any area of inquiry, be it scientific or otherwise, we ask questions. For example:

Why is there something rather than nothing?

How did life originate?

Why did the dinosaurs go extinct?

What makes us human?

Why do we sleep?

Why do we dream?

How did the ancient Egyptians build the pyramids?

If there is an all-powerful and good God, how come there is evil in the world?

How was Stonehenge built?

Why be moral?

Why are we subject to cognitive biases?

¹⁸ For an argument that the Real World Hypothesis is the best explanation for our sensory experiences, see Beebe (2009).

¹⁹ Though, as mentioned above, Beebe (2009) offers an abductive argument for the Real World Hypothesis.

What makes a good story?

Why did Caesar cross the Rubicon?

Why do honey bees make hexagonal honeycombs?

Why is there a “mass gap” in the solution to the quantum versions of the Yang-Mills equations?

Answers to such questions are called “explanations”; that is, “Why such-and-such is the case?” or “How did such-and-such come about?” Answer: “Because *X*” (Schurz and Lambert 1994, p. 67). Of course, we want not just explanations but *good* explanations. What makes an explanation a good explanation? The following are common good-making criteria for explanations or criteria for selecting the best explanation among several competing explanations (Mizrahi 2012, p. 134):

Unification: As a general rule of thumb, choose the explanation that explains the most and leaves the least unexplained things.

Coherence: As a general rule of thumb, choose the explanation that is consistent with background knowledge.

Simplicity: As a general rule of thumb, choose the least complicated explanation, i.e., the one that posits the least causal sequences and entities, and that goes beyond the evidence the least.

Testability: As a general rule of thumb, choose the explanation that yields independently testable predictions.²⁰

For example, the extinction of the dinosaurs can be explained by postulating a catastrophic meteorite impact but it can also be explained by postulating a catastrophic volcanic eruption. The question, then, is which explanation is the best one. The answer to this question is determined by evaluating each explanation according to the aforementioned criteria. As far as these two competing explanations are concerned, the meteorite explanation is better than the volcanic eruption explanation because the former has more unification power than the latter. As Carol Cleland puts it:

A scientific consensus on the meteorite impact hypothesis for the K-Pg extinctions was reached because it explains an otherwise puzzling body of traces, e.g., iridium anomaly, shocked quartz, glassy spherules, etc., and fossil records of ammonites, foraminifera, plant pollen, fern spores, etc. The appearance of these disparate traces in geological strata of the same age is deeply mysterious; they are individually unexpected and their joint occurrence is even more enigmatic. The Alvarez hypothesis explained this double mystery better than any of its scientifically plausible, available rivals (Cleland 2013, p. 6).

This sort of Inference to the Best Explanation (IBE) is not only “the inference that makes science,” as Ernan McMullin (2013) puts it, but also “frequently employed in everyday reasoning” (Douven 2011). For example, suppose that my car does not start. There are at least

²⁰ For present purposes, this list would do. For a more detailed list of explanatory criteria, see Beebe (2009), pp. 608-611.

two potential explanations for this: (a) the car does not start because the battery is dead; (b) the car does not start because it is out of gas. These two explanations are competing hypotheses for the same fact, namely, that my car does not start, insofar as each, if true, would explain why the car does not start. Now suppose that I just replaced the battery in my car but did not fill up my car with gas this week. In that case, (b) is more likely than (a), since (b) is more coherent than (a). I could then reason as follows:

1. My car does not start.
2. (b) explains (1).
3. No other hypothesis [e.g., (a)] explains (1) as well as (b) does.

Therefore, probably,

4. My car is out of gas.²¹

An example of IBE in philosophy comes from the philosophy of science, particularly, the scientific realism/antirealism debate. Scientific realism is supposed to explain the success of science, and we are supposed to prefer scientific realism over alternative explanations for the success of science, such as van Fraassen's selectionist explanation for the success of science (Wray 2007), because scientific realism is said to be the best explanation for the success of science, or so some scientific realists argue. The argument for scientific realism, then, known as the No-Miracles Argument (NMA), goes like this (cf. Busch 2008):

1. Our best scientific theories produce novel predictions.
2. Scientific realism explains the predictive success of our best scientific theories.
3. No other hypothesis explains the predictive success of our best scientific theories as well as Scientific realism does.

Therefore, probably,

4. Scientific Realism is true (i.e., our predictively successful scientific theories are approximately true).

Clearly, then, scientific realism is taken to be an explanation for the success of science. The problem is that, as far as explanations go, scientific realism is not a very good explanation. First, it is not clear that scientific realism really explains the success of science better than other explanations (Wray 2010). Second, as an explanation for the success of science, scientific realism fails to unify phenomena that are related to that success (Frost-Arnold 2010). Third, scientific realism does not make independently testable predictions that, if true, would demonstrate its superiority to other explanations for the success of science (Mizrahi 2012). For these reasons, scientific realism is an example of academic knowledge from the academic discipline of philosophy that is supposed to be an explanation for something (namely, the success

²¹ On the structure of IBE, see Psillos (2007).

of science) but that fails to be a good or successful explanation because it does exhibit the good-making qualities of explanations, such as unification and testability.

IBE is also employed (albeit not explicitly) in literature. Consider the question mentioned above: What makes a good story? There are several explanations for what makes a good story. One such explanation invokes archetypes. According to *The Oxford Companion to English Literature*, an archetype is “a primary symbol, action, setting, or character-type that is found repeatedly in myth, folklore, and literature.” By invoking archetypes one can explain the appeal of literary works (Cole and Lindemann 1990, p. 203). For instance, the archetypes of the hero’s journey explain why ancient epic poems, such as *The Epic of Gilgamesh* and *The Odyssey*, have such an enduring appeal. As Christopher Volger (2007, p. 26) puts it: “Every good story reflects the total human story, the *universal* human condition of being born into this world” (emphasis added).

The claim that most academic disciplines seek explanations can be tested empirically. If both scientific and non-scientific disciplines seek explanations, then we would expect the percentage of research articles that contain the word ‘explain’ (and its cognates) to be roughly the same in scientific and non-scientific disciplines. On the other hand, if scientific disciplines seek explanations, but non-scientific disciplines do not, then we would expect the percentage of research articles that contain the word ‘explain’ (and its cognates) to be significantly higher in scientific compared to non-scientific disciplines. This test can be conducted using JSTOR Data for Research (dfr.jstor.org). This tool allows researchers to search full texts for exact phrases and access the metadata associated with results. It also allows for multiple-character “wildcard” searches. So a search for *explain** through the JSTOR corpus would yield all the research articles that contain ‘explain’ and its cognates. Table 1 summarizes the search results by discipline group in comparison with the total number of research articles in the relevant discipline group.

Table 1. Search results for *explain** in the JSTOR corpus (Source: JSTOR Data for Research)

	Number of research articles in the JSTOR corpus that contain ‘explain’ and its cognates	Total number of research articles in the discipline group
Humanities	393,393	1,060,650
Sciences and Mathematics	505,563	1,641,336
Social Science	602,415	1,645,072

These results show that there is no significant difference between the percentages of research articles that contain ‘explain’ (and its cognates) in the Humanities (38%), Science and Mathematics (31%), and the Social Sciences (37%).

At this point it might be objected that any attempt to measure academic knowledge across academic disciplines presupposes that all knowledge is equal and that that's a philosophical assumption. Again, I hope that for present purposes, it is sufficient to point out that, just as the mere fact that an argument is based on scientific theories does not make that argument a *scientific* argument, the mere fact that an argument is based on philosophical assumptions does not make that argument a *philosophical* argument. Moreover, in the same way that epistemologists bracket the content of a proposition when they theorize about propositional knowledge, i.e., knowing that *p*, and treat all propositional knowledge equally, information scientists who use bibliometric techniques to study scientific knowledge can bracket the propositional content of that knowledge and treat each piece of knowledge (measured in terms of publications, citations, and the like) equally.

Accordingly, if IBE is ubiquitous in scientific and non-scientific reasoning, and good explanations are those that are comprehensive, coherent, simple, and testable, then it follows that, in both scientific and non-scientific contexts, the best explanations are those that are comprehensive, coherent, simple, and testable explanations.²²

Some might grant that the best explanations are those that are comprehensive, coherent, simple, and testable explanations, in scientific as well as non-scientific disciplines, but insist that non-scientific explanations need not be instrumentally successful. For instance, why think that a philosophical explanation needs to have any instrumental value?²³

In reply, I would like to point out that the idea that philosophy has, or *should* have, instrumental value has a long tradition. For example, according to Epicurus:

Empty are the words of that philosopher who offers therapy for no human suffering. For just as there is no use in medical expertise if it does not give therapy for bodily diseases, so too there is no use in philosophy if it does not expel the suffering of the soul (Long and Sedley 1987, p. 155).

Nowadays, there are professional philosophers who advocate for philosophical therapy or counseling.²⁴ Other philosophers argue that philosophy can be useful in dealing with not only mental ills but also the most challenging problems facing humanity today, from climate change and geoengineering (Burns and Strauss 2013) to existential risks (Bostrom 2013). Indeed, any "applied" field within academic philosophy, from applied ethics to applied epistemology, is a testament to the idea that philosophy has, or should have, instrumental value. So, too, is the effort to make philosophy "public." As the American Philosophical Association's Committee on Public Philosophy puts it: "the broader presence of philosophy in public life is important both to our society and to our profession," which is why the committee seeks "to find and create

²² According to Woodward (2014), "the tendency in much of the recent philosophical literature has been to assume that there is a substantial continuity between the sorts of explanations found in science and at least some forms of explanation found in more ordinary non-scientific contexts, with the latter embodying in a more or less inchoate way features that are present in a more detailed, precise, rigorous etc. form in the former."

²³ Thanks to an anonymous reviewer for raising this point.

²⁴ See, e.g., Marinoff (1999). There are also two professional organizations of philosophical therapists or counselors: The American Philosophical Practitioners Association and the National Philosophical Counseling Association.

opportunities to demonstrate the personal value and social usefulness of philosophy” (<http://www.apaonline.org/group/public>).

If the aforementioned considerations are correct, then to say that scientific knowledge is better than non-scientific knowledge is to say that scientific knowledge is quantitatively and qualitatively better than non-scientific knowledge. Scientific knowledge is quantitatively better than non-scientific knowledge in terms of research output (i.e., more publications) and research impact (i.e., more citations). That is, the research output and research impact of scientific disciplines is greater than the research output and research impact of non-scientific disciplines. Scientific knowledge is qualitatively better than non-scientific knowledge in terms of explanatory, instrumental, and predictive success. That is, scientific knowledge is explanatorily, instrumentally, and predictively more successful than non-scientific knowledge. An advocate of scientism, then, *should* argue that non-scientific knowledge is not as explanatorily, instrumentally, and predictively successful as scientific knowledge.

As for (O2), the problem with (O2) is that it is not an objection against *Weak Scientism per se* but against any *inferential* way of knowing. This is because even “deductive inference is only defensible by appeal to deductive inference” (Ladyman 2002, p. 49), as Lewis Carroll’s “What the Tortoise said to Achilles” (1895) makes clear. One might think that the soundness of a rule of inference like *modus ponens* is simply “intuitive” (on some sense of “intuitive”).²⁵ Notice, however, that this means abandoning the attempt to *prove* the soundness of *modus ponens* and simply accepting that it is intuitive. As Psillos (1999, p. 86) explains:

one cannot *prove* the soundness of *modus ponens* unless one ultimately employs *modus ponens*. We need *modus ponens* (and other deductive rules) because we need truth-preserving rules of inference—rules such that, whenever the premises of an argument are true, the conclusion is also true. But can we *prove* that *modus ponens* is truth-preserving? The best we can do is to *prove* a meta-theorem that *modus ponens* in the object-language is truth-preserving. This meta-proof, however, requires that the meta-language already has *modus ponens* (or other deductive rules) as a rule (emphasis added).

Another problem with claiming that the soundness of *modus ponens* is intuitive is that there are putative counterexamples to *modus ponens* (e.g., Lycan 1994). There are also putative counterexamples to other rules of inference that one might think are intuitive.²⁶

For this reason, if opponents of scientism were to object to *Weak Scientism* on the grounds that supporting *Weak Scientism* with scientific evidence is viciously circular, they would thereby be committed to the claim that attempting to prove the soundness of inference rules by logic is viciously circular. For example, they would have to say that the following proof that contradictions imply everything (also known as “explosion”) is viciously circular:

²⁵ See Jenkins (2014) on how ‘intuition’ is used in many ways.

²⁶ For counterexamples to Hypothetical Syllogism, see my (2013a).

1. P
2. $\neg P$
3. $P \vee Q$ 1 Addition
4. Q 2, 3 Disjunctive Syllogism (Lewis & Langford 1932, p. 252)

This is because this proof uses first-order logic to prove what Priest calls “a valid principle of inference in standard twentieth-century accounts of validity,” or “classical logic,” namely, that $\alpha, \neg\alpha \vdash \beta$ (Priest 2004, p. 24). In other words, if it is viciously circular to support claims about science using scientific evidence, then it is viciously circular to prove the soundness of inference rules using logic. Of course, as mentioned above, “deductive inference is only defensible by appeal to deductive inference” (Ladyman 2002, p. 49), and so (O2) is an objection that undermines all inferential ways of knowing, both scientific and non-scientific. As such, it is not an objection that defenders of philosophy would want to use against those who accuse philosophy of being *useless*. After all, (O2) would render philosophy—as well as any other “branch of learning” (Sorell 2013, p. x)—unable to generate knowledge by inference, and thus *useless* as a “branch of learning.”

Finally, there are those who think that there is a “moral” problem with scientism. For instance, according to Pigliucci (2012):

Taken to its logical extreme, scientism leads to nihilism, and as such is both scientifically untenable (nihilism is a philosophical position, not an empirical one) and philosophically sterile. (Cf. Rosenberg 2011, p. 101.)

I suppose that by “nihilism” Pigliucci means ethical or moral nihilism, i.e., the total rejection of all values (see Friedrich Nietzsche’s *Will to Power*, I, 24), and that by “leads” Pigliucci means logically implies, since he uses the phrase “taken to its *logical* extreme.” In that case, *Weak Scientism* logically implies moral nihilism *only if* science is value-free. For, if science is value-laden, then one cannot reject all values without rejecting science itself. But science is not value-free. That is to say, epistemic values play a major role in scientific practice. Such epistemic values include “accuracy, precision, scope, simplicity, fruitfulness, consistency, and so on” (Kuhn 2000, p. 251).²⁷ Some philosophers of science have argued that even non-epistemic values play a major role in scientific practice. For example, methodological decisions involve value judgments about the reliability of practitioners and trust that they have the “right” epistemic attitudes (see Wilholt 2013). Likewise, theoretical decisions involve value judgments about the costs of accepting false hypotheses or rejecting true hypotheses. This is known as “inductive risk” (see Douglas 2000).²⁸

Given that science is value-laden, then, it is not the case that *Weak Scientism* logically implies nihilism, i.e., a total rejection of all values. For *Weak Scientism* would logically imply nihilism *only if* science is value-free. Since it is not the case that science is value-free, it follows that *Weak Scientism* does not logically imply nihilism. It may be the case that some adherents of

²⁷ See also Longino (1995), p. 383.

²⁸ For more on the value-free ideal, see Douglas (2009) and the essays collected in Kincaid et al (2007).

scientism have actually argued for nihilism (see, e.g., Rosenberg 2011). However, if I am right, then they *shouldn't* have. Instead, they *should* accept that science is value-laden. In doing so, they need not give up on scientism. They could still hold on to a defensible version of scientism, namely, *Weak Scientism*. According to *Weak Scientism*, scientific knowledge is the *best* knowledge. *Weak Scientism* is compatible with there being other ways of knowing that are not scientific. If *Weak Scientism* is correct, however, then those ways of knowing are not better (either quantitatively or qualitatively) than the scientific way of knowing.

5. Conclusion

To sum up, I have argued that scientism should be understood as the thesis that scientific knowledge is the *best* knowledge we have, i.e., *Weak Scientism*. I have shown that scientific knowledge can be said to be better than non-scientific knowledge both quantitatively and qualitatively. Scientific knowledge can be said to be *quantitatively* better than non-scientific knowledge in terms of research output (i.e., number of publications) and research impact (i.e., citations counts). Scientific knowledge can be said to be *qualitatively* better than non-scientific knowledge in terms of explanatory, instrumental, and predictive success.

Whether or not *Weak Scientism* is what adherents of scientism actually mean when they use the term 'scientism', *Weak Scientism* is what they *should* mean if they want a defensible definition of scientism. For, if I am right, *Weak Scientism* is a non-persuasive, non-question-begging, principled, and defensible definition of scientism. For these reasons, I propose that those philosophers who seek to defend philosophy against accusations of uselessness abandon the attempt to make it analytic that scientism is wrong and instead target *Weak Scientism*. As philosophers, we must do better than resort to persuasive and question-begging definitions, like (SP).

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