*Organon F* 29 (1) 2022: 128–164
https://doi.org/10.31577/orgf.2022.29106

ISSN 2585-7150 (online)
ISSN 1335-0668 (print)

RESEARCH ARTICLE

# Is There an Alternative to Moderate Scientism?

Szymon Makuła*

Received: 13 January 2020 / Revised: 11 January 2021 / Accepted: 20 June 2021

*Abstract*: This paper's primary purpose is to show that there is a peculiar alternative to scientism whose central thesis is not about sources of knowledge or the existence of various objects, but it aims at setting out a strategy to help decide which of the two mutually exclusive beliefs is the better one to adopt. Scientophilia, to coin a term, recommends preferring, without any discussion, a position consistent with the consensus of credible and reliable experts in a given domain. In case there is no such agreement, mainly because peers disagree with each other, or experts are difficult to identify, it is recommended for a scientophile to suspend judgment. Scientophilia is not a position on science or human knowledge boundaries, but it deals with the practical side of belief change. Verdicts made by this approach are partially similar to those offered by mild scientism, as scientophilia puts scientific knowledge as one of the most reliable sources. However, it is also consistent with mild antiscientism, as in some particular cases (for example, Moorean truths), it assigns reliable expertise to non-scientific experts. Therefore it is a third way.

*Keywords*: Antiscientism; demarcation of science; scientism; scientophilia.

* University of Silesia
https://orcid.org/0000-0001-6421-2748
Bankowa 11 40-007 Katowice University of Silesia, Poland
szymon.makula@us.edu.pl

## 1. What science is?

Before anything is said about scientism and scientophilia, it is first necessary to discuss the very concept of science. The question "what is science?" is similar to the Augustinian question about what time is. Until we make an effort to find an answer, the issue seems to be simple. However, once we try to take on this seemingly trivial challenge, we notice that we are dealing with an extraordinarily complicated and multidimensional human activity, one which is continuously evolving and changing. The term "science" has very positive connotations and suggests that we are dealing with the highest quality of knowledge. This word is so well-established in our language that, as Susan Haack notes, it often has an ennobling function (Haack, 2012). The prestige that goes hand in hand with this term is undoubtedly related to the natural sciences' success. The aura of reliability surrounding the word "science" gives rise to a strong temptation to use it for persuasion. We observe such attempts every day. Advertisements cite scientific research, the results of which assure us of the positive characteristics of the product offered to us. Participants in television debates willingly use the authority of science to authenticate their position in a dispute. Even university circles are not immune: various disciplines and fields of study containing the word "science" in their names, such as cognitive science, political science, social science, are proliferating at universities around the world (Haack, 2012). The variety of contexts in which the term "science" occurs raises the question of its exact definition.

Unfortunately, the very concept of science is vague (Hansson, 2013); therefore, it cannot be precisely defined. Nonetheless, the term "science" can be applied in the vast majority of cases, albeit the existence of a grey area, in which the use of this term will be ambiguous, is inevitable. No one will argue with the claim that tying shoes, playing tennis, or watching a film at the cinema are not examples of doing science. Similarly, no one will deny that in the Michelson–Morley experiment or the Hershey–Chase experiment, we are dealing with science *par excellence*. It does not mean that a scientific approach to tying shoes, playing tennis, or watching a film is impossible; one could not be more wrong, though in most cases, tying shoes is nothing other than tying shoes.

On the other hand, one can discuss whether a Michelson–Morley experiment finalized during a theatrical performance is scientific or not. Such discussions only begin when a particular issue is located in the grey area. As if that was not enough, not only do we not know where science begins and where it ends, but we do not know precisely when it was created. Was Aristotle's inquiry about the natural world a science or not yet? Did Ptolemy conduct science? Is Ibn al-Haytham's *Optics* a scientific work? Following Massimo Pigliucci (2017), it could be argued that they are in a sense, but certainly not in the way we talk about biology, astronomy, or optics today. As Robin Dunbar (1996) notes, it can be said that the traditional Japanese method of *ayu* fishing also has something scientific about it, as its effectiveness was because fishers managed to correctly recognize the mating habits of this species. This example does not mean that centuries ago in Japan, fishers practiced ethology in the same way it is practiced at modern universities.

Contrary to common opinion, there is no single scientific method; therefore, science's diversity is also manifested in its methodologies (Haack, 2016; van Woudenberg, 2011). Not all sciences are experimental, and not all sciences predict phenomena and explain them. The same holds true for using statistical methods, creating computer models, or using surveys. The reasons for this state of affairs can vary. Some scientific disciplines do not need specific tools, e.g., physicists will never use a survey in their work. Some fields cannot use specific research methods for various reasons, or they are applicable in only a minimal range; for example, in disciplines such as psychology or medicine, it is not always possible to use experimental methods due to ethical issues.

For these reasons, it cannot be said that there is such a thing as one science. There is a whole cosmos of sciences similar in some respects and different in others (Haack, 2016). Whenever we talk about science, we assume a definition that involves arbitrary decisions and includes disciplines that someone else would not include among the sciences. This does not mean that one can use the term "science" freely and, for example, put magic on a par with astronomy, as Feyerabend (1993) did in his "Against method". Similarly, as there is no one science, there cannot be one nonscience. It is worth noting that the term "nonscience" applies to a relatively

broad concept, which includes not only tying shoes, swimming, dancing, or watching movies, but also religion, practical knowledge, political beliefs, poetry, and a vast range of so-called pseudoscientific theories such as astrology, creationism, homeopathy, Lysenkoism, or phrenology. Every pseudoscientific theory should be classified as a nonscience, but not the other way around. A pseudoscientific claim is not only nonscientific but, contrary to other nonscientific activities, its proponent aims to create the impression that we are facing the most reliable knowledge in this particular subject matter, which is not the case. It follows that drawing a demarcation line between science and nonscience is more complicated than it might seem because the world of nonscience is internally diverse. That is why there are still fierce arguments about where the demarcation line separating science from nonscience should be placed (Hansson, 2013; Nickles, 2013; Pigliucci, 2013; Simonton, 2018).

## 2. Nonscience and pseudoscience

The problem of demarcating science from pseudoscience attracted philosophers of science's attention in particular and is often taken as equivalent to the more general term "demarcation of science." However, this issue is vital; not every demarcation line will be established to distinguish between science and pseudoscience, as it is essential to differentiate among other above-mentioned nonscientific activities. Indeed, one issue related to the distinction between science and pseudoscience can be generalized to the whole question of demarcation. As Hansson (2013) put it, "For a scientist distinguishing between science and pseudoscience is much like riding a bicycle" even though there is no explicit criterium of demarcation, that is to say, it is instead a matter of tacit knowledge. In most cases, most scientists will unanimously recognize scientific inquiries, just as most people will recognize a short man.

Moreover, just as it will be hard for us to pinpoint when a person ceases to be short, it will be hard for scientists to pinpoint the moment when a human activity begins or ceases to be science. This quandary also applies to both nonscience and pseudoscience. It is not the job of a layman to distinguish science from nonscience, but it is a proper task for an expert in

the field. There is no better candidate even if such an expert cannot establish a sharp boundary between them.

Nonetheless, it is crucial to distinguish between the broad and narrow meaning of the "science" term. The latter originated in the nineteenth century, and its meaning was restrained to the very study of nature. Science in a broad sense is a quest for seeking knowledge about the laws of nature and an attempt to discover, explain, and understand the mechanisms regulating and influencing our organisms' functioning, psyche, or the regularities governing social life. There is no reason why we should exclude psychology, sociology, economy, or history from the set of science in the aforementioned broad sense. These are also remarkable, methodically conducted, and academically acclaimed inquiries, and what is even more relevant, social sciences strive to produce the most epistemically warranted knowledge there is. If we consider epistemological success and reliability, then there is a meaningful discrepancy between natural sciences and social science, and the advantage of the former over the latter is indisputable. The credibility of the evidence and the verifiability of theses provided by climate science is incomparably more significant than those present in historical sciences. However, since historians have established the exact course of the events of the Holocaust, there is no reason to dismiss their claims merely because history is a less credible science than climate physics, especially since there are no other reliable studies on past events than those conducted by academic historians.

To sum it up, it is impossible to indicate the boundaries of the term "science", which means that it is impossible to indicate exactly where it begins or where it ends; it is also problematic to distinguish its elements (Blackford, 2017), and it will also be dubious about differentiating between science and nonscience and science and pseudoscience conspicuously. This does not mean that everything can be contained in this term, but that the powerful feature, namely scientificity, is a gradable property and can sometimes be overlooked or mistakenly attributed to an object. In the broad sense, adopted here, science is a conglomerate of many disciplines that intersect and mix. Indeed, science is not the only source of knowledge, but it is a recognized source (de Ridder, 2018). This recognition is based on the power of authority that we assign to science, which in practice is equivalent

to accepting scientific assertions. Not every scientific discipline stands out to the same extent as physics or the natural sciences in general, so not every science should be treated as an authority with the same clout as the natural sciences, and if any specific issue turns out to be a nonscientific one, it does not mean it is worthless. In some disciplines, especially in the social sciences, experts' opinions will be only slightly better than that of laypeople.

## 3. Science from a social epistemology perspective

If we look at science from an epistemological perspective, it is hard to deny that scientific theorems deserve proper respect because of the sciences considerable cognitive success. It does not mean that they should be treated as absolute truths and scientists as their infallible preachers (Haack, 2007). Nothing could be more wrong: scientific knowledge is fallible, uncertain, and far from perfect, like any other human creation. It is not the degree of certainty of scientific statements that deserves esteem, but the way scientists have succeeded in developing our ordinary ways of thinking.

Scientists engage in such activities as experiments, take measurements, collect data, analyze them, draw conclusions from them, publish in peer-review journals, compare their results, replicate their colleagues' studies looking for errors in them (Goldman, 1999). To this end, researchers are developing various standardized procedures that facilitate their evaluation. Unfortunately, it has not been possible to work out one universal recipe that would allow us to assess, always and everywhere, what evidence is needed to resolve a given dispute. Humanity is continuously improving old methods or developing new methods, and this work better in a given context but do worse in others. Some specific standards are common to many disciplines; others can be found only in mathematics, physics, yet others in psychology. Some disciplines have stringent and precise rules of evidence—here, the model is mainly formal sciences. In others, a lot still depends on the researchers and their decisions, as in the social sciences. Some pieces of evidence are so complicated that professionals need years to detect errors in them. Even in the case of mathematics, it can take years to detect an error in a proof. It took 11 years to find a fault in one of the famous four-color theorem's alleged proofs. It took decades to establish the consensus

which is currently adopted on the observed climate change. As early as 1991, 67% of the scientifically active climatologists were convinced that it is a human activity that is causing the planet to overheat; it was only in 2009 that this percentage approached 100% (it was about 97%) (Cook et al., 2016). Unfortunately, expert opinions are not always unanimous; there is much discussion in science, controversial views, unsolved problems. That is because the research and data collected do not always allow for an unequivocal adoption of a given conclusion. As if that was not enough, it is not uncommon for scientists to make mistakes or even to commit ordinary forgery (Fanelli, 2009). Additionally, there are phenomena such as merchants of doubt i.e., scientists paid by various interest groups who question the research results unfavorable to the client (e.g., the harmfulness of tobacco or the ecological effects of burning fossil fuels) (Oreskes and Conway, 2010).

Science defends itself against such problems quite a simple way: the scientific community is continuously keeping an eye on itself. It is possible thanks to various protective mechanisms, such as the blind review method of publications, replication studies, discussions, meta-analyses, new measurement methods, and tools. The foundation for these safeguards is the constant pursuit of processes, let us call them knowledge-making processes, which are as transparent and replicable as possible. Adaptation of these procedures means that in an ideal situation, every competent researcher should replicate, step by step, an experiment conducted by a colleague or replicate a measurement, thus checking whether the same result can be obtained. Various sciences manage to implement this idea to varying degrees, which does not change the fact that the pursuit of intersubjective communication is the common denominator of all kinds of scientific thinking. The safeguarding system, which results from implementing the idea of intersubjectivity to varying degrees, is far from perfect and is unable to stop us from finding errors and mistakes in science. In this case, the only thing we can hope for is to reduce their number.

## 4. Experts and nonexperts

The word "expert" has a broad meaning, as we commonly refer to people who have acquired an exceptional level of some skill or ability. In this sense,

an expert is both a chess player, car mechanic, ballerina, and volleyball player. However, for epistemological purposes, one's expertise is narrowed down to a cognitive extent; therefore expert is a person who not only possesses a substantial body of truths in a given domain but also she is sufficiently competent to form the right answers to new questions in her domain (Goldman, 2011).

Everyone would be a cognitive expert in an ideal world, and everyone could assess the quality of evidence behind two contradictory claims. Unfortunately, we do not live in such a reality; we have to deal with the fact that everyone is a layperson in our world. Even if someone is a nuclear physics professor, they are most likely a layperson in any other discipline such as crowd sociology, cognitive psychology, evolution theory, horse riding, chess gambits, fuzzy logic, mating habits of orangutans or ancient Roman law. It does not mean that we are all ignorant, but that even the greatest erudite will have achieved mastery of a few disciplines at most. Nobody will ever know all spheres of science, literature, music, sport, history, or philosophy. In other words, there is a significant division of labor in science (D'Agostino, 2016).

Specialization requires time and sacrifice, mostly when we talk about the natural sciences. They are characterized by such a high degree of complexity that a layperson would not understand even an abstract of a paper without proper training. The development of scientific disciplines and the following specialization have gone so far that the evaluation of evidence collected by experts is beyond a dilettante's capabilities or even for a single expert. In the last century, Derek de Solla Price observed a rapidly growing multi-author publication trend in science (Price, 1963). Nowadays, this tendency is even more visible, as the "Multi-authorship and research analytics" report claims, the most frequent number of authors is three, and the count of papers with at least 100 involved scientists is continuously growing (Adams et al., 2019). These scientists often represent different disciplines, which means that a single expert cannot even review interdisciplinary teams publications because his expertise is too narrow.

Besides our lack of competence, there is another reason we are doomed to scientists, which is that we have too little time. The continual increase in knowledge, measured by the number of scientific publications, is too vast

for one person to be able to take all of it in. In 2012, the number of annual publications exceeded 1.8 million (Ware and Mabe, 2012). It may be comforting to know that there are also such issues whose complexity level is so low that we cannot say there are laypeople in their case. Each of us is an expert in matters such as our pocket contents, our parents' names, or our place of residence; we know perfectly well whether we have a toothache or not. When someone asks us if we have a lighter or wants to know what time it is, we will not consult an expert because we can answer these questions immediately or know how to answer ourselves. In other words, in the face of such issues, we can trust ourselves. Unfortunately, we will not always have such comfort.

A person who thinks that she can decide whether human activity is the cause of the climate catastrophe, whether vaccines cause autism, whether GMO is harmful, or whether 5G technology harms the human brain is under an illusion. Our autonomy in such complicated matters boils down to merely recognizing some sources of information we have found credible and rejecting others as unreliable. There is always a third way, i.e., to suspend judgment. Unfortunately, such a skeptical attitude cannot save us from all dilemmas, because in some cases, the suspension of judgment is tantamount to taking action consistent with one of the disputed positions. A layperson may recognize that the dispute over climate change's genesis is overwhelming and thus refrain from taking a position. Unfortunately, the dispute over climate change also applies to human actions because one side recommends reducing CO2 emissions, and the other claims that such actions are unnecessary. Depending on whether a layperson will try to reduce their impact on the environment or not, they will act as recommended by one or the other party to the dispute. At least in some cases, we will not escape having to decide on whom to believe. That is why it is worth finding a strategy that gives one the least chance of making a mistake. The choice of such tactics is essential in the modern world of information overload. On the internet, one can find everything from scientific research, through reports about mermaids living in the Atlantic Ocean, to video recordings of alleged time travelers. The conclusion is as follows: we are laymen; hence the dependence on an expert's testimony is inevitable (Goldberg, 2016; Lackey, 2011); if so, our ability to assess the degree of expertise of others and their credibility is a crucial skill.

## 5. Informed trust in expert opinion

Regardless of whether we are talking about the natural or social sciences, scientific knowledge is the product of a complex structure built by large teams of people, and a layman's confidence in scientific claims can only be based on trust in these structures. However, contrary to John Hardwig (1991), trust in science does not have to be blind; more so, it could be, as Naomi Oreskes (2019) calls it, informed trust. Jennifer Lackey (2011), one of the so-called social epistemologist, notes that everything we know is more or less based on other people's testimony; undeniably, we are told such things as how everything around us works, what is going on in foreign countries, where our food came from, what is it made of, what happened before our birth. It is hard to pinpoint any specific part of our knowledge that we established without trusting in someone else testimony. It is precisely the same case with scientific discoveries. Problems start to emerge when we face many contradictory statements that express these testimonies, which is, unfortunately, an inevitable situation with scientific knowledge.

Social epistemology is an expanding philosophical discipline that offers some guidance in this baffling situation. Unlike plain epistemology, this very discipline is concerned not with abstract and theoretical issues but mainly with such practical problems as testimony, judgment aggregation, and peer disagreement. It is worth pinpointing that the following heuristic's primary purpose is to make our decision process about trusting in expert testimony more efficient. It is not designed to advise on such issues as establishing scientific truth, and its character is probabilistic, which means if a layperson follows these cues, she will increase the odds that she chose a reliable opinion.

Scientific experts differ from laypeople in several significant respects, including their extensive and substantive knowledge in a given field, and that they gravitate towards using this knowledge to answer new questions and solve current problems in their field, evaluate evidence gathered by their peers (Goldman, 2011). It is reasonable to treat an expert's opinion in their field of expertise as more reliable than that of a layperson because expertise in a particular field carries with it a specific type of authority, namely, cognitive authority. Of course, relying on such authority is fallible

under the fallible nature of scientific inquiry itself, but the layperson has nothing better up their sleeve, as it was concluded earlier.

There is no distinct point beyond which the layperson becomes an expert. Expertise is a continuous trait in which sheer ignorance lies on one side of the spectrum and extraordinary competence on the opposite. There is a consistent pattern, layperson or even a novice exploring a given domain of scientific knowledge lacks, at least partially, access to the evidence that the expert has, is unable to correctly assess the soundness of the reasoning on which the expert bases his conclusion, and does not have access to studies critical to the expert's position (Goldman, 2011; Hardwig, 1985, 1991). Nonetheless, nonexpert might have reasons for believing that the opinion of a given expert is sound, and even might have reasons to believe that this particular expert is more reliable than her opponent (Goldman, 2011). In the latter case, Alvin Goldman (2011) posits that layperson makes an inference about levels of expertise of rival experts. Albeit, I would argue that informed trust in an expert's opinion, in general, can be called inferring to the best expertise, on the grounds that it necessarily includes the stage of comparing a given opinion with the position of other experts.

## 6. Expert's credibility and reliability

The question of trust in expert opinion can be whittled down to two separate but related issues. The first is the problem of establishing an expert's credibility, and the second is connected with an attempt to enact a level of reliability of his opinion. Whenever we meet with the opinion of a putative expert, regardless of whether it is a public debate, any discussion, or even in a private conversation, our first step should be to establish the given expert's credibility.

To achieve this goal, we should first establish whether the author of the opinion is an expert in the relevant field. There is the crucial distinction between a reputational expert, that is, a person who is perceived as one, and an actual specialist; when the former role is discretionary and may be filled by anyone, even a celebrity, the latter is based on objective premises (Goldman, 2011). Expertise in an irrelevant field can create such a reputational expert too. As I mentioned before, the range of every expertise is

invariably limited to the specific domain, and an expert's opinion that exceeds their area of interest is not much better than that of a layperson. Unfortunately, we tend to effortlessly ascribe authority to someone when they should not have any, so being aware of the limitations of expertise is invaluable. Far-reaching specialization means that it is no longer enough to be a physicist to talk about climate change causes; a more narrow specialization is needed, which in this case is climatology. Climate science is an exceedingly complicated field; only a dedicated specialist can be up to date with the latest research and findings.

Taking the above into account, relying on the opinion of an expert whose area of specialization is adjacent to the proper one may be deceptive or even lead us astray. Undoubtedly, among particle physicists, we will find many familiar with climate science, but their knowledge will always be simplified and limited compared to that of an experienced climatologist. At the same time, we encounter many climate deniers among physicists. It is true in any other discipline; some philosophers, historians, psychologists, sociologists, and even laypeople will be more or less informed, and some will be unquestionably ignorant. However, none of them can match the knowledge of experts in climate science. Therefore the first cue is as follows: if an opinion O is within a subject domain S, expertise of a person E who asserts that O is true (false) should be in S too (Walton et al., 2008; Walton, 1996).

Determining the pertinence of a range of expertise is essential; however, establishing an expert's credibility is not a sufficient condition. There are other cues, which can be supportive in this task. Each expert can boast a history of opinions given, based on which their credibility can be determined; it often involves such issues as absence or presence of frauds, conflict of interest or documented attempts of concealments of such conflicts, plagiarism (Goldman, 2011). It is worth pointing out that not every industry-funded scientist is undeserving of our trust; it depends on the whole social context of their activity, mainly is their opinion is a product of the scientific community, namely, did they attend a conference and publish their paper in a peer-reviewed journal. If this is the case, then we are free to assume that all critical norms and scientific scrutiny are satisfied, and their contribution to the field is as good as any other (Oreskes, 2019). There is a reason why a given expert's social background is among crucial cues of their

credibility. The quality of research that cannot be found anywhere else is precisely the product of various procedures regulating scientists' work. This epistemic quality of research, which cannot be found anywhere else, is the result of the various procedures which formulate the work of scientists. Such quality can only be achieved within a community that meets certain conditions, such as considering and testing many alternative hypotheses, allowing multiple competing points of view, self-criticism, an evidence-based approach to eliminating hypotheses, replication, and modification of conducted research. For example, Fred Singer, a prominent rocket scientist, has been involved in many initiatives sponsored by the tobacco industry, the purpose of which was to cast a shadow of doubt on the scientific evidence linking smoking with lung cancer (Oreskes and Conway, 2010); furthermore, his claims have not been published in any peer-reviewed journal.

On this basis, distrust of Singer's opinion on the causes of climate change is reasonable. His expertise is not pertinent; other experts do not review his views and do not review his view since the so-called merchant of doubt considerably undermines his authority and credibility. Being a merchant of doubt does not ensure that Singer's opinions are dubious (however, it significantly reduces their importance); there is still a chance that his opinion expresses a scientific consensus on climate change. To rule this out, one must compare his words with other researchers' positions and decide if it is consistent with what other expert assert. The risk that we are dealing with a view designed only to spread disinformation is insignificant, on the basis that the greater the expert's agreement on X, the greater the likelihood that the evidence available to humanity supports this particular view. In this particular situation, consistency with other experts' opinions outweighs the unreliable source of information. Even a broken clock is right twice a day, but it is reasonable to trust it only if it is consistent with other clocks. Suppose a given expert opinion is inconsistent or even contradicts the scientific consensus. In that case, it is safer to reject such a view on the basis that the likelihood of the situation where the majority of experts have gone awry and we have met a prodigy presenting a groundbreaking discovery is much lower than the likehood that experts are correct, and alleged prodigy is a fraud. To simplify, let us assume that expert's position in discipline X is true in 51 cases out of 100. That is enough reason for a layperson to

prefer the expert community's coherent view over their guessing, other non-expert opinions, or the opinion of a dubious and lonesome scientist. One may ask why one should ever worry about expert credibility when consensus is much more critical. This issue is crucial as a credible expert is often an excellent source to inquire about whether there is a consensus; it is also much easier to establish the credibility of one expert and focus on the consensus question afterward than to check the entire community's position in the first place.

Unquestionably, trusting in science is always risky; after all, sometimes science makes mistakes, and the position of science is not developed once and for all. New evidence may force it to change and, consequently, the layperson's opinion should be updated. In other words, the dilettante's opinion on issues examined by science should be, "science's position is my position," not because science is the only reliable source of knowledge, but because—as Bertrand Russell notes—when the experts agree on something, the opposite view cannot be regarded as certain (Russell, 2004). Above thought can be expressed by paraphrasing Alvin Plantinga's maxim: "When any belief and science clash, 'tis belief must go to smash" (Plantiga, 2018, 226).[1] This slogan can be developed as follows: "Where it conflicts with common sense, religion, and tradition, science should be regarded as authoritative for education and public policy as well as objective inquiry; and scientific knowledge is even relevant to moral and political deliberation" (Ladyman, 2018, 106). What if science clashes with another science.

## 7. Disagreement among peers

The proposed heuristics offer some guidance when there are two or even more experts with rival opinions. Whenever we face contradictory testimonies of experts within a pertinent domain of expertise and whose history is untainted by suspicious activity, our last resort is the very question about scientific consensus and its relation to these testimonies. Our trust should

[1] In his article, Alvin Plantinga focuses on the conflict between scientism and religion; hence the maxim he quoted was, "When faith and science clash, 'tis faith must go to smash." I have taken the liberty of generalizing it to all beliefs.

be given proportionally to the support of the opinion given by the community of experts, or as some social epistemologists call this approach, we should "use the numbers" (Coady, 2006; Goldman, 2011).

Consider the dispute over X; scientists have proposed three solutions: A, B and C. Each group supports their position with some scientific evidence, such as completed experiments, the proper amount of measurements, or other analyzed data types. However, experts disagree on quality of those, and as a result, 40% support solution A, 33% support B and 27% think that C is the best answer. The layperson is universally unable to judge the whole body of evidence behind any of these options, but can judge the experts' credibility. All groups consist of professionals with a similar level of trustworthiness, there is nothing suspicious in their previous activities, they have published the whole body of evidence in peer-review journals. There is nothing else for a layperson to do but to assign these positions no more significant degree of belief than professionals' amount of support. The conclusion is that none of the proposals put forward by scientists can be considered as the science position.

There is no single answer to what percentage of a given scientific community must agree to describe theirs as the position of science and treat it as a reliable stance on some issue. It all depends on the particular issue and the context in which it is being considered. When we wonder whether to use a homeopathic remedy, we only need the qualitative information that the vast majority of medical specialists consider such therapies ineffective. For a politician who must decide whether to regulate the legality of such treatments in the state, information about the "vast majority" will not be enough. Determining whether 61% or 91% is behind the term "vast majority" is of great importance in this case. However, knowing that there is no "vast majority" or there is no majority among experts at all will be always compelling, and should be treated as a serious reason not to prefer any of the positions.

If asked today, no one will have a problem with answering whether the iguanodon was a bipedal animal, because the position of paleontology in this matter is unambiguous. It was different in the first half of the 19th century, when paleontology was a fledgling discipline, and the incomplete reptile skeleton had just been discovered. Two paleontology pioneers argued

about the dinosaur's posture. The first, Sir Richard Owen, considered the animal to have been four-legged, and the second, Gideon Mantell, two-legged. The lack of a complete skeleton allowed some freedom in how to reconstruct the shape of the dinosaur. It was not until discovering other fossils that this dispute was resolved in favor of Mantell's position. Until then, a layperson could do nothing but suspend their judgement, on account of the lack of agreement between experts.

There are possible scenarios where the problem under consideration is within a domain where experts are difficult to identify, or the given field is so straightforward that no expert opinion is required. There are a plethora of different fields in which the existence of cognitive experts is at least questionable. There are undoubtedly authorities in such domains, although not every authority, however influential, is based on cognitive expertise. An example of the fields I am referring to may be most areas of the humanities, theological considerations, or even religions. There will undoubtedly be some expertise in these areas related to their history or doctrine content. The existence of such established consensus is not under contention here, although it is crucial to make a distinction between agreement on what Plato's, Aristotle's, or Kant's concept of metaphysics was about and agreement on the fundamental nature of reality itself. The former is a matter for the history of philosophy; the latter is a genuine metaphysical issue. As far as the history of philosophy is concerned, there are reliable experts within this domain, just as there are reliable experts in physics's history. It is worth to emphasize that from the perspective presented here, it is of paramount importance whether there is a consensus on a given issue or not; accordingly, the discussion about the existence of experts can be relegated to the background as an attempt to establish whether there is a consensus or not plays a decisive role. Therefore, a question about metaphysics should be stated as follows: is there any metaphysical issue for which most experts have established a solution? The answer to this question is negative. Not a single problem has been solved in terms of which most metaphysicians agree. Plato's metaphysical system competes with Aristotle's system and every other set of metaphysical beliefs. Therefore, as in the Mantell vs. Owen case, layperson could do nothing but suspend their judgement about metaphysical issues.

Similarly, not only is Islam a holistic alternative to Christianity, but so is any other religion. Textbooks in various fields of science are a good illustration of this point. Books explaining the principles of thermodynamics or the theory of evolution refer to the current state of human knowledge while at the same time, they inform about issues on which there is consensus between experts in a given discipline. Such texts involve many simplifications, which does not change the fact that they contain a set of findings, i.e., statements considered true. There are no textbooks of metaphysics that contain or present the current state of knowledge about the nature of reality because there is not even the slightest consensus on this matter. There is no question of textbooks in the case of religion because there are holy books that are expositions of a specific faith, and there are religious studies that describe various doctrines. The reason for this difference is that the sciences have established certain things. The position of science regarding the number of planets in the solar system is unambiguous. Thanks to the work of astronomers, we know that there are eight of them. There is neither a philosophical nor religious position on the number of existing gods; it is impossible to designate even the smallest number of deities common to all known faiths. Each philosophical and religious system proposes a pantheon that is unique to it, filled with a different number of various gods. Even if some religions postulate one god's existence, they attribute different properties to it and suggest different methods of communicating with it, thus explicitly excluding any similarity between them. In such a case, the extension of the term "expert" to include the authors of metaphysical concepts, founders of religions, theologians are acceptable under the assumption that expertise is gradable. Such disciplines as metaphysics, epistemology, or theology can be treated as fields in the pre-paradigmatic phase, to use Thomas Kuhn's term, as these areas are always torn by disputes over fundamental issues none of them has an established consensus. Therefore, experts in these fields are experts whose reliability is limited. However, this is a consequence of the application of a general heuristic: if a particular field is lacking even the slightest consensus, then before someone decides to trust one of the concepts presented in those domains, they should indicate why we ought to prefer this and not another position. Otherwise, acceptance of any particular position in the unresolved dispute gives rise to the risk of making an error,

proportional to the aggregate percentage of support for other viewpoints. It is irrelevant if this dispute is within physics, biology, gender studies, or philosophy.

Sooner or later, we will come across issues that will be difficult to be assigned unambiguously to a specific discipline. What kind of expertise is needed to evaluate a given political decision or the overall reform undertaken by a government? Is the opinion of a political science specialist enough, or on the contrary, is a consultation with an economist needed, or is it both? Why not ask a sociologist too or a professor of law. Cases such as these are beyond the comprehension of a single domain; therefore, it is difficult to name the pertinent expertise. It is reasonable to seek advice from an expert within a field of expertise related to the problem under consideration and check for any common ground between their opinions. For example, when we encounter an immense number of negative reviews of a given political reform, even if these opinions differ in magnitude, their common aspect is their negative nature. In such a situation, rejecting any positive review is a way to reduce the risk of adopting an ill-founded view or even a thoroughly inadequate verdict.

Before everything else, there are matters of subjects where no cognitive expertise is needed, besides the opinion of an involved person or a group of engaged people. There is no justification for scientific approach to establishing how to hold a woodcutter's ax; moreover, any experts other than the woodcutter alone are unnecessary. To convene an expert committee to determine the contents of a given refrigerator or someone's pocket is also beside the point and even ludicrous. There is no community of experts capable of telling a father of five which of his children should he kiss first after supper. These are only a few examples, but there are a plethora of different issues, and even domains, where scientific expertise is redundant, and the testimony, intuition, common knowledge, hunch or a guess of a single person is a good source of opinion, and a fair basis for making a decision.

## 8. Scientophilia

Inspired by the term *Biophilia*, the love of all living things coined by Edward Wilson (1984), I would like to propose a name for the heuristic

presented above: scientophilia—the love of science. Love of science is motivated by the fact that science provides knowledge of the best possible degree of justification and manifests itself in an established consensus among credible experts. I would venture to put forward the thesis that most of us very often behave as a scientophile.

Until 1992, Pluto was considered a planet, but observations made at that time and in the following years enriched our knowledge with new information, which precluded us from calling this object a planet any longer. It turned out that Pluto has a smaller mass than the rest of the bodies coorbiting it, which is a breach of one of the necessary conditions for being a planet. In 2006, after several years of disputes, scientists developed the position that Pluto is a different type of celestial body than previously thought, namely a dwarf planet. The vast majority of us behaved in this matter like quintessential scientophiles—overnight, we stopped listing Pluto among the planets, thus rejecting the view that there are nine of them in the solar system. Insisting on the opposite position would have been unreasonable in this situation. Currently, the whole world is struggling with the severe problem of the COVID-19 pandemic, and most of us, although unfortunately not all of us, try to follow the recommendations of scientists. We cannot independently check whether we are sick, predict how the virus will spread, determine what behaviors are safe or whether animals can infect us. We are condemned to expert opinions, and we trust them because those scientists work in organizations that guarantee their employees' reliability.

In conclusion, the main guideline of scientophilia can be described as inference to the most reliable and attainable expert's opinion. This heuristic name indicates a love of science because looking for scientific consensus is advantageous for establishing a well-informed opinion for a layperson interested in a particular issue. In science, a consensus is not achieved by agreement but by examining evidence supporting different positions. The scientific community comprises groups of qualified experts using a variety of procedures to find the best explanations and theories to explain the evidence they collect. They are involved in such activities as critical discussions, gather, analyze, and evaluate various data and publish their research results in peer-reviewed journals. When the evidence starts to tip the balance to the side of some hypothesis acutely, consensus arises. Therefore, if such a

community of cognitive experts has established a consensus on a particular issue, there is no better cue for a layperson to believe that the subject of a consensus is the most reliable position in that matter. Indeed, a consensus is not always essential, as it is frequently redundant and even impossible to achieve in various subject matters. However, if there is an established consensus in a particular field in which we are interested, adopting an opinion contrary to the position of science is associated with a high risk of adopting a view that turns out to be false, and sometimes even harmful to our health or finances.

Scientophilia has some inconvenient consequences, as it entails a change of belief to reflect changes in science. Contrary to appearances, consensus-based opinions are far from perfect and can change, as its foundation does. The view that there are eight planets in the solar system is applied because of the specific definition of the term "planet", based on the current information about our planetary system, which, in turn, is influenced by the sensitivity of modern instruments used to observe space. Changing any of these elements will affect our knowledge of the solar system. A person following this heuristic in 1991 would have thought that it was quite likely that people were causing a sudden increase in temperatures, but there was no certainty, as there were a considerable group of credible experts who disagreed with the others. In 2019, however, things had changed, as there is almost 100% consensus on what causes climate change; therefore, someone would say that we have such certainty. If in 2034, climatologists agreed that they were wrong and it was not humans that caused the temperature rise, there would be no other choice but to accept the position of climate science.

## 9. What is scientism?

Scientism most often refers to a specific set of philosophical views on the relationship between science and other disciplines. As Rik Peels (2018, 29) observes, almost every type of scientism can be reduced to a set of statements about "the relation that should obtain between the natural sciences on the one hand and something else—another academic discipline or another realm of reality—on the other". The above characteristic is also how

scientism will be understood in this paper. As a side note, it should be noted that a scientist, by default, associates the term "science" either with physics alone or with the natural sciences, which is a relatively narrow meaning of the word.

One of the positions often associated with scientism is the view described by some authors as "scientific expansionism" (Stenmark, 2018) or "scientific imperialism" (Ladyman, 2018). According to this belief, the boundaries of science are far beyond what we think. Usually, this means that science can answer a much larger number of questions; in particular, it can answer questions that we have not associated with scientific research so far (Stenmark, 2018). The above remarks typically concern problems in the field of law, literature, and politics, as well as philosophy, in its broader meaning (Haack, 2012). Such scientism may vary in strength—its most extreme version refuses to acknowledge questions that science cannot answer. When making claims about our knowledge's current state, scientific imperialism—in its extreme version—is trivially false, and we will probably not find a supporter of such a view. We know that there is a wide range of questions that none of the sciences can answer , from those that each of us faces every day ("Should I drink coffee or tea?") to the more complicated ("What taxes should we introduce in our country?") (Haack, 2012). It does not mean that scientific issues do not play any role in social matters.

On the contrary, its function is difficult to overestimate; e.g., medicine does not tell us whether vaccinations should be mandatory, whether the refusal of a vaccine should be punished, and if so how, but it does inform us about the benefits and disadvantages of vaccination so we can make better decisions thanks to this knowledge. Assuming that scientific imperialism does not make claims about the present state of science but about the future, there is no reason to reject or accept such a position. It is also unclear what would result from the adoption of such a view.

Let us assume that in the distant future, it will turn out that physics or the natural sciences will be able to indicate, from the set of all pressing questions, those that have been wrongly posed and answer the rest. Such a scenario in no way justifies the view that now philosophy, for example, should be done on the model of physics or that we should give it up completely. Instead, we should press on physicists to speed up their work.

We can give up the humanities study only when physics replaces it, not when we think that it is possible. The extreme version of scientific imperialism may appear in a weaker, i.e., local, version. Such a version would occur if someone found that natural science has absorbed a set of issues specific to discipline X. An example of such a position may be the view that metaphysical issues are currently being investigated by cosmologists, making philosophers' attempts to resolve these problems superfluous. Local imperialism is the most challenging position to assess because it collects various concepts, each of which deserves a separate analysis. Weak versions of scientific imperialism do not seem to be particularly controversial. No one will deny that many scientific disciplines have emerged from philosophy, so at least some philosophical questions have been answered scientifically after undergoing appropriate modifications. It is even more difficult to reject the above view when we use the term "science" in the broad sense proposed earlier. The weak version of scientific imperialism, which says that science may or may not expand its borders in the future, expresses a belief in scientific progress; hence an excellent rationale can be found.

The imperialist nature of scientism can be implemented in many ways. The first worthy of discussion is the reductionist version of scientism, or internal scientism, as Stenmark (2018) calls it. In proposing a specifically interpreted "scientization" of disciplines outside the natural sciences field, this view develops the idea behind scientific imperialism. Usually, the process of scientization of a given discipline comes down to its complete reduction to a specific science in the strict sense, e.g., to physics, biology, or chemistry. An example of this is the famous sociobiology project of Edward O. Wilson (1975). This type of scientization can be targeted at a specific discipline or all social sciences and humanities. Internal scientism is a distinctive position because it cannot be analyzed in isolation from a specific project of "scientization." Such a discussion would require high competence in all areas involved in the proposed process, and as such, it goes far beyond the scope of this paper.

The standpoint which Stenmark (2018) refers to as epistemic scientism can be regarded as different from the above understanding of scientism. According to Stenmark (2018), some scientists, philosophers, and thinkers (Rosenberg, 2011; Russell, 1978; Sellars, 1963) can be associated with the

claim that "The only kind of genuine knowledge we can have is the one provided by the sciences" (Stenmark, 2018, 63), or even with the more extreme position that "We are rationally entitled to believe only what is scientifically justified" (Stenmark, 2018, 65). There are many possible variations of this notion, which means that its postulates can take different shapes, depending on their author (Boghossian, 2006; Kitcher, 2008; Rosenberg, 2011). For simplicity, I assume that their common denominator is one of the two theses cited by Stenmark. If both of these statements are treated literally, then finding countless counter-examples for them turns out to be a straightforward task. I know that I have two hands, I know that chess pawns attack only diagonally, I know that I have never been on the moon, I know that bachelors have no wives, I know that I have a mobile phone in my pocket, and I know all this without any help from the natural sciences. Any research methods and instruments used in natural sciences are unnecessary in determining the above facts. Nobody observes a bus stop in different weather conditions to determine the bus schedule; after all, it is enough to check the timetable. Examples of non-scientific knowledge, or Moorean truths, as Rene van Woudenberg (2011; 2018) calls them, can be multitudinous because the amount of knowledge sources other than science is staggering. Thus, when a scientist claims that the only source of knowledge about the world is physics/the natural sciences, they should explain their exclusion of the collection's Moorean truths. The easiest way to get out of this situation is for the scientist to admit to using a very narrow definition of knowledge that deals only with what scientistic knowledge is. In such a situation, its exact content and its consequences should be considered.

What are the consequences of the fact that my knowledge of chess rules is not scientistic? Would the non-scientistic character of a police officer's knowledge of a suspect's guilt be a valid reason to abort the arrest? What about a lumberjack's knowledge of the correct way to hold an ax securely? Human knowledge, like science and scientism, is a vast and blurry concept. Nothing prevents one from cutting out some of its fragments and comparing their properties with others, which is advisable, if only for cognitive reasons. Moorean truths differ in some respects from the knowledge of engineers building solar sails for space vehicles, and these differ from the knowledge

of logicians studying the relationships between various formal systems. To understand the rich world of human knowledge, it is undoubtedly necessary to distinguish its various manifestations. It does not change the fact that exclusive claim that only certain areas of human thought constitute knowledge requires precise clarification of non-knowledge fields. Depending on how one answers the question of the status of other alleged varieties of knowledge, epistemic scientism may turn out to be a false and absurd position or not at all as controversial as it is usually painted.

Another variation on scientism worth mentioning is the ontological version. Again following Stenmark, it can be said in simple terms that this type of scientism can be reduced to the thesis that "[t]he only things that exist are the ones that the sciences can discover" (Stenmark, 2018, 68), or in the words of Carl Sagan: "the Cosmos is all that is or ever was or ever will be" (Sagan, 2013, 8). Scientism, which claims that the entire world is limited to physical entities, is close to some naturalism varieties. Ontological scientism inherits from naturalism all the problems typical of this kind of position, i.e., problems with such issues as the existence of norms, works of art, laws of nature, or logical laws. Logically, this kind of scientism seems to be the strongest position since it entails all the other varieties mentioned above. Accepting that the world is limited to entities described by the natural sciences immediately imposes the adoption of the view that only the sciences provide knowledge of reality, the consequence of which is that all human forms of cognition should be either reduced to them or conducted like them.

In summary, scientism, like science, is heterogeneous. The examples mentioned above of differences in understanding the concept of "scientism" do not exhaust the rich semantic field of this term. A particular case of scientism needs not to be limited to epistemological or ontological versions; the above varieties of scientism can often be combined, which is often the case. Most instances of extreme scientism, that is, one which claims that "science is the only..." are very easily dismissed as absurd or even merely false. It is different in the more moderate versions, which are much more challenging to evaluate without the theoretical context in which they occur. In particular, it is impossible to evaluate them without comparing them to competing positions.

## 10. The missing link in the scientism debate

Discussions about scientism understood as a synthesis of many philosophical positions dominate the literature devoted to this issue. There is also plenty of polemic with particular authors who admit to being scientists or are accused of such sympathies. It is rare for commentators to analyze alternatives to scientism, and without this, it is impossible to evaluate any position fully. The search for antiscientism can be carried out in two ways. The first is to extract antiscientism from the writings of scientism's critics. The second is to determine its shape based on scientism's presentation, for which it is to be an alternative. Every view, theory, or even a single statement can be criticized from a neutral position; therefore, not every criticism of scientism will contain an alternative to this view.

Furthermore, even if the criticism is not neutral, it does not have to directly express an antiscientistic position; a reconstruction of such a position will be required. The second approach has a significant advantage because it allows one to build a theoretical framework for later attempts to extract antiscientistic positions from specific texts. Thus, this is the one we will start with.

The types of scientism cited earlier provide a good starting point for constructing possible alternatives to this view. Since scientism is associated with scientific imperialism, antiscientistic positions will oppose it. The disagreement with the view that the boundaries of science are much further than we think can be expressed with the help of many different statements that form the basis for different types of antiscientism. One may argue that the natural sciences have now reached their end and that we will not learn anything new thanks to them. In particular, they will never enter the realms of law or philosophy. As with scientistic imperialism, there is no reason to reject or accept such antiscientistic imperialism. It is impossible to decide where and when the development of the natural sciences will stop.

Much more radical opposition to scientific imperialism is also possible. According to extreme imperialistic antiscientism, the natural sciences have either long exceeded their powers or, indeed, have never had them because they can be wholly reduced to social sciences (e.g., sociology) or other fields of culture (such as philosophy or poetry) and the issues they study are just

social constructs. Alternatively, no discourse is distinguished, so there is no question of crossing boundaries. Supporters of social constructivism, feminist philosophy of science, or methodological anarchism would probably agree with such claims (Burr, 2003; Feyerabend, 1993; Harding, 1991). Internal antiscientism has automatically emerged from the above statements, one which in its most extreme version will proclaim the reduction of natural sciences to a discipline belonging to the social sciences, possibly to philosophy, or even religion or theology. Opponents of internal scientism do not have to be so radical—they can settle for a much weaker position and proclaim the view that specific disciplines cannot be reduced to natural sciences. This impossibility may be absolute or limited to the current state of knowledge.

To negate the extreme version of epistemic scientism is enough to agree that Moorean truths belong to the set of knowledge and deny that its only source is the natural sciences. Of course, epistemic antiscientism can take an extreme form, not so much pointing to sources of knowledge other than scientific ones, but limiting human cognition to only one sphere related to intuition, mystical experience, or some form of philosophical insight into the essence of things, for example. Thus, epistemic antiscientism would exclude the natural sciences for not being a credible source of knowledge or put them below the alternative of its choice. The natural representatives of ontological antiscientism are various religions and related metaphysical assumptions, but these are usually an extension of the ontology provided by the natural sciences, so antiscientism based on them will be moderate. Other examples of moderate versions of this notion can be provided by various philosophical realisms, i.e., positions that postulate mathematical entities' autonomous existence, moral norms. The extreme version of ontological antiscientism can be found in such philosophical positions as Platonism, recognizing the world of ideas as the only actual reality, or in social constructivism—which I mentioned above—on the assumption that it treats the entirety of reality, including the world of nature, as a social construct.

It is time to look at the actual uses of the term "scientism." Philosophical texts on scientism can be divided into two groups, the first of which comprises debates on the nature of scientism, in which the authors consider how to define this term loosely, how to distinguish its various varieties. The

second group will contain all polemics, containing critiques and defenses written by supporters and opponents of its different varieties. In the latter case, antiscientism will assume different variations on the types outlined above. In addition to theoretical considerations, there are texts in which the word "scientism" functions as an accusation or an epithet used to discredit an opponent's position. Discussions in which such an allegation is made usually concern the conflict between science and some other field, most often philosophy and religion, and the dispute concerning the legitimacy of pursuing the latter. It is not only supporters of philosophy and religion who use this term in this way. In 2015, a public forum entitled "Scientism in the Age of Obama" was held in the United States, with the primary goal of agitating against the various science-based elements of the American president's political program at that time (Pigliucci, 2017).

Another example is an article defending homeopathy against mainstream science. According to this article, mainstream science does not allow homeopathic therapies to be treated as a science because, being possessed by a scientistic ideology, it cannot see the advantages of homeopathic therapies (Ledermann, 2003). Rupert Sheldrake (2012) uses the term in a similar way when he writes about the scientific worldview's followers. This term in the above cases not only serves as an accusation, but it also forms the basis for an appreciation of the defended discipline, or at least elevating it to the scientific level, thereby dismissing any criticism as unfounded.

Assuming that scientism and antiscientism are opposite positions in the dispute over the nature of the natural sciences' relationship and some other field or aspect of reality, their final shape will depend on how this relationship is seen. Using any of these terms on its own does not make sense because a given statement may be considered scientistic by one opponent and antiscientistic by another. One may be convinced that physics will someday displace all metaphysical inquiries like it has displaced Aristotelian physics while claiming that ethics will remain out of its reach. Such a person in a dispute with a supporter of extreme scientism, who claims that physics will also absorb ethics, will take an antiscientistic position. However, to a proponent of the thesis that metaphysics will never succumb to studying the natural sciences, they will appear to be taking a scientistic position. That is why it is so important to define this relationship discussed by

scientism/antiscientism; it is only by defining it that we will identify a proposed position as supporting or opposing.

## 11. Scientophilia and scientism

Scientophilia, at first glance, resembles a peculiar version of scientism, probably an epistemic one, as it is challenging to identify the single point where a proponent of such a view would disagree with a scientophile. However, if we take a closer look at both concepts, there should be a few crucial differences, although the level of dissimilarity between these two depends on the chosen variation of scientism itself.

The first important distinction between scientophilia and epistemic scientism concerns that scientophilia is not limited to scientific methods or even scientific (in a narrow sense) knowledge. Scientophilia is interested in specific knowledge-forming procedures, and science appears to be an excellent example of its implementation. A scientophile accepts the reliability of any discipline practiced by a community of experts who evaluate each other, who have developed intersubjective methods of evaluating evidence, indulge in critical discussions, and submit their works to journals with peer-review procedures. Thus, science is in the highest place; nevertheless, other levels of expertise are acceptable when scientific expertise is redundant or not attainable. From a scientophilia perspective, disputes over "whether discipline X is scientific or not" are superfluous as long as X's purported experts can reach an evidence-based consensus. However, if a consensus has not been attained, there is no reason to adopt either side's position; it makes no difference if this discipline is physics, philosophy, history of jazz, or religion. Scientophilia also places Moorean truths among consensus-based knowledge, and as far as these are concerned, each of us is sufficiently competent to represent, in specific circumstances, a credible and reliable level of expertise. Therefore in such cases as whether a given person has hand, or how to hold woodcutter's axe there is a consensus among peers. Nonetheless, if any particular epistemic version of scientism can adopt Moorean truths and other non-scientific types of knowledge (law, for example) as a reliable source in cases where scientific expertise is not attainable, this

distinction will begin to fade away; otherwise, scientophilia will appear closer to epistemic antiscientism.

The second difference is inextricably linked to the essential characteristic of scientophilia, where epistemic scientism is a proper philosophical position, scientophilia is instead a decision-making strategy. Scientophilia aims at making our decisions about opinions and testimonies more efficient; thus, its sole advice is to trust any purported expert, only if their opinion is consistent with their peers, eventually to accord a given opinion no greater degree of belief than that found in the expert community. While the primary goal of scientophilia is practical, there is no doubt that scientophilia rests on a theoretical foundation, which includes statements shared with epistemic scientism, especially those that place natural sciences on the podium. Scientism is not scientophilia's only ingredient; for example, there is an aspect of scientophilia that attaches great weight to the significance of consensus, and this feature is based preferably on common sense than on scientism itself. That is because common sense, not scientism, implies trust in the coherent testimony of a group of eyewitnesses when we have not been able to experience the event they saw. Scientophilia adjusts this suggestion to scientific considerations; one should trust in the coherent testimony of a group of credible and reliable experts, whenever he has not been able (usually due to lacking sufficient competence), to gather and evaluate evidence accumulated by those experts.

In terms of other scientism variations, scientophilia is usually theoretically indifferent; however, there are possible areas in which conflict may arise. If scientific imperialism is considered, there is no common ground between the robust version of this position and scientophilia, as the latter is relatively silent about science boundaries. When scientific imperialism states that science can solve any problem, scientophilia only advises adopting the position of the most reliable expert if such opinion is available on the issue. Such an approach is nothing more than informed trust based not on substantive but formal cues, such as credibility and compliance with other professionals' opinions. Scientophilia does not determine what issues a scientific consensus is possible on whatnot, but advises recognizing it if it has already been established. However, there is a possible conflict. Since scientophilia allows the existence of unscientific knowledge and even

endorses experts who are not scientists themselves, it can be reconciled with the notion that there are problems that science has not solved, but that they at least have provisional, though unscientific solutions. As a result, the proponent of scientific imperialism will have a hard time accepting scientophilia as a whole. With weaker versions of scientific imperialism, namely those which express belief in scientific progress, scientophilia can coexist without the slightest problem.

Scientophilia and internal scientism are entirely indifferent to each other, there are no points that would cause any conflict between them, but there are no joint statements for them either. There is no contradiction in the fact that the most radical advocate of the "scientization" of all possible disciplines outside the natural sciences domain simultaneously applies the guidelines provided by scientophiles, at least to the very moment when scientization becomes complete. As for ontological scientism, scientophilia takes no position regarding the existence of anything unless it is about experts and the opinions they express; their existence is, of course, presupposed. With the guidance provided by scientophilia, it is impossible to establish whether something exists or not, but whether we should trust the people who postulate the existence of objects belonging to a given category. It follows that scientophilia is potentially open to various ontological positions, even those which contradict ontological scientism. That is the theoretical level; in practice, scientophilia can be challenging to distinguish from ontological scientism as their verdicts will coincide. After all, consensus on matters such as the number of existing gods or the existence of an afterlife is lacking, but there is consensus on objects such as planets, atoms, or genes.

The relation of scientophilia to imperialist antiscientism resembles the relationship between scientophilia and imperialist scientism. If a given alteration of imperialist anitscientism is a moderate one, it allows and endorses equal every existing narration or possible discourse; then it follows that a scientophilia-based approach is also allowed endorsed. Therefore, at least theoretically, it is possible to embrace the guidelines of scientophilia and simultaneously be a moderate imperialist antiscientist partisan. However, among antiscientistic imperialists, some positions seek to distinguish some discourse, for example, the philosophical or the religious, as a more reliable source than a scientific position. Neither of these stances, by nature,

will be compatible with the guidelines provided by scientophilia because sooner or later, the latter will recommend adopting an opinion that turns out to be contrary to that of the distinguished discourse. The relation to antiscientisitc internalism is correspondingly dual; that is, scientophilia is consistent with any moderate version. However, any supporter of a more radical version of this philosophical position will find deference to the best expertise hard to accept. If agreeing that Moorean truth belongs to the set of knowledge is enough for a given concept to be classified as epistemic antiscientism, then scientophilia should be categorized as such. Of course, in a more radical form of epistemic scientism, the partnership between these two will be limited or even impossible. The ontology assumed by a scientophile is indeed liberal. However, when it comes to various ontologies postulated by ontological antiscientisms, their credibility will depend on whether a consensus of reliable experts supports them, and in most cases, they are not. Among philosophers, there are convinced platonists, but there is not even the slightest agreement between peer professionals about the possible contents, capacity, and other qualities of the world of ideas, not to mention lack of agreement on whether such a plane exists in the first place.

If we agree that mild or moderate scientism embraces the following maxim "When any belief and science clash, 'tis belief must go to smash", then scientophilia occurs as a peculiar variant of mild scientism. However, its central thesis is not about sources of knowledge or the existence of various objects but rather sets out a strategy to support the decision-making process. It should be noted that scientophilia does not claim that the natural sciences are the only source of knowledge; apart from physics and chemistry, it respects the achievements of other sciences, including psychology, sociology, economics, history; it is even able to treat a personal opinion or testimony as a reliable source. Therefore, scientophilia can also be adapted by both moderate scientists and mild antiscientists. Its belonging to one or the other concept depends mainly on the nuances contained in the definition of a given stance. Things get even more complicated when we distinguish local alterations of scientophilia, which, contrary to its global counterpart, is limited to a selected group of problems. Consider a declared phenomenologist, who believes that his philosophical method is the most reliable approach, but unfortunately, its cognitive scope is excessively limited to ethical values.

Whenever she ponders any issue outside of the field of ethics, she can behave like an exemplary scientophile and defer to the most reliable expertise.

## 12. Problems and limitations

Scientophilia is not without flaws, and one of its most essential imperfections is a problem with, for lack of a better term, self-proclaimed experts such as clairvoyants, psychics, or various pseudoscientists. Communities that bring such individuals together, with an appropriate degree of organization, can create convincing imitations of evidence-based consensuses. There are even peer-review journals dedicated to homeopathy, for example, so detection of such well-crafted deceit requires the enrichment of the scientophilia-based approach with more advanced critical thinking tools.

Another problematic issue is linked to the probabilistic character of scientophilia, as this heuristic does not guarantee by any means that the provided inferences are indefeasible. What seems today to be an established consensus may tomorrow turn out to be a rejected theory. Inference to the best expertise is never definitive, as it aims at providing the most success in the long run, not in a particular case. Hence, false negatives are inevitable. If a consistent scientophile had met Albert Einstein before the entire world of physicists had acknowledged him, it would have been reasonable for him to dismiss his theory. The basis of such a decision is that Einstein's theory was more likely to be inconsistent with classical mechanics because he was a dilettante than it was that he was a lonesome and unrecognized genius presenting a groundbreaking thesis. In this striking example, scientophilia's advice leads to a catastrophic mistake, but it will discard as unreliable an unimaginable number of amateurs at the expense of that single genius when applied dozens of times.

An additional issue is associated with the fact that consensus may be elusive and challenging to identify for a person lacking a good experience and understanding of scientific communication. Such compelling indicators of established consensus as textbooks, reports of prominent scientific organizations akin to the IPCC, WHO, or FDA. are not always obtainable for various reasons, but mostly because there are none. That means consensus

is probably, at least at the moment, part of esoteric knowledge and is recognized only among specialists dedicated to a particular domain within which consensus has been established. Other explanations are possible, too; for example, a consensus has not been fully formed yet. Regardless of the causes, the only solution is to seek the advice of a credible expert. Unfortunately, we do not always meet the latter personally; therefore, our opportunities to ask them consensus questions are minimal.

Occasionally scientophilia will leave its followers with a recommendation to suspend judgment. It is inconvenient because many disputes have a practical dimension, which means taking one side involves taking a particular action. In this case, Suspending judgment is practically equivalent to adopting a position because we will act following one side or, following the other, we will do nothing. For example, if there is a dispute on whether vaccines cause autism and there is a position of evidence-based medicine, opposed by a person who states that she had a revelation, in which the angel announced that vaccines cause autism. Even if we decide to suspend judgment, we will take some action, i.e., to vaccinate or not, which is equivalent to adopting one of the positions.

## 13. Conclusion

Scientophilia is hardly an alternative for various alterations of both scientism and antiscientism in terms of being a philosophical position. However, scientophilia is not without philosophical assumptions, and those can be treated as potential substitutes. We can say that scientophilia supports science because it is an unprecedented phenomenon in our culture. Undeniably, science has many drawbacks: scientists lie, deceive, make mistakes, or even give in to fashions. However, it is precisely the same as the case of philosophers, priests, historians, homeopaths, law professors. The difference is that scientists sometimes manage to expose these lies, deceptions, mistakes, and fashions, thus choosing the best-justified claims. Therefore, certain things are established in science, which is not always the case within nonscientific disciplines, as there are domains as philosophy, for example, which lack consensus. It does not mean that the latter is devoid of any value or that some form of science should replace it.

On the contrary, philosophy is necessary for ethical or political issues because even with science, we have not worked out anything better than what is offered by the multitude of philosophical positions. If there is no established consensus among scientists on such issues as ethical values, the definition of justice, number of existing gods, sense of life, then from the perspective of scientophilia, there is no difference between a scientist opinion, a philosopher's, or a priest's point of view, as neither of their positions is backed up by a significant majority of other purported experts. However, let us say if philosophers could reach a consensus on any of the above matters, and that consensus resulted from a critical debate on the gathered evidence, followers of scientophilia should adopt such a position like any other consensus reached by experts. Scientophilia is a love for science because the scientific consensus is much more common than in other areas and is also easier to recognize.

On the other hand, if we consider scientism or antiscientism as strategies guiding changes of beliefs, of course, insofar as they contain such guidelines, at least as tacit assumptions. Scientophilia may appear to be a compelling rival for the stronger versions of both positions, mostly when we speak of scientism and anti-scientism, which are simultaneously epistemic, ontological, and imperialist. Such radical varieties of these two can lead to undesirable and even harmful consequences, such as the exclusion of various naive or amateur historical and anthropological theories from the area of pseudosciences, or rejection of reliability of various nonscientific specializations (law, for example) on the basis that they are not scientific (in a narrow sense) fields on the one hand, or the legitimation of religious fundamentalism, numerous forms of relativism, the admission of pseudoscience or even various conspiracy theories on the other. It seems that the view of reliable sources of knowledge adopted in imperialist scientism is too narrow and too wide in the case of its antiscientisitic counterpart. Scientophilia avoids these risks. In the mild versions of both scientism and antiscientism, scientophilia can be adopted as an addendum to them, especially when the cues provided by both of these stances are confusing or indecisive.

The idea of putting scientophilia in the scientistic camp rather than among antiscientistic positions may seem reasonable and tempting, especially since in disputes between philosophy, religion, and science, it will

usually advocate taking the latter's side, as quintessential scientism. However, its consensus-based approach makes this problematic because, on numerous occasions, a science position will not be needed, and there is an acceptable possibility that, in some cases, it will be not preferred. In this situation, scientophilia seems to be closer to being the third way.

## References

Adams Jonathan, Pendlebury David, Potter Ross, and Szomszor Martin. 2019. *Global Research Report. Multi-authorship and Research Analytics*.

Blackford, Russell. 2017. "The Science and Humanities in a Unity of Knowledge". In M. *Science Unlimited? The Challenges of Scientism*, edited by Maarten Boudry, and Massimo Pigliucci, 11–31. The University of Chicago Press.

Boghossian, Paul. 2006. *Fear of Knowledge*. Oxford University Press.

Burr, Vivien. 2003. *Social Construction* (Second edition). Routledge.

Coady, David. 2006. "When Experts Disagree". *Episteme*, 3 (1–2). https://doi.org/10.3366/epi.2006.3.1-2.68

Cook John, Oreskes Naomi, Doran, Peter T., Anderegg, William R. L., Verheggen Bart, Maibach, Eed W., Carlton, Stuart J., Lewandowsky Stephan, Skuce, Andrew G., Green, Sarah A., Nuccitelli Dana, Jacobs Peter, Richardson Mark, Winkler Bärbel, Painting Rob, and Rice, Ken. 2016. "Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming". *Environmental Research Letters*, 11(4). https://doi.org/10.1088/1748-9326/11/4/048002

D'Agostino, Fred. 2016. "Disciplines, the Division of Epistemic Labor, and Agency". In *Social Epistemology and Epistemic Agency. Decentralizing Epistemic Agency*, edited by Patrick J. Reider, 91–109. Rowman & Littlefield.

de Ridder, Jeroen. 2018. "Kinds of Knowledge, Limits of Science". In *Scientism. Prospects and Problems*, edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 189–219. Oxford University Press.

Dunbar, Robin I. 1996. *The Trouble with Science*. Harvard University Press.

Fanelli, Daniele 2009. "How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-analysis of Survey Data. *PLoS ONE* (Vol. 4, Issue 5). https://doi.org/10.1371/journal.pone.0005738

Feyerabend, Paul 1993. *Against Method*. Verso.

Goldberg, Sanford C. 2016. "A Proposed Research Program for Social Epistemology". In *Social Epistemology and Epistemic Agency. Decentralizing Epistemic Agency*, edited by Patrick J. Reider, 3–21. Rowman & Littlefield.

Goldman, Alvin 1999. *Knowledge in a Social World*. Oxford University Press.

Goldman, Alvin 2011. "Experts: Which Ones Should You Trust?". In *Social Epistemology: Essential Readings*, edited by Alvin I. Goldman and Dennis Whitcomb 109–37. Oxford University Press.

Haack, Susan 2007. *Defending Science within Reason. Between Scientism and Cynicism*. Prometheus Books.

Haack, Susan. 2012. "Six Signs of Scientism". *Logos & Episteme*, *3*(1), 75–95. https://doi.org/10.5840/logos-episteme20123151

Haack, Susan. 2016. *Scientism and its Discontents*. Rounded Globe.

Hansson, Sven O. 2013. "Defining Pseudoscience and Science". In *Philosophy of Pseudoscience. Reconsidering the Demarcation Problem*, edited by Massimo Pigliucci and Maarten Boudry, 61–78. University of Chicago Press. https://doi.org/10.7208/chicago/9780226051826.003.0005

Harding, Susan. 1991. *Whose Science? Whose Knowledge? Thinking from Women's Lives*. Cornell University Press.

Hardwig, John. 1985. Epistemic Dependence. *The Journal of Philosophy*, *82*(7). https://doi.org/10.2307/2026523

Hardwig, John. 1991. "The Role of Trust in Knowledge". *The Journal of Philosophy*, 88: (12). https://doi.org/10.2307/2027007

Kitcher, Philip. 2008. Science, Religion, and Democracy. *Episteme*, *5*(1). https://doi.org/10.3366/e1742360008000208

Lackey, Jennifer. 2011. "Testimony: Acquiring Knowledge from Others". In *Social Epistemology: Essential Readings*. Edited by Alvin I. Goldman and Dennis Whitcomb. 71–92. Oxford University Press.

Ladyman, James. 2018. Scientism with a Humane Face. In *Scientism. Prospects and Problems*, edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 105–26. Oxford University Press.

Ledermann, Erich K. 2003. Saving Holistic Homeopathic Medicine from Mechanistic scientism - An urgent need. In *Homeopathy* (Vol. 92, Issue 3). https://doi.org/10.1016/S1475-4916(03)00039-0

Nickles, Thomas. 2013. The Problem of Demarcation. History and Future. In *Philosophy of Pseudoscience. Reconsidering the Demarcation Problem*, edited by Massimo Pigliucci and Maarten Boudry, 101–20. University of Chicago Press.

Oreskes, Naomi. 2019. "Why Trust Science?" In *Why Trust Science?* Princeton University Press. https://doi.org/10.2307/j.ctvfjczxx

Oreskes, Naomi, Conway, Erik M. 2010. *Merchants of Doubt. How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. Bloomsbury.

Peels, Rick. 2018. "A Conceptual Map of Scientism". In *Scientism. Prospects and Problems*. Edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 27–56. Oxford University Press.

Pigliucci, Massimo. 2013. "The Demarcation Problem. A (Belated) Response to Laudan". In *Philosophy of Pseudoscience. Reconsidering the Demarcation Problem*. Edited by Massimo Pigliucci and Maarten Boudry, 9–27. The University of Chicago Press.

Pigliucci, Massimo. 2017. Scientism and Pseudoscience: In Defense of Demarcation Projects. In *Science Unlimited? The Challenges of Scientism*. Edited by Maarten Boudry and Massimo Pigliucci, 185–203. The University of Chicago Press.

Plantiga, Alvin. 2018. "Scientism. Who Needs It?" In *Scientism. Prospects and Problems*. Edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 219–32. Oxford University Press.

Price, Derek de S. 1963. *Little Science, Big Science*. New York Columbia University Press.

Rosenberg, Alex. 2011. *The Atheist`s Guide to Reality*. W.W. Norton & Company.

Russell, Bertrand. 1978. *Why I Am Not a Christian*. Unwin Paperbacks.

Russell, Bertrand 2004. *Sceptical Essays*. Routledge.

Sagan, Carl. 2013. *Cosmos*. The Random House Publishing Group.

Sellars, Wilfrid. 1963. *Science, Perception and Reality*. Routledge & Kegan Paul Ltd.

Sheldrake, Rupert. 2012. *The Science Delusion. Freeing the Spirit of Enquiry*. Coronet.

Simonton, Dean K. 2018. "Hard Science, Soft Science, and Pseudoscience: Implications of Research on the Hierarchy of the Sciences". In *Pseudoscience. The Conspiracy Against Science*, edited by Allison B. Kaufman and James. C. Kaufman, 77–99. The MIT Press.

Stenmark, Mikael. 2018. "Scientism and its Rivals". In *Scientism. Prospects and Problems*. Edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 56–82. Oxford University Press.

van Woudenberg, René. 2011. "Truths That Science Cannot Touch". *Philosophia Reformata*, *76*(2), 169–86. https://doi.org/10.1163/22116117-90000515

van Woudenberg, René. 2018. "An Epistemological Critique of Scientism". In *Scientism. Prospects and Problems*, edited by René van Woudenberg, Jeroen de Ridder, and Rick Peels, 166–89. Oxford University Press.

Walton, Douglas. N. 1996. *Argumentation Schemes for Presumptive Reasoning*. L. Erlbaum Associates.

Walton, Douglas, Reed Chris, Macagno Fabrizio. 2008. *Argumentation Schemes*. Cambridge University Press.

Ware Mark, Mabe Michael. 2012. *The STM report. An Overview of Scientific and Scholarly Journal Publishing*. Accessed October 1, 2019. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1008&context=scholcom

Wilson, Edward O. 1975. *Sociobiology. The New Synthesis*. Harvard University Press.

Wilson, Edward O. 1984. *Biophilia*. Harvard University Press.