Scientism after its Discontents

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Résumé — Le scientisme a plus de notoriété que l'histoire proprement dite, car il a été identifié avec le « positivisme », le « réductionnisme », le « matérialisme » ou le « marxisme », ou même tenu pour responsable de l'application de la science au détriment d'autres affaires humaines. L'idée que la recherche scientifique produit les meilleures connaissances possibles réside dans la définition même du « scientisme ». Cependant, même lorsque la science a montré un nombre considérable de succès théoriques et pratiques, une confiance rationnelle mise sur elle comme moyen de résoudre tout problème factuel a été dénoncée comme illégitime, défectueuse ou dogmatique. Ainsi, après avoir revisité les variétés de la signification du scientisme, je plaide pour une défense raisonnable du scientisme contre certaines de ses critiques dominantes. Par conséquent, on soutiendra que la science est l'approche la plus fiable pour acquérir des connaissances sans nuire à d'autres activités humaines précieuses dans la mesure où celles-ci ne traitent pas de questions factuelles ou cognitives ni ne sont en contradiction avec une vision du monde scientifique.

Abstract — Scientism has more notoriety than history proper for it has been identified with "positivism", "reductionism", "materialism" or "Marxism", or even held responsible for the enforcement of science at the expense of other human affairs. The idea that scientific research yields the best possible knowledge lies at the very definition of "scientism". However, even when science has shown a considerable amount of theoretical and practical successes, a rational confidence put on it as a mean for solving any factual problem has been denounced as illegitimate, defective, or dogmatic. Thereby, after revisiting the varieties of the meaning of scientism, I argue for a reasonable defense of scientism against some of its prevailing criticisms. Hence, it will be sustained that science is the most reliable approach for attaining knowledge without detriment of other valuable human activities insofar these do not address factual or cognitive questions nor are at odds with a scientific worldview.

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Science has shown a considerable amount of successes since the early modern period. Progress was not limited to astronomy nor mechanics but reached the discovery of oxygen, the development of cell theory, the principles of natural selection, and research on the neural basis of learning. Social research has neither dispense with the use of the scientific method as seen in cognitive linguistics, economics, and mathematical sociology. Proposals such as string theory or evolutionary psychology have received criticism but have not eclipsed the advancement of contemporary science on matters of all kinds. Testimony of emerging disciplines from computer sciences to behavioral neurosciences is an evidence of the pivotal role of science in our age.

The departure from mythological explanations can be traced back to the studies on geometry, medicine, and natural philosophy made in ancient Babylonia, Egypt, and Greece. Even technological innovations in Chinese, Indian and Roman cultures are evidence of the growing adoption of a rational approach for understanding reality. Except for the romantic revolt led by Hegelian philosophy, no development in culture, health, or industry have been done in foreign ways of science and technology. Certainly, neither warfare nor global warming would have been possible without scientists, but this is not the fault of science itself but rather of partisan politics to the extent that German eugenics and Lysenkoism share the same ideological bankruptcy.

If we cannot deny the historical achievements of science, shouldn't we adopt a scientific worldview instead of relying on religious authority or cultural tradition? Such worldview exists and is commonly—and derogatory—called "scientism". Moreover, it is denounced as illegitimate or even vicious. One can revise the historical evolution of the term in Schöttler (2017). Suffice is here to say that scientism has been identified with "positivism", "reductionism", "materialism" or "Marxism", and even held responsible for the enforcement of science to the detriment of other human practices, the condoning of industrialism in third-world countries, and even for the spread of atheism. Such diversity of meanings suggests that scientism has more notoriety than history proper which will not

be addressed here. I am going to argue instead for a reasonable defense of scientism against some of its prevailing criticisms.

1 Against Scientism

Scientism was endorsed as early by adherents of French Enlightenment, laymen and arguably most contemporary scientists and scientific philosophers (Bunge, 2016). The term was coined by the time of Renan, Renouvier or Bernard Shaw albeit as an "arbitrary use" of science (Schöttler, 2017). Fauverty criticized the "orthodoxy" of science while attempting to reconcile reason and religion. Similar objections were shared by spiritualists, occultists, and firm believers (Raynaud, 2017). Conversely, scientism was openly defended by La Mettrie, Condorcet, D'Holbach, Le Dantec, and Lalande. According to Haack (2012), these authors may have overestimated science and even denigrated other valuable human activities. Against this trend, Dilthey, Bergson, Hayek, the Frankfurt School, postmodernists, radical skeptics or constructivists reacted against whatever they identify as "scientism" in Comte's positivism, the Vienna Circle, or Western industrialism. Moreover, any vigorous defense of science will be quickly labelled as "dogmatic", "lame", "narrow", "pedantic", "pretentious", or worse, "false" (Schöttler, 2017, p. 40). Thus, it is the influence of scientism that may have been overestimated or consciously exaggerated by its critics as it was neither a dominant phenomenon nor a well-received stance in society.

The view that "scientism" meant a mode of thought that considers things from a scientific viewpoint was soon superseded by its current negative connotations spread by Hayek (1942) in the human and social sciences. The following definitions are representative of the "anti-scientism" sentiment in academia and comprehensive perspectives of the debate can be found in De Ridder *et al*. (2018), Boudry and Pigliuci (2017) and Andrade (2017).

For instance, Haack (2012) conceives scientism as "a kind of over-enthusiastic and uncritically deferential attitude towards science, an inability to see or an unwillingness to acknowledge its fallibility, its limitations, and its potential dangers" (p. 76). Famed authors as Hawking, Krauss, Harris, or Rosenberg are to be found guilty of this trend for their contempt of philosophy and the humanities which is noticeably on the rise as much more pervasive as thought. Pigliuci (2017) defines it as an "activity that projects itself into domains or areas of inquiry where it does not (allegedly) properly belong" (p. 187). Scientism is also seen responsible for making extraordinary claims on behalf of science but delivering little to nothing to support them (Pigliuci, 2015). Unwarranted assertions

are, however, usually unreasonable. If those assertions met any rational or acceptable standard, can we carry on with scientism after all, or will it still be condemned because of certain "boundaries" science is said to cross in order to encompass other academic disciplines or even realms of reality?

But what are those fields science should not dare to venture? Remarkably Haack (2017) is thinking in other valuable forms of inquiry such as the historical, legal, and literary as well as human activities such as music, art, storytelling, joking or cooking. But excluding historical research, none of them seems to have descriptive, explanatory, or predictive aims as they do not constitute scientific enterprises of their own. Of course, the legal system can (and should) be aided by scientific techniques such as blood sampling, facial recognition techniques and reliable psychological measurements but Law Schools do not produce laboratory or field lawyers. On the other hand, no one studies culinary arts for a better understanding of the cultural or economic impact of food (less for learning its nutritional values) but for improving their cooking skills. The problem appears to be Hayek's (1942) blending of "physicalism" with "scientism" as the social sciences don't need to cling upon radiocarbon dating or geological remote sensing but to their own techniques such as cohort studies, scatter plots or field surveys adopting the "methods and language of science" (although certainly not those of the "natural" sciences). Other human activities are not at odds with science insofar as they do not have factual content but follow instead practical, social, aesthetic, or recreational ends with the clear exception of religion and ideology.

Gould's (1997) famous complaint against overlapping magisteria between science and religion seems to be a direct confrontation with scientism. This can also be mirrored in Snow's depiction of the incomprehension between the natural sciences and the humanities. True is that neither art, music, or literature make factual claims so extending the domain of science to them would be rather unilluminating and misleading (Mahner and Bunge, 1996b). But religions and ideologies do pretend to tell us something about reality, so they are actually crossing these boundaries with claims at times incompatible with those made by science about the world. Surely one can discuss whether descriptive or explanatory assertions can overshadow normative claims but what matters is that scientists are often intimidated to research assertions of nonscientific disciplines even if they are blatantly false (e.g. psychoanalytic accounts of repressed memories), or at least questionable (e.g. biological basis of gender roles) for fear of being labelled as "pretentious" or "defective".

It is also important to notice how science already assists long-lived philosophical issues such as moral cognition (e.g. whether our ethical intuitions are universal or not), philosophy of mind (e.g. fMRI record of parietal activation), or even ontology (e.g. an understanding of emergent properties). As Buckwalter and Turri (2018) state, contravening boundaries is not always amiss. Moreover, the distinction between human sciences (*Geisteswissenchaften*) and natural sciences (*Naturwissenschaften*) was stillborn when Dilthey came up with the idea that social studies deserve an intuitive or "empathic" method of interpretation (Bunge, 2016). Neuropsychology, biological anthropology, and population geography are living examples that the dichotomy between nature and culture is spurious and in clear contrast with the dubious inferences of "interpretative sociology" and "cultural studies".

Regrettably "anti-scientism", namely, the rejection of scientism mainly for its negative connotations, is well spread in intellectual circles and it would not be surprising that even scientists themselves dismiss it. Hereby, Haack (2012) makes a sober characterization of scientism in terms of certain "signs" to avoid.

First, the use of terms like "science", "scientific" or "scientifically" is denounced as a gratuitous endorsement of epistemic praise. As noticed earlier, any claim raised with unwarranted assertions is not scientistic per se but an example of defective arguing. Moreover, the examples given by Pigliuci (2017) seems to be a case of media sensationalism such as popular advertisements or science divulgation gone mad. But blind enthusiasm and dubious marketing is to be considered a psychological or sociological sign rather than an internal feat of scientism. A second sign is the improper usage of scientific language or mathematical terms to make apparent sense of nonsense. While a valid point, it is neither an essential feat of scientism as even authors of the so-called Sokal's affair were accused of using incorrect or meaningless concepts (e.g. "lacanian" topography or Irigaray's ludicrous account of fluid mechanics), but not of committing to scientism. Here again clarity is a form of courtesy that both the philosopher and men of science owe.

Haack's third sign is rather suspicious as she marks out the preoccupation with demarcation as a distinctive sign of scientism but shortly afterwards admits that there is indeed a distinction (although not a sharp one) between sciences and other activities. Scientific research is described as "more systematic, refined and persistent" (2012, p. 26) with the familiar procedure of conjecture-and-checking along the specialized techniques devised in various fields (Haack, 2017). It happens that later she characterizes "bad science" as done carelessly,

mainly too vague, with decorative symbolism and purely speculative statements. It is then a sample of kindness not to call this a "pseudoscience" or a "faulty science" as these feats are commonly found within claims falsely pretending to be a scientific (see also Romero, 2018). On the contrary, Pigliuci (2017) replies that "scientistic" research is not one of demarcation but of "expansionism" as everything worth inquiring must be amenable to scientific analysis (p. 192). What is relevant to be researched is flour from another sack, but certainly scientism follows Russell's (1946) conviction that whatever can be known, can be known by the means of science.

A special concern for scientific method is another alleged sign of scientism. There is an extended idea that adherents of scientism advocate for the existence of a single method to rule them all. In fact, scientism endorses the superiority of scientific method in matters of all (cognitive) kinds, but not the neglecting of other forms of inquiry. Haack would agree with the idea that there may be a general method ("an underlying pattern of all serious scientific research") coexisting with more specific methods developed for each field. With the aid of a systematic method we can tackle factual issues, but it would be indeed an exercise in bad praxis to look to science for answers to questions beyond their scope. In any case, technology, ethics, and wise decisions help solve social or political problems, not science alone.

Last but not least, Haack's (2012) final objection against scientism is its devaluation of the diverse. Government efforts to focus resources on science education at the expense of other fields is a denigration of scientism of other valuable activities (Haack, 2017). Of course, investment in Latin American science remains considerably inferior to blocks such as the European Union or the United States, so third-world countries would be free of scientism according to this. Certainly, asking for the importance of science over cultural expressions is a misguided question. Worrisome is the paternal attitude adopted about the displacement of "old traditions" by scientific practices blaming them for the "impersonal" character of, for example, modern medicine (Haack, 2012, p. 36). Beyond a personal right to long for these beloved traditions, this is not a sign of intellectual opening but of cultural conservatism.

One cannot deny that there is a complementary risk of the underestimation of science, namely, its overestimation. But the problem does not lie on an enthusiastic confidence for its achievements over religious or traditional knowledge are undeniable. Neither is that scientific discourse is recalcitrant to internal or external criticisms for philosophy and sociology of science are responsible for

giving accounts of these. It is providing a caricature of science that can hamper scientific progress that does not do justice to the efforts, setbacks, and bias present in science. Enemies of scientism react by mocking the whole enterprise as an outcome of "Western rationality", by greeting "alternative" or pseudoscientific practices, or by limiting even more public funding of science. In line with Haack's reasoning, this is not so much a problem of scientism but an example of media portrayal of scientism. (For a criticism of science in media culture, see Elias, 2018).

It may be further objected that to question the limits of scientific knowledge belongs to philosophy turning scientism self-refuting as it cannot be empirically proven. Naturally, one could circumscribe philosophy to conceptual or logical analysis (Ayer, 1936). This is, however, not needed as scientism can be deemed as an epistemological or methodological postulate presupposed by the bulk of scientific knowledge. Philosophical theses too can become scientific if they test their theories by their interaction with more specific theories of science while using as many exact tools as possible (Romero, 2018). Haack (2017) admits that proceeding in philosophy should be as rigorous as the best scientific inquiry if it also takes into consideration everyday experience. If the role of philosophy is to frame the semantical, ontological, epistemological, and methodological aspects of various issues, the question then is if there is a tenable or equally compatible type of inquiry other than science.

2 The Varieties of Scientism

Nor only should we accept that there are multiple usages of the term "scientism" but also that it would be untenable if it does not rely on a suitable philosophy. As there are many recent trends in philosophical inquiry such as constructive empiricism, naturalized epistemology, or theoretical structuralism, not all of them understand "scientism" in the same way. The kind of philosophy here endorsed aligns with "scientific realism". (For a comprehensive review see Sankey, 2008; Bunge, 2006; Niiniluoto, 1999). Accordingly, we need first to refine the varieties of scientism.

Peels (2018) distinguishes between academic and universal scientism. The former is divided into methodological scientism (i.e. disciplines should adopt the methods of the natural sciences) and eliminative scientism (i.e. disciplines other than the natural sciences have nothing to add to our bulk of knowledge). But the author misguidedly identifies observation and experimentation as the methods of natural sciences as if they were not already used in the social sciences. On the

other hand, eliminative scientism is reductionism be towards physics (Neurath) or biology (Wilson), but can also be towards sociology (Woolgar), politics (Foucault) or economics (Marx). Thereupon, "methodological scientism" can be redefined just as the expansion of the methods of science to other academic disciplines.

"Universal scientism" is also a rather misguided term as it also encompasses eliminative reductionism. Here science attempts to answer the once epistemological, ontological, or moral problems. Peels (2018) concludes that the conceptual core of scientism is the expansion of its boundaries. Some claims are indeed unwarranted such as that all genuine knowledge is to be found only through natural science in detrimental to the human and social sciences. But factual science comprises both kinds of sciences. And although optimistic, we can neither rule out some limitations of scientific research while keeping a reasonable confidence in its endeavor.

For their part, Buckwalter and Turri (2018) contrast "radical scientism" (i.e. science as the only way to acquire knowledge about reality) with "moderate scientism" (i.e. science is a good way of answering any factual question). The former is likewise false as there are other forms of inquiry and even other organisms gain knowledge about their surroundings without being practicing scientists while the latter coincides with the strategy of scientific expansionism (Pigliuci, 2017; Stenmark, 2014). Nonetheless, according to this view, science can be deemed as a useful tool for deepening our understanding of the world but nowhere is stated to be the best one. Therefore, it represents science as only helpful (but not the only one) for answering questions typically thought to fall outside of it.

"Radical" or "strong" scientism can be tracked in Quine's naturalized epistemology and Stitch and Churchland "revolutionary scientism" (Haack, 2009). But it is hard to know whether they would accept the label of being radical. As Mizrahi (2017) notices, these characterizations are usually persuasive definitions which express disapproval of scientism. Only Rosenberg (2018) is an exemplar of the advocacy of "strong scientism". He vocally states that there is no meaning in the universe, that metaphysics and ethics are derived from science, and that all we need is the scientific method, although he seems to encompass eliminative and causal realism to a certain extent.

But on a more positive trend, certain philosophers have openly defended scientism as Ladyman and Ross (2007). These authors attempt to take contemporary science seriously enough for building a "naturalistic metaphysics" that

enriches our "relatively unified picture of the world" (p. 27). In a rather critical tone, they also reject what they label as "neo-scholastic metaphysics" found in analytic philosophy and propose instead that our ontology should not rest upon intuition or common sense but on science itself. They go beyond criticizing philosophers who use "outdated or domesticated science" (p. 17) or make generic rather than specific claims. It is further argued for the "primacy of physics" based on its maturity and the asymmetry between physical science and other disciplines. Although reductionists, Ladyman and Ross end up mentioning that explanations in other sciences should at least be consistent with what is known in the physical and biological sciences. In their views, "scientism" is to be considered as a stance which encompasses a certain version of empiricism and materialism (p. 63).

The case of Bunge (1986) is similar although he adopts critical realism as a distrust of sense data that encourages the building of sophisticated conceptual systems which include some concepts that have only a remote relation with reality but refer nonetheless to a certain domain of facts (p. 23). The acceptance of emergent levels favors the merger or convergence of disciplines and frees us from the charges of reductionists. Therefore is the idea that scientific research yields the best possible knowledge of reality which lies in the very definition of "scientism" (Bunge, 2016).

Sorrell (2013) attaches a valuative element on scientism as a matter of putting too high a value on science in comparison with other aspects of society. This is important as Mizrahi's (2017) account of "weak scientism" (i.e. science is not the only way to attain knowledge) would be indistinguishable from moderate scientism without a value put on it (e.g. science or technology are the best among others and even considered prized commodities). With everything revised, we can sketch three versions of "scientism" according to what kinds of boundaries it crosses and how much confidence is deposited in scientific enterprise:

1. Strong scientism—Science is necessary and enough for yielding knowledge
2. Moderate scientism—Science is necessary but not enough for yielding knowledge
3. Weak scientism—Science is enough but not necessary for yielding knowledge

Only *cognitive aims* are to be supposed here, so this distinction is strictly epistemological ruling out ontological or moral implications. Strong scientism argues

that scientific enterprise is necessary for yielding knowledge as it has proven to be the only reliable source of knowledge against superstition or speculation. But what stands more about it is not that science is enough but either theoretical physics, evolutionary biology, or neurosciences at best. Hence most of the advocates of strong scientism are also reductionists.

It is striking that Ladyman and Ross (2007) argue for a "weak metaphysics" as long as it is not an activity that has a specialized science of its own (p. 65). This "deflationary" project (whether defensible or not) is further criticized by Haack (2017) as barely more than promoting a meta-science. But the mere idea of a science-oriented philosophy is not necessarily dependent upon reductionism (Rescher, 2003), nor need to abdicate from scientism (Romero, 2018; Bunge, 2012). The case against strong scientism consists of establishing whether other forms of inquiry are nonexistent or illegitimate.

While "strong scientism" as represented by Rosenberg, Hawking and Stitch may deny that other nonscientific disciplines produce legitimate knowledge, Mizrahi's (2017) "weak scientism" admits that scientific knowledge is the best among others. But to have such a clear conviction of the superiority of science does not seem to be a weak stance but rather a moderate one. Compare this to Buckwalter's and Turri's (2018) "moderate scientism" which is actually weaker as it asserts that scientific knowledge can be good enough but not the best one as there can be other means to attain knowledge. Arguably Buckwalter, Turri, Pigliuci, Haack and many practising scientists would endorse "weak scientism" without the label while admitting that it is trivial and uninteresting to keep it.

Moderate scientism further states that science cannot rest upon pragmatic justification only. As Raynaud (2017) points out, there is no practical utility in Young's experimental test of the ondulatory nature of light, or in discovering that the Beck's tree frog can be divided into two different species in spite of their morphological similarities (p. 73). Science certainly works but should also be theoretically sustained. In fact, most utilitarian attitudes applied to science cannot be directed towards basic research while ignoring that science as a social activity rests upon institutional norms (Ladyman and Ross, 2007) or research communities (Romero, 2018).

Shermer (2002) defines scientism as "a scientific worldview that encompasses natural explanations for all phenomena, eschews supernatural and paranormal speculations, and embraces empiricism and reason as the twin pillars of a philosophy of life appropriate for an Age of Science" (p. 35). Scientific realism follows this by including scientism as the epistemological and methodological

branches of the matrix of scientific progress (Bunge, 2012). Therefore, science is not only one form of inquiry among others but the most reliable one. And although valuable in itself, it does not need to deter other human activities. Innovations in vaccines, medicines, roads, and industrial processes are all due to advancements in basic research, but without music, art, literature, or jurisprudence neither would we be far from having left Altamira's cave. It seems that the insistence of Haack (2017) in everyday experience is due to the so-called "Big Questions" whatever these are (likely Kant's questions). Surely intuition and ordinary experience can lead to ordinary or literary reflections and some of them are valuable. But having sophisticated science-oriented systems, committing to folk philosophy still be necessary?

3 In Defense of Scientism

The boundaries scientism is said to cross is any cognitive domain with a factual reference to it. After all, no one has accused a mathematician or logician of scientism no matter how much confidence he or she has to their formal or abstract procedures. Now we can state the principles found tenable for scientism and why we should endorse it:

1. Science is the most reliable approach for attaining knowledge of the world
2. Scientific methods address intellectual problems, not things
3. There should not be a blockage of scientific inquiry

As repeated until weary, scientism is defined as the thesis that cognitive problems are best tackled by adopting the scientific approach as it can yield the truest and deepest possible knowledge of things (Bunge, 2016; 1986). There are indeed other kinds of inquiries and knowledge, but science is a pattern of inquiry which provides systematic knowledge and no alternative system be it religion, mythology, ancestral wisdom, or pseudoscience has matched its success in solving conceptual issues. Moreover, it was science by (pleasantly) crossing boundaries that lead to the discovery of the recession of nearby galaxies thus suggesting the idea of cosmic expansion, the common ancestry between man and beast, or the mechanisms of aspirin from the native uses of Spiraea. Against divine creation, intelligent design, or herbal healing, science successfully gave a better account of the phenomena purportedly explained by them. Certainly, scientists like Newton or Lemaître were religious, but science progresses not due to cultural

and religious tradition which anyway can encourage or hamper research, but in *spite* of them.

Haack (2017) admits that scientists have amplified the process of inquiry, so they have figured things out *better*. Scientific enterprise allegedly uses the same procedures and inferences as everyday inquiry, so scientists have improved, refined, amplified, and augmented them but holding the conviction that it is nothing more than refined common sense. Nonetheless, while herbal medicine can yield useful results, botany gives us a deeper account of their therapeutic effects by analyzing their mechanisms and efficacy, e.g. isolating the active compounds, and conducting double-blind studies. By deepening the state of affairs, science is a better account of ordinary knowledge. But it also gives us counterintuitive information such as rejecting the flatness of the Earth contrary to common sense. So, science does not only provide a more refined representation of reality but also corrects our intuitions.

Precisely Ladyman and Ross (2007) criticizes the dependence on intuition and common sense that might lead to an outdated scientific image (p. 10) and can be extended to ordinary language analysis and phenomenology (Buckwalter and Turri, 2018). Although ordinary knowledge is to some extent indispensable, scientific research starts by acknowledging that background knowledge is indeed insufficient or even conflicting with our current theories. Therefore, science gives us counterintuitive pieces of knowledge (Bunge, 2016). But how can we quantify how much better is scientific knowledge in comparison to other forms of inquiry? The measurement of the impact of research papers and academic journals is a relevant index, but its qualitative evaluation has deep roots in the philosophy of science regarding its explanatory, instrumental and predictive success (Azrahi, 2017).

Literature and the arts are also said to help us grasp a deeper meaning of the human condition. Actually, experimental psychology teaches us that art is influenced by emotional state, ambiguity, perception, and expectations (Jakesch and Leder, 2009; Jacobsen, 2006). Art is not scientific but its investigation as a cultural artifact that produces aesthetic responses can be scientific (Romero, 2018). Moreover, allegories and metaphors can be vicariously descriptive or reformulated as saying something factually true or false (Mahner and Bunge, 1996b). For example, the insight of the morals of a fable can be seen as the formulation of a rule of behavior. And when conveniently interpreted by theologians, some biblical myths are symbolic rather than literal. At best they can fulfill a pedagogical or vicarious purpose as in Plato's allegories. But in general, art does not need to

rely on describing the nature of reality but on producing aesthetic experiences, so there is no actual conflict between science and the arts.

Naturally, philosophy and the humanities are open to more mundane reflections through everyday experience, but this can be one point of departure insofar common sense cannot be taken for granted. Otherwise we run the risk of transforming philosophy into naïve physics or folk psychology. And for most of their branches, the humanities can benefit from adopting a more scientific approach by making grounded conjectures, weighing the reasons or evidence, arriving to a conclusion and carefully examining it (Haack, 2012) while avoiding ad hoc guessing and metaphorical talk.

As stated earlier, the scientific method is a general pattern of inquiry and should not be restricted to any kind of science but as the kernel of scientism as such (Bunge, 1986). Although philosophers throughout history have doubted about the method (Popper) or even denied its very existence (Feyerabend), its employment has proven to be superior to relying on intuition, authority, or revelation (Peirce, 1955, p. 18). Moreover, it is not enough to hold true propositions but to be able to give an account of how we come to know that a statement is true. We also must consider that the scientific approach is applied to the full gamut of cognitive or intellectual problems (Bunge, 1998). That means that indistinctly from its subject matter, be it protons, tectonic layers, ape behavior, economic recessions, or political crisis all can be studied with the aid of the scientific method. The "myriad specialized techniques" devised by scientists (Haack, 2017) from the microscope to the psychometric questionnaire obey a general strategy of research that begins with identifying a problem and using our intellectual and empirical resources for reaching a tentative solution.

The last principle states that any factual question can be formulated in intellectual terms. Although there may be *de facto* beyond scientific investigation, there is nothing that could not be *de jure* studied scientifically (Bunge and Mahner, 1996, p. 103). As everything is open *in principle* to scientific research, we must avoid any attempt of blocking the way of inquiry (Peirce, 1955, p. 54). Its imperative form can be reformulated as stating that any factual domain worth being inquired should lack of border patrols. Noticeably Peirce suggested that the first rule of reason is to try any theory so long as it is adopted "in such a sense as to permit the investigation to go on unimpeded and undiscouraged" (p. 54). And the first impediment to this is admitting the unknowable. What is unwarranted is not our scientific attempts to understand better or our "epistemic

optimism", but to call out for dogma where no reason nor evidence but tradition and revelation might play a better role.

There are no royal roads in science or philosophy so we should go on without assuming intrinsic boundaries of scientific inquiry. While conjectures are at first speculative and some are eventually abandoned, science can correct itself progressively. It is then not clear why this kind of scientism would be considered "dogmatic", "lame", "narrow" or "pretentious". As a methodological principle, scientism relies upon an ontology that fathoms our scientific worldview. In short, scientism is not only tenable, but also desirable for our intellectual heritage. But there is a major risk of "anti-scientism", namely, that it denies not only that science is our best strategy but as equal as any other knowledge. And when everything is the same, then nothing, not a single intellectual endeavor or a sincere fervor for knowing would really matter.

4 An Addendum on Pseudo-Scientism

As any other human idea or device, scientism can also be falsified. Its core idea, that is, that any cognitive problem is best tackled by adopting the scientific attitude and method, can be accepted by both laymen and specialists alike. Yet there are abuses of the term which both can share the label of "pseudo-scientism".

A first meaning arises from the concept of which it is an -ism itself, i.e. "pseudoscience". By arranging our previous definition, pseudo-scientism defends the idea that pseudosciences are reliable or legitimate approaches for acknowledging or influencing the world. For instance, psychoanalytical lessons are usually tolerated along behavioral and physiological approaches, or homeopathic "medicine" can be found in the curricula of scientific medicine. Hence "pseudo-scientism" can be defined as the promotion of pseudosciences as if they were authentic sciences because they exhibit some of their attributes (e.g. use of mathematical symbols) (Bunge, 2017, p. 27). Nonetheless pseudosciences struggle for passing the litmus test of internal consistence, compatibility with previous knowledge, or empirical testability, not to mention they are based on non-scientific philosophies.

Canonical examples of "pseudo-scientism" can be found in orthodox psychoanalysis, Lysenkoism, creationism and doctrinal Marxism. These do not denigrate science per se but support it under the condition that they are included against "bourgeois", "reductionistic", "materialistic", "positivistic", "colonialistic" or "Western" science while thickening their "protective belt" against refutations,

empirical proofs or any other standard of scientific contrasting. There is not much more to say about this meaning of pseudo-scientism. Insofar as pseudosciences are identified and denounced, they should not be promoted either by universities or by the State as they can be hazardous in terms of health and educational policy. We must not forget the denunciation of "Jewish science" that delayed Germany from relativistic physics. Their pervasiveness in culture and why people believe weird things is rather a matter of psychological and sociological research as Sharmer puts it.

Another widespread and more relevant meaning should be, however, discussed. From the "two cultures" chasm, a tendency arises to grant greater confidence to the "hard sciences" to the detriment of the "soft sciences". This sense of pseudoscientism is detrimental as governmental funding is usually directed to the former and does not help to extend the idea that science is necessary to understand phenomena not addressed by physics or chemistry alone. On the contrary, it gives the idea that either everything is to be reduced to physics or biology, or there are aspects that cannot be explained due to their "complexity" thus giving rise to pseudoscientific and religious narratives.

A vivid example are scientists carrying out research in the *Specola Vaticana*. There is no doubt about the seriousness of their astrophysical queries, but it is also common to oppose them to nonreligious laymen who stress the incompatibility between religious and scientific education but happen not to have a PhD in physical sciences. Most of the Catholic priests are physicists, cultivated philosophers, and theologians, but what counts are the argumentative soundness and the available evidence on these issues in despite theological indoctrination. If it were a matter of accumulation of academic degrees, an economist can be a lawyer and a psychologist; or an educator can also be a historian and a social worker. As the reader can suspect, it is implicit that here some sciences are given a greater epistemic prestige though is no more than an authority argument degraded in fallacious reasoning. One needs no to be an astrophysicist nor a neuroscientist for discussing gods, politics, morals, or sports.

This pseudo-scientism privileges fundamental physics and molecular biology over psychology and anthropology. For example, while a pandemic crisis is mainly a medical and political issue, there is no reason not to listen to economists on the topic. Or rather, we should not hand over the Ministry of Economy and Finances to a physician as surely this one would demand not to offer the Ministry of Health to a journalist. More than a "war on science", this can be seen as a "battle royale of sciences" competing against each other though with clear

disadvantages such as public funding and social prestige still reserved for the natural sciences.

To be clear, we have to recognize which sciences are competent to answer certain issues such as physics for the formation of the galaxy, or economics and demography for avoiding an economic disaster. But denigrating some sciences over others fosters their underdevelopment by warding off funding instead of attracting human talent to these fields. Including them in the public discourse will help them grow more scientific and socially relevant. Genuine scientism not only rejects the promotion of pseudosciences, but also the expansion of this kind of pseudo-scientism.

One can see similarities of this to the "scientistic thought" of Hawking, Nye o DeGrasse who subordinate philosophical queries to science. This attempt is not sound. For example, the abortion debate cannot be settled within biology or medicine. An embryo is a human being, not a future calf. What is in dispute is not its genetic identity, but whether it is ethically justified to interrupt the process. Nonetheless, this "pseudo-scientism" is also a false portrayal of science disregarding other sciences. Hence, we must not stop our rational confidence in sciences, but in men of science. Sometimes, scientists themselves can be imprisoned by their own fame, prejudices, or philosophical misconceptions. Luckily, scientific psychology already knows more about this than organic chemistry or astrophysics.

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