Bunge's Metascience and the Naturalization of the General Discourse

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Abstract — We will explain why the *Treatise on Basic Philosophy* is a metascientific work and not a philosophical one. We will then argue that this meta-science is part of a long process of naturalization of thought that begins at the end of the Middle Ages to give birth to the scientific thought of the study of the world. For Bunge, naturalization takes the form of the naturalization of the general thought which makes it possible to replace philosophical general discourse with scientific general discourse. Finally, this naturalization of general discourse should not be confused with the projects of naturalization of philosophy, in particular one of many projects of scientific or naturalized metaphysics known as ontic structural realism.

Résumé — Nous expliquerons pourquoi le *Treatise on Basic Philosophy* est une œuvre métascientifique et non pas philosophique. On soutiendra ensuite que cette métascience s'inscrit dans un long processus de naturalisation de la pensée qui débute à la fin du Moyen Âge pour donner naissance à la pensée scientifique de l'étude du monde. La naturalisation prend la forme chez Bunge d'une naturalisation de la pensée générale qui permet de remplacer le discours général philosophique par le discours général scientifique. Finalement, cette naturalisation du discours général ne doit pas être confondue avec les projets de naturalisation de la philosophie, notamment un des projets de la métaphysique scientifique ou naturalisée connu sous le nom de réalisme structurel ontique.

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> […] though young and far from guaranteeing success,
> the scientific point of view is the best because it is the
> most demanding and the most open of all.
> MARIO BUNGE
> *From a Scientific Point of View*

Contents

Following a discussion with Gerardo Primero, one of the administrators of the Facebook group *Lectura y análisis de las obras de Mario Bunge*[2], we think it is necessary to provide some clarification as to our interpretation of Bunge's thought. The scientific general discourse we propose is virtually extracted from the Bungean system, but to do so we must redefine the boundaries between the disciplines traditionally associated with philosophy. What for? We wish to dissociate the scientific general discourse from any transcendent discourse, whether philosophical, religious or mystical, to the extent that we adopt the scientific point of view concerning knowledge of the world. Once recognized that the best knowledge of the world is that produced by the sciences[3], philosophical doctrines no longer have any use, because at that moment the scientific general discourse takes science for granted and does not seek to found it philosophically, metaphysically, logically, or in any other way[4].

That said, it is true that Bunge wishes to inscribe his thought in the philosophical tradition, while we propose an interpretation of his thought that would rather place him in a metascientific framework. This metascience is not our own; it is inscribed in the work of Bunge. This metascientific mark in Bunge is not found in an isolated passage of a little-known article from a little-known journal; it runs through the whole work and structures Bunge's *magnum opus*, the *Treatise on Basic Philosophy*. It is then necessary to extract this metascience from Bunge's work, but to do so we

[2] Some of Bunge's leading scholars frequent this group, including Gustavo Romero, author of *Scientific Philosophy*. Although the group's exchanges are mostly in Spanish, we can express ourselves in English.

[3] For a defense of this position, known in philosophy as scientism, see in this issue the article by Andrés Pereyra Rabanal, "Scientism after its Discontents", as well as the chapter "Scientisme méthodologique" from *Sociologie fondamentale* by Dominique Raynaud (2021).

[4] Science essentially *produces conceptual* or *propositional* knowledge, but there is also *sensorimotor* knowledge and *perceptual* knowledge (Bunge 1983, p. 72, Romero 2018, p. 52).

cannot rely on Bunge's conception of his own thought since he tries to situate it within the limits of philosophy, while if we dwell on his results, it appears quite quickly that the Bungean discourse has nothing in common with philosophy but the name. Bunge's discourse about his own writings does not reflect the results achieved by his practice. In other words, if we focus on what Bunge does and not on what he says, it appears that his practice is moving away from philosophical practice. With regard to the Bungean ontology, we have demonstrated this in our article "What is Metascientific Ontology?" in this issue.

We will try in what follows to generalize this idea: doing does not follow saying in Bunge. We will first propose a metascientific reading grid of the *Treatise*. We will then put forward the idea that the Bungean approach is part of the process of naturalization of thought that goes back to the very beginning of modern science. Finally, this Bungean naturalization should not be confused with recent attempts at naturalization of metaphysics.

1 Metascience in the *Treatise*

Bunge has always defended the idea that philosophy should be practised *with* or *in* science, while supporting a traditional division of philosophical fields. Yet, with Bunge, philosophy is only about science, even if he claims something else. The situation is complicated because Bunge uses both the expressions "philosophy" and "philosophy of science", even though he does in his own way *only* philosophy of science or, even better, metascience. Thus, the title of his *magnum opus*, *Treatise on Basic Philosophy*, and titles of the volumes which compose it, *Semantics I* and *II*, *Ontology I* and *II*, *Epistemology and Methodology I*, *II* and *III*, this book III having for subtitle *Philosophy of Science and Technology*, then finally *Ethics*, suggest that he will expose a complete philosophical system composed of semantics, ontology and epistemology, to then develop a philosophy of science and technology, to finally crown it all with an ethical theory, which is indeed a traditional division of philosophy into theoretical philosophy and practical philosophy.

In fact, Bunge's semantics, ontology, and epistemology address, among other things, but not exclusively, problems that usually fall within philosophy of science, and the two volumes devoted to the philosophy of science extend and apply to physics, chemistry, psychology and the social sciences, the results obtained in the previous volumes. Thus, in these two volumes devoted to philosophy of science, Bunge discusses principles or postulates specific to the sciences he examines, principles that would not have been the subject of an

analysis in the first six volumes, such as the principle of correspondence in physics; he attempts to elucidate certain concepts that are the subject of debate, such as that of biological species, or he reports on scientific results using the concepts of the first six volumes, which means that it provides the sciences with a common vocabulary[5]. However, the results of the first six volumes of the *Treatise* were obtained by a reflection on the sciences and by an analysis of them. He thus practices from *the outset* a philosophy of science, which means that the expression "philosophy of science" is redundant in Bunge. In other words, Bunge does not propose a priori semantics, ontology or epistemology that would precede his philosophy of science. Bunge does not have a philosophical doctrine that would support its semantics, ontology, epistemology, philosophy of science, and ethics. Bunge deals only with science because his "philosophy", that is, his semantics, ontology, and epistemology, are designed from the beginning to account for science through the study of scientific constructs.

We then consider that the ethical theory of the *Treatise* is independent of the semantics, ontology and epistemology that precede it. For us, ethics, like axiology and praxeology, is part of a *general discourse of convivence* or living together, a discourse independent from a scientific general discourse (Maurice 2020). A metascience is not an attempt to bring together under the same name knowledge and convention. Moreover, Bunge does not establish any logical, philosophical, or metaphysical link between the ethics of volume 8 and the scientific general discourse that precedes it in the first seven volumes of the *Treatise*. If an ethics want to be reasonable, rational and humanistic, it will surely use results from science and metascience, which Bunge does not hesitate to do in volume 8 of the *Treatise* on ethics.

Thus, the apparent division of philosophy in Bunge does not reflect his practice. The real boundary lies between a scientific general discourse and a general discourse of convivence, two discourses that Bunge brings together, like philosophers, under the expression "philosophy", and this scientific general discourse in Bunge does not distinguish a "first philosophy" from a "philosophy of science" since this discourse is based on the same postulates as those of the sciences and is built on the conceptual results of the latter. Bunge does not question science, he studies it, in the same way that scientists do not question the world, they study it. One of the most striking examples is his refusal to postulate

[5] In fact, this vocabulary can be used in any rational and objective discourse, whether in technology, ethics, management, law, etc. For an example of the use of this vocabulary and associated concepts in the field of information technology, see in this issue the article by Roman Lukyanenko, Veda C. Storey, Oscar Pastor, "Foundations of Information Technology Based on Bunge's Systemist Philosophy of Reality".

metaphysical entities or properties, as we indicated in our previously mentioned article on Bungean ontology. Bunge relies on the sciences as to what exists.

In summary, the semantics, ontology, and epistemology from the first six volumes of the *Treatise* are *general metasciences*, while volume 7, which deals with physics, chemistry, biology, psychology, and sociology, exposes *particular metasciences*: metaphysics[6], metachemistry, metabiology, metapsychology and metasociology. This metascience, which lies at the heart of the *Treatise*, is the naturalization of human thought and the naturalization of the general discourse, a naturalization that should not be confused with the various attempts at naturalization in philosophy.

2 Naturalization of the General Discourse

Bunge's thinking is part of this long process of developing a reasonable, humanistic, rational, and practical approach to study the world, including human beings. This process was born at the end of the Middle Ages, gained momentum in the Renaissance, accelerated during the Scientific Revolution, and imposed itself in the Age of Enlightenment[7]. We are, of course, talking here about the birth and rise of modern science. As the factual sciences developed, general questions found themselves in the hands of philosophers, who steered questioning and results into a transcendent mode. Now, why didn't any thinker long before Bunge offer a non-philosophical approach to general discourse? We believe that science (and many other sectors of activity) was not mature enough before the nineteenth century to be able to see clearly. For example, physics as we know it today took shape in the early nineteenth century, during the period that some authors call the second scientific revolution (Cohen 2015, pp. 269-278, Kuhn 1961, Morus 2005, p. 6). It was during this same period that several other disciplines acquired individuality as well as autonomy through their divorce from natural philosophy, at least through their rejection of what was still transcendent in natural philosophy, in particular the search for a philosophical theory of matter which was to be the ontological foundation of all disciplines, like the vitalist one of Aristotle, or the mechanistic one of Descartes.

[6] We have redefined metaphysics as the metascience of physics. For details of our classification of the metasciences see our article "Metascience: for a Scientific General Discourse" (2020) published in the first issue of *Mɛtascience*.

[7] The Greeks had begun such a process, but it aborted at the end of the Hellenistic period or at the beginning of the Roman Empire. The history of the naturalization of human thought is told by Gaukroger in the first three volumes of his tetralogy *Science and the Shaping of Modernity* (Gaukroger 2006, 2010, 2016).

In other words, it is not possible to study an object if it is not well developed. For example, a star can only be studied once it has formed. On the other hand, we can study the formation of a star. In the same way, one could not study science in the manner of Bunge, metascientifically, before it had taken a certain form, the one that we have known about it since the second half of the 19th century. Everything that precedes this period is part of the formative period of science. Just as a protostar is studied in one way and a star is studied in another way, a protoscience is not studied in the same way as a science. This situation suggests that there are diachronic metasciences and synchronic metasciences. There is the study of the formation of scientific constructs through time and the study of scientific constructs at a given time. We must therefore pay attention to the idea, which we have also supported, that the history of science can serve as a "laboratory" for metasciences. A thorough reflection is necessary to clarify the meaning of this proposal, especially when we know that historical anecdotes or "case studies" have served just as well to defend a utopian vision of science as to affirm that anything goes in science.

The sciences, that is, the conceptual products of the sciences, but also the ways of thinking about the world, must have reached a certain stage of development to allow a metascience to be constituted. A metascientific is interested in the study of the *conceptual framework* of science at a given time or its changes over time[8]. We must be careful about using our analogy since a star is a concrete object and science is a construct. A concrete object changes because it is endowed with energy, while a construct is replaced by another. In the strict sense, a construct does not change. It should also be noted that it was not only the factual sciences that had to reach a certain level of development in order to allow the birth of the metasciences, but also the formal sciences. Like the sciences, the metasciences can use logic and mathematics to formalize ideas, but modern formal logic and mathematics most useful to metascience did not appear until the late nineteenth century, for example set theory and group theory[9].

Thus, general thinking in Bunge is part of this long process of naturalization of human thought, and by the same token of naturalization of knowledge of the world. How to think about the world in a natural way? Over the past few centuries, the factual sciences have focused on developing a way of *thinking about the natural world in a natural way*. In other words, it is not enough to discourse on

[8] On the Bungean notion of conceptual framework, see our article "What is Metascientific Ontology?" in this issue.

[9] For examples of formalization in metascience see the first four volumes of Bunge's *Treatise on Basic Philosophy* (1974a, 1974b, 1977, 1979).

the natural world for a discourse to be naturalized, since philosophical, religious, and mystical doctrines discuss the natural world in a transcendent framework. It is also necessary that the modes of thought of a discourse be natural, that they do not appeal to supernatural faculties that would give access to a transcendent reality more fundamental than the concrete reality, or that they do not appeal to non-standard methods such as philosophical intuition (whose nature varies from one doctrine to another).

That said, the modes of reasoning accepted in the formal sciences and factual sciences are not limited to logical and deductive reasoning, but also include investigative strategies, heuristics, analogies, methods, and techniques specific to each discipline, etc. On the other hand, even if science cannot be reduced to logic, there are logical conditions necessary for scientific activity and for any rational activity. Some fundamental principles and logical rules have been used for centuries, even millennia, without which any rational discourse would be impossible. We think of the principle of non-contradiction and inference by *modus ponens*: "Even if the works of logic are constantly progressing, the logical rules are stable: the syllogism ($p \subset q \subset r$) or the *modus ponens* ($p \supset q$, $p = q$) have never changed over time, and are as valid today as they were in Aristotle's time" (Raynaud 2021, p. 412). Another necessary condition for scientific activity, but this time empirical, is the confrontation of statements against the world. Here we see the two modes of naturalization at work in the factual sciences. The objects of study of the factual sciences must be *natural* or concrete objects, not "metaphysical objects", and the study of natural objects must be done with the help of *natural faculties*, such as reflection and reasoning, from which stem the use of proven standard rules, such as the confrontation of ideas with reality and the use of elementary logical rules. It is this union of the two modes of naturalization that was the great success of the scientific revolution and that characterizes the Bungean approach to general discourse.

This process of naturalization of knowledge has not been done in a linear way. Not only did the new scholars have to fight the Aristotelians, the Platonists, the Stoics, the scholastics, and some religious (not all, since many religious welcomed the idea of getting rid of Aristotle), they also had to debate among themselves the various possible approaches. Should they favor a very empirical, Bacon-style approach and collect only data? Should they favor a mathematical approach? A theoretical approach, but without mathematics? Should they trust experiments? Did the new instruments of observation, microscope, telescope, scale, etc. distort reality or did they help us to study it better? Are the classifications of natural objects or phenomena relevant? How to approach the human?

Study the body? Study the spirit? Both at the same time? Everything was on the table because (almost) everything had to be done. In the end, scientists favored an eclectic approach by adopting any technique or method that could help study the world. Scientists have long practised "methodological pluralism"[10], or, more simply, developed over time various ways of apprehending the world.

Thus, scientists have developed an approach to think about the world without appealing to transcendence, and now metascientists, following Bunge, can think about science and the world in general without appealing to transcendence. We can see Bunge's approach as the naturalization of the general discourse on the world and on science, but this naturalization does not constitute a reduction of the general discourse to the factual sciences, and even less to the natural sciences alone, as is the case for some naturalization projects in philosophy. It is not a question of transforming metascience into a factual science, as some philosophers have wanted to transform epistemology into psychology or ontology into physics. Metascientific ontology and epistemology, like philosophical ontology and epistemology, are not factual sciences. The former, because they study scientific constructs and not concrete objects, the latter, because they are interested in transcendent or metaphysical objects.

There is naturalization of general discourse in Bunge because there is a rejection of the unnatural way that philosophers think, and not because metascience studies natural or concrete objects. But this naturalization implies that there is an adoption of the general postulates of science from the outset. Again, metascience does not study the concrete objects of the world, but the constructs used by science to represent these objects. Metascientific results, in turn, make sense only if they are based on the same general assumptions on which scientific results are based[11]. Thus, metascience, like Bunge, thinks from a scientific point of view[12].

[10] In philosophy and the social sciences, methodological, epistemic or scientific pluralism is used to justify attacks on science on the pretext that science has a narrow view of scientific practice. Scientists did not wait for philosophers and gurus of cultural studies to diversify their ways of doing things. Even a cursory reading of the history of science shows that scientists, far from being conservative in their practices, are multiplying the ways of thinking about the world. Chemistry and biology, as well as psychology and the social sciences, could not have emerged from the dominant mechanistic paradigm of the seventeenth century without the existence of several modes of investigation and several criteria for evaluating ideas, including that of confronting them with reality.

[11] For examples of general postulates see our article "Metascience: for a Scientific General Discourse", published in *Mετascience*, n° 1-2020.

[12] A book by Bunge is entitled *From a Scientific Point of View* (2018).

General scientific or metascientific postulates are not *a priori* philosophical postulates, although the former are equated with the latter, which makes philosophers, including Bunge, say that scientists do philosophy without knowing it and, therefore, that science is based on philosophical postulates and that it is up to philosophers to analyze these postulates in order to ensure a true *foundation* for science. The general postulates of science and metascience are hypotheses that we make based on both our experience of the world, including our scientific experience of the world, and our reflections on it. These are non-testable assumptions, but they can be abandoned if they prove useless or frankly harmful to science. If we want to keep the notion of foundation, we can either characterize it by associating it with metascientific practice, and then metascientific research is foundational research, or, more prosaically, following Bunge, we can assert that the only foundation for scientific knowledge is reality.

We must specify that the reality in question is the concrete reality since among the philosophers who defend scientific realism and scientific metaphysics some affirm the existence of a metaphysical reality. Let us examine this new wave in the metaphysics of the sciences[13] to highlight the difference between this program of naturalization of metaphysics and that of a metascientific naturalization previously identified.

3 Naturalized Metaphysics?

Bunge's way of naturalizing general discourse differs from all the naturalization strategies that philosophers have resorted to. This is not surprising once one understands that Bunge does not believe in the existence of a metaphysical reality, a central aspect of Bunge's thought. Although Bunge formulates a conception of ontology or metaphysics in a similar way to philosophers, he differs from them in his practice, as we have shown in our article "What is Metascientific Ontology?" in this issue, a question to which we have returned in the first part of this article. His practice clearly demonstrates that he does not believe in any metaphysical reality and that he rejects all forms of transcendence. The rejection of a metaphysical reality implies that it cannot naturalize metaphysics using any of the naturalization strategies that philosophers have resorted to.

We will examine only one of these trends whose promoters have given it the name of *scientific metaphysics*. Bunge also uses this expression, notably in his article "Is Scientific Metaphysics Possible?" (1971), and we are interested in this

[13] The expression is from Soto (2015).

trend because in principle it represents what is closest to Bunge's scientific metaphysics when we compare only Bunge's description of metaphysics with the description made by the authors of this trend. The practice of each other will turn out to be very different. Our goal is not to make an in-depth critique of them, but to highlight the transcendent aspect of these doctrines, since they are, after all, philosophical doctrines, and to emphasize the difference in approach between the scientific metaphysics of these authors and the scientific metaphysics of Bunge. Hence, the same name can refer to really different activities.

In general, these philosophers do not question the existence of a metaphysical reality, unlike Bunge. The way to the naturalization of metaphysics is *using scientific results and practices to answer metaphysical questions*. This scientific metaphysics should not be confused here with philosophy *in* science examined in our article "When Philosophy is no Longer Philosophical" in this issue. The latter does, so to speak, the reverse of the new wave scientific metaphysics by *using philosophical methods to approach scientific problems*.

Thus, Kincaid, in the introduction to *Scientific Metaphysics*, briefly describes the conception of a scientific or naturalized metaphysics, a conception similar to what Bunge argues: "The thesis is that any legitimate metaphysics and conceptual analysis must be tied into the results and practices of the sciences." (Ross, Ladyman & Kincaid 2013, p. 1). This characterization is just as ambiguous as one of the characterizations used by Bunge: metaphysics *informed* by science. In our article "What is Metascientific Ontology?" in this issue, we have discussed what is vague in a characterization of metaphysics in general both in Bunge and in other authors. Here, we dwell on what is vague in a characterization of a scientific or naturalized metaphysics.

What does it mean to be "tied into the results and practices of the sciences"? Scientific results and practices are varied and diverse in nature. For example, in terms of practices, there are social practices, creative practices, methodological practices, heuristic practices, etc. With regard to scientific results, let us focus on two types among several: factual results and conceptual results. The results of an observation or experiment are factual results, such as the demonstration of the existence of atoms. Scientists also produce constructs, concepts, theories, classifications, etc., which form the conceptual results of science. Among thinkers of the different trends of naturalization in philosophy, it is not clear whether "being in agreement with science" or "being informed by science" refers to factual results, conceptual results, or both, or other types of results.

Kincaid is more accurate in his characterization of scientific metaphysics in the following passage. Scientific or naturalized metaphysics maintains:

> […] 1) an extreme scepticism about metaphysics when it is based on conceptual analysis tested against intuition, and about any alleged a priori truths that such intuitions and analyses might yield; and 2) the belief that scientific results and scientific methods can be successfully applied to some problems that could be called metaphysical. The conjunction of these two theses then provides some pressure for the stronger view that it is only by means of scientific results and scientific methods that metaphysical knowledge is possible, for it is not clear what third activity metaphysics might be if it is not conceptual analysis or scientifically inspired metaphysics. (Ross, Ladyman & Kincaid 2013, p. 3, our italics)

As for the first point, it is not enough to be skeptical, we must reject any approach that claims to appeal to a supernatural intuition to achieve a *priori* truths. The second point is just as problematic as the expression discussed above, although it is more precise. In the first place, we still do not know what "scientific results" refer to. Second, we don't know which "scientific methods" are used, especially since these methods (and the scientific results obtained by them) must address "metaphysical problems" or produce "metaphysical knowledge". But the meaning of "metaphysics" is unclear since no one understands what a metaphysical reality can be. If we exclude any form of *a priori* metaphysics based on a philosophical supernatural intuition, as this trend rightly requires, there is only one solution, that adopted by Bunge in his practice of metascience, to undertake analyses of scientific constructs (conceptual results), followed by metascientific syntheses (description, classification, contextualization, theorization).

If ontology is a conceptual science, then it does not study the *factual results* of science, but rather the constructs used and produced by science, such as a general postulate, a nomic statement (a law statement), a classification, a theory, etc. Care must be taken here not to confuse the conceptual analyses mentioned by Kincaid in the previous quote, with our conception of metascience as a conceptual science. If we paraphrase Kincaid, the results of *philosophical conceptual analyses* are tested using *philosophical intuition*, which would produce *a priori* truths. There is nothing more alien to the Bungean approach than this "method" that has never been proven. Bunge's conceptual analyses are not those of philosophers. Bunge uses his natural faculties and standard methods to think, and if metascience is a conceptual science it is because it studies scientific constructs and not because it engages in conceptual analyses of a philosophical type.

This vague characterization of scientific metaphysics would cause little harm if the results of the new wave scientific metaphysics were not transcendent. After all, Bunge's characterization is just as vague, but its practice is clear, and it produces thoughtful and reasonable results. Take as an example Ladyman and Ross, possibly the two most prominent philosophers of scientific metaphysics. They are the authors of *Every Thing Must Go: Metaphysics Naturalized* (2007), a widely cited work. The authors defend *ontic structural realism*, which "has become the most fashionable ontological framework for modern physics" (Kuhlmann 2012). This doctrine claims that the thing, the concrete object, does not exist hence the expression "*every thing*" and not "*everything*" in the title of the book. Quantum and relativistic theories would rather indicate that there is "modal structures" between "phenomena" that exist[14]. Yet, to my knowledge, even microphysics researchers interact with objects endowed with energy like those studied using particle accelerators. This does not prevent the authors from asserting that "[t]he history of science undermines not only materialism and classical views of space and time, but also the claim that science describes the true objects that lie beyond the phenomena". (Ladyman & Ross 2007, p. 106)

It is true that the classical conception of space and time no longer holds, but neither science nor the history of science undermines the existence of objects "beyond phenomena", an expression just as misleading as that of "external world", associated with the fundamental philosophical dichotomy between appearance and reality (see the next paragraph). The refutation of materialism is based according to these authors on the strategy of attaching to certain thinkers a classic and obsolete conception of matter or concrete objects. In a provocative style that we appreciate, the authors reject any "ontology of little things and microbangings" (Ladyman & Ross 2007, p. 4). We know that quantum objects are not small balls that collide with each other's (Bunge 2012, Lévy-Leblond 2003, 2006). In any case, even the objects accessible to our senses do not all obey the laws of classical mechanics: chemical substances, living organisms, social groups, etc. It is then easy to imagine that objects inaccessible to our senses may not obey these laws. The fact that objects do not obey the laws of classical mechanics, that they have properties that seem strange to us, and that we cannot form images of them does not imply that these objects do not exist or that they are unknowable.

[14] The notion of a phenomenon here is that of philosophy, that is, "phenomenon" is synonymous with "appearance", which appears to consciousness. For common sense and science, "phenomenon" is synonymous with "fact", what happens in the world.

In fact, from the outset, these objects inaccessible to our senses do not interest these authors, like most philosophers, since, according to them, the history of science and contemporary physics show that there are no objects beyond phenomena, beyond what is perceived by a conscious subject or beyond appearances. It is not the history of science or contemporary physics that prompts these authors to deny the existence of objects that interact with us, at least to be skeptical of their existence, but a fundamental philosophical position.

Ladyman and Ross, as philosophers, support the fundamental position of philosophy: they pose a dichotomy between appearance and reality. More precisely, as Raynaud put it well in another context, by "exploiting the idea that reality is not directly accessible" (Raynaud 2021, p. 419), that is to say by abusing an elementary observation, philosophers produce a fallacy that we have called the logicist fallacy (Maurice 2020). The absence of a *direct*, *necessary*, *metaphysical*, *logical,* or *philosophical* link between objects and what appears to consciousness makes philosophers suspicious of the existence of these objects. A classic formulation of this fallacy is that of Hume, taken up by the authors in the following passage:

> Scientific realism without a commitment to objective modality is unable to explain the success of science, because *there is no connection between unobservable entities and the phenomena we observe* other than constant conjunction in the actual world, and that doesn't explain anything. (Ladyman & Ross 2007, p. 123, our italics)

Since the authors claim to defend a variant of scientific realism and to explain the success of science, they must then reject the idea of constant conjunctions, because "that doesn't explain anything", but since the logicist fallacy excludes the existence of concrete, material stable links between objects and phenomena (what appears to consciousness), assuming that these objects exist since the history of science and contemporary physics would have demonstrated the nonexistence of these objects, they then postulate the existence of "objective modalities" or "modal structures" that would give structure to otherwise messy appearances. These relationships and structures are fundamental in the metaphysical universe of Ladyman and Ross:

> […] there is a minimal metaphysical commitment that we think structural realism must entail. This is that there are mind-independent modal relations between phenomena (both possible and actual), but these relations are not supervenient on the properties of unobservable objects and the

> external relations between them. Rather, this structure is ontologically basic. (Ladyman & Ross 2007, p. 128)

In other words, there would be a metaphysical reality independent of the mind that structures phenomena (what appears to consciousness). The structural, modal, physical or mathematical relations[15] of this metaphysical reality connect the phenomena that appear to consciousness in a nomic way. What, then, is the difference between postulating concrete objects to account for appearances and postulating structures to account for them? Why would these independent structures, postulated by these authors, would have a link with the appearances, while the unobservable concrete objects, postulated by scientists, would not? This "minimal metaphysics" is at odds with their fundamental philosophical position of separating reality from appearances. In short, concrete objects are replaced by immaterial entities on the basis of an arbitrary dichotomy between appearance and reality and a sophism that concludes that there are no links between concrete objects and phenomena they provoke in us.

If Ross and Ladyman didn't want to separate reality from appearances, they could simply change their conception of concrete objects! Instead of seeing them as marbles that collide with each other, they could include within concrete objects class all the objects studied by the sciences, from physics to sociology. But Ross and Ladyman argue that it is quantum theories and relativistic theories that indicate the existence of independent "structures". These theories do not attest to the existence of structures or even that of concrete objects. We cannot directly read these positions in these theories. It is through our experience of the world, including our experience of the world through science, and a reflection on this experience that we conclude to the existence of concrete objects in the same way that we conclude that there is no gap between reality and appearances.

We could try to defend the idea of concrete object by pointing out the fact that scientists reason in these terms. In fact, even the logico-mathematical formalism used by scientists is based on the notions of object and property (variable-object and predicate). However, the scientists' habits of thought and the thingness of formalism they use are not proof that they represent reality in the right way. On the other hand, our experience of the world and a reflection on it lead us to believe that scientific representations are adequate. If some people

[15] No one agrees on the nature of these relations and structures. Thus, Ross and Ladyman write: "What makes the structure physical and not mathematical? That is a question that we refuse to answer" (Ladyman & Ross 2007). See Ainsworth's article, "What Is Ontic Structural Realism?" (2010), for a critical account of two variants of ontic structural realism, while proposing a third.

feel that this approach is not adequate, then they have the burden of proof. In the same way that logical positivists have attempted to rewrite scientific proposals in observational terms, ontic structuralists must rewrite scientific statements in a new formal language in order to replace predicate logic, set theory, and mathematics used by scientists. The new community of researchers who will use this new formalism will have to produce new results, that is, results that the traditional approach does not produce, otherwise the new formalism risks being only a formal equivalent of the old formalism without saying anything new about reality.

Ross and Ladyman's approach is typical of some philosophical approach that consists of establishing *a priori* desiderata to which a metaphysical system will have to submit. This is an exercise in consistency. In this case, the authors want metaphysics freed from concrete objects, but realistic, naturalistic, objectivist and non-reductionist physicalist. By proceeding in this way, we can actually elaborate many fairly coherent metaphysics, such as that of Plato, Aristotle, Descartes, Berkeley, Kant, Hegel, etc. The outcome will depend on, among other things, the thinker's "philosophical intuition", how he conceives of "common sense" and "scientific reasoning", what he thinks are the right ways to argue, including what he allows himself to use among existing scientific and technological theories, such as the theory of evolution and information theory in the case of the two authors who interest us here. Ross and Ladyman fiercely criticize *a priori* metaphysics, but it seems that they themselves have fallen into the traps of analytic metaphysics. They wanted to get rid of all the things in the world, but they should have started by cleaning up their intellectual toolbox, starting by rejecting the philosophical dichotomy between appearances and reality, and accepting the metascientific dichotomy between formal and concrete objects.

Thus, for Ross and Ladyman, contemporary physics studies immaterial structures. In fact, physics have no choice since it had itself demonstrated that concrete objects do not exist and that it had challenged materialism by the same token. What can a "naturalization" of metaphysics mean in this context? What should we think of those philosophers who postulate the existence of immaterial entities and who claim to support "scientific realism"? All the more reason to drop the use of -isms, even if it means using paraphrase to make oneself understood.

4 Conclusion

We have shown that Bunge's major work is a metascience, not a philosophy. Bunge does not propose a first philosophy on which his research in philosophy of science would be based. On the contrary, from the outset, Bunge reasoned within a scientific framework that he did not question and that he did not seek to found.

But this is possible because by rejecting the dichotomy between appearance and reality, Bunge rejects by the same token what makes philosophy philosophical:

> In the philosophical tradition appearance is the opposite of reality. This is mistaken, for an appearance is a process occurring in the nervous system of some animal, hence it is just as much of a fact as an external event. Appearances constitute just facts of a special kind [...]. (Bunge 2003, p. 26)

Disagreement is not about direct access or not to reality, since we all admit it, philosophers, scientists, metascientists, and, indeed, anyone who thinks about the question that there is no such access[16]. Disagreement depends on the position taken to address what Dicken (2016) called the problem of coordination between objects and our conception of them, which will determine in which camp we are. If you are a philosopher, you will conclude that the lack of direct access to reality is a serious problem that alone justifies the philosophical project since its beginnings.

But, if we refuse the search for direct links between appearances and reality, especially associated with the rationalist project, or if we do not question the existence of objects or the knowledge of them, rather associated with the empiricist project, then there are no philosophical problems and by the same token there are no problems of foundation in science. On the other hand, there are metascientific problems. Thanks to Bunge's effort to naturalize the general thought, the philosophical general discourse was replaced by the scientific general discourse.

[16] It can be argued that a direct link exists since the facts outside the brain are causally related to it and that there is therefore an exchange of energy. In other words, there is a concrete direct link.

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