To appear in *Synthese*

The epistemic value of metaphysics

Raoni Wohnrath Arroyo · Jonas R. Becker Arenhart

Accepted: July 26, 2022

Abstract It is sometimes argued that, given its detachment from our current most successful science, analytic metaphysics has no *epistemic value* because it contributes nothing to our knowledge of reality. Relatedly, it is also argued that metaphysics properly constrained by science can avoid that problem. In this paper we argue, however, that given the *current* understanding of the relation between science and metaphysics, metaphysics *allegedly* constrained by science suffers the same fate as its unconstrained sister; that is, what is currently thought of as scientifically respectful metaphysics may end up also being without epistemic value. The core of our claim is that although much emphasis is put on the supposed difference between unconstrained analytic metaphysics, in opposition to scientifically constrained metaphysics, it is largely forgotten that no clear constraining relation of metaphysics by science is yet available.

Keywords Analytic metaphysics · Epistemology of metaphysics · Metaphysics of science · Scientific metaphysics · Value of metaphysics.

1 Introduction

The relation between analytic metaphysics and science has been the focus of a heated debate for some decades now, and, just as any metaphysical debate known to date, it has sparked unending controversy. The main issue of contention concerns the claim that metaphysics, if it is to be appropriately developed, must take our best science into account, and, unless that is done in the appropriate way, metaphysics has no value as a source of knowledge of reality (see Guay and Pradeu, 2020, for an interesting discussion and clarifications of the distinct positions on the field).

Now, friends and foes of metaphysics are undoubtedly willing to grant that science could have something significant to say to metaphysics. The hope is that by engaging metaphysical

Order of authorship does not represent priority; authors contributed equally to this work.

Raoni Wohnrath Arroyo
Centre for Logic, Epistemology and the History of Science, University of Campinas, Campinas, SP, Brazil.
Support: grant #2021/11381-1, São Paulo Research Foundation (FAPESP)
Research Group on Logic and Foundations of Science (CNPq), International Network on Foundations of Quantum Mechanics and Quantum Information
E-mail: rwarroyo@unicamp.br
Corresponding author

Jonas R. Becker Arenhart
Federal University of Santa Catarina, Department of Philosophy, Florianópolis–SC, Brazil
Federal University of Maranhão, Graduate Program in Philosophy
Research Group on Logic and Foundations of Science (CNPq), International Network on Foundations of Quantum Mechanics and Quantum Information
Partially funded by CNPq (National Council for Scientific and Technological Development) E-mail: jonas.becker2@gmail.com

investigation with science, one could somehow transfer some *epistemic warrant* from the latter to the former. The major difficulty, the cause of most concerns for those interested in this relation, is: *how* to do that? In other words: how to provide a proper relation between metaphysics and science in which metaphysics derives epistemic warrant from the fact that it is related to science? It is not as if this relation were available, and analytic metaphysicians had merely chosen to ignore it; rather, the most appropriate way to frame any such relation is just another major theme in metaphysics now (a methodological one, to be sure), one that, due to the absence of a clear relation between science and metaphysics, puts in doubt the credentials of analytic metaphysics as a legitimate contributor to the enterprise of gathering knowledge about reality. Currently, there seem to be no successful means to establish a relationship that somehow transfers the epistemic credentials of science to its accompanying metaphysics, and this awkward situation generates many quite understandable apprehensions (on the side of analytic metaphysics, naturally).

In this paper, we address some recent concerns precisely in this area, related to the value of doing *analytic metaphysics* and also the *metaphysics constrained by science*. This is a most crucial question, because it casts some light (or the shadows of doubt) on the discussion concerning the value of the metaphysics constrained by science too. We argue that discussing some of these issues requires that some important problems concerning the appropriate relationship between science and metaphysics are settled. This is an issue that, alas, is far from settled. So, why put so much pressure on analytic metaphysics, when there is no sign of an appropriate relation between metaphysics and science to begin with? The question, as typically put so far, is: what is the value of analytic metaphysics? Our provocative question in this paper is: what is the value of metaphysics of science, given *the current* understanding of the relation between science and metaphysics? It seems to us that, even for the current metaphysics that is thought of as properly related to science, given the current accounts of such a relation, if the same criteria as those used to judge unconstrained analytic metaphysics are employed, then, even what currently counts as scientifically respectful metaphysics will end up without a value, otherwise, a double standard is being applied to both senses of metaphysical inquiry.

The plan of the paper is as follows. In section 2, we present a short terminological discussion that shall help us bring our arguments to a clearer light. Given the lack of a unified terminology in metaphysics and in discussions about its methodology, we believe it useful to spell the intended meanings of terms like 'metaphysics of science', 'scientific metaphysics', and also spell the relation between metaphysics and scientific realism, given that this is prominent in the relation between metaphysics and science. In section 3, we present Amanda Bryant's (2020) claim that analytic metaphysics, when disengaged from science, does not have enough constraints to acquire epistemic warrant. This gives us the opportunity to discuss the kind of warrant attributed to metaphysics that is expected from science, in particular in the metaphysics engaged with (or constrained by) science. Bryant seems to take it for granted, but we argue that her arguments against unconstrained analytic metaphysics, if effective, may be used in the case of metaphysics of science as well. The problem is that the kinds of constraints advanced by Bryant are not enough to grant epistemic warrants of the kind expected. In section 4 we make a detour through a discussion by McKenzie (2020). Basically, McKenzie is skeptical that a metaphysics of science will be of much value unless we have the ultimate scientific theory available. The problem with actual metaphysics of science and scientific metaphysics is that metaphysical theories do not evolve along with science as science slowly progresses to a final theory; metaphysical theories are a matter of all or nothing (according to McKenzie), and either are attached to science, or else they are not, with no progressive improvement from theory to theory. We argue that such a complaint is fair, but it, by itself, presupposes that we have a clear answer to the question of how to attach a metaphysical theory to science in order to obtain some epistemic warrant, even if for the time being, for our provisional theories of the present. Unless we have solved that problem, then, we are unsure of whether the task will be valuable even for a final theory (and here we part ways with McKenzie). In section 5 we discuss in more detail claims that unrestricted analytic metaphysics is valuable, independently of such criticism, because it provides tools for philosophers of science concerned with metaphysics and issues of scientific realism. We conclude in section 6, by bringing together the elements of our discussion and by examining the kind of constraints that such literature puts on metaphysics if it is to be valuable.

2 The terminology

In this section we adapt terminology from Guay and Pradeu (2020) and from Arroyo and Arenhart (2019). Our goal is to both try to capture what is behind most uses of the terms involved in the discussion, and to grant terminological consistency throughout the rest of this paper. Obviously, others may use these terms with distinct meanings, but our primary concern is with the fact that most people use the terms interchangeably, so that confusion results that could be avoided by paying terminological issues some care.

The first important term here is *scientific metaphysics*. This is meant to describe a way to practice metaphysics, i.e., metaphysics that is attempted to be developed as departing somehow *from* data provided by science (scientific theories and concepts). Under this label fall such radical proposals such as attempts to *derive* or *extract* metaphysical lessons from science, as well as tailor made proposals, where metaphysical concepts are tailored to suit the purposes of a scientific theory, such as the proposals of a quantum version of modal realism and a new metaphysical nature of modality inspired by the many-worlds interpretation of quantum mechanics (see Wilson, 2020). In general, scientific metaphysics is the development of metaphysics directly engaged with science, looking to science and not to any metaphysical purpose accepted beforehand. If feasible, scientific metaphysics would fulfill the promise of a properly scientifically engaged metaphysics.

This promise, however, is still left at a very problematic level in current literature, given that it is not clear that any kind of epistemic credentials of science may be said to be involved in the metaphysical theory, unless the proposal is clearly articulated and can be evaluated by appeal to such credentials. Current literature is almost unanimous that any metaphysical doctrine, even those that are thought to be somehow extracted from science, will suffer from some kind of metaphysical underdetermination (see French, 2014). Indeed, given that the science itself that serves as a basis suffers from underdetermination in relation to the data, it is not surprising that the metaphysics that supposedly could get extracted from it would also suffer from such metaphysical underdetermination. We shall come back to the issue of metaphysical underdetermination later, but keep in mind that if we consider that metaphysics is an extra layer in relation to science, metaphysical underdetermination is guaranteed—whether or not we have other kinds of underdetermination (see also Arroyo and Arenhart, 2020).

Distinct from scientific metaphysics, we have the *metaphysics of science*: under this label falls the idea that a description in metaphysical terms (what is sometimes called 'metaphysical profiles') needs to be attributed to the entities that are said to exist according to a given scientific theory (the posits of the theory), and they provide for something like the metaphysical character of such posits. That is, one has scientific theories with their posits, and 'dress' those posits with metaphysical concepts that are *available beforehand*. This may be the appropriate place for a further terminological clarification: for the purposes of this paper, we reserve the term 'ontology' to deal with existence questions, so that the problem of how to extract the posits of a scientific theory is the matter of ontology (and we believe that this is a quite standard use of the term in Quinean tradition). 'Metaphysics' is a more general discipline, dealing with a wide plethora of problems, which include the nature of particulars, the nature of modality, the nature of properties, among others. With this terminology in hand, the task of metaphysics of science is to provide for a metaphysical description of the ontology of a scientific theory.

For instances of the problems with which metaphysics of science is concerned, one could consider: metaphysical characterization of modalities employed in the description of scientific laws, the metaphysical character of the wave-function in quantum mechanics (French, 2013), the metaphysical nature of consciousness in some dualist interpretations of quantum mechanics (Arroyo and Arenhart, 2019), the metaphysical status of objects in non-relativistic quantum mechanics—are they individuals or non-individuals? See French and Krause (2006) for the *locus classicus* of these discussions. What is really relevant for us here is that by imposing a metaphysical layer over the context of a scientific theory, this relation between metaphysics and science also does not grant any kind of direct epistemic justification to metaphysics, unless one has a good story about how such a justification flows from scientific theory to metaphysics. But this is exactly the problem of relating metaphysics productively to science. So the problem of connecting metaphysics and science once again rears its ugly head.

We remain neutral, so far, on whether any of these proposals has any kind of merit in attributing epistemic warrant to metaphysics. As we mentioned, spelling how this warrant could work is precisely the major challenge in the methodology of metaphysics. The plan is that such constraints imposed by science, if they exist, in any of the cases, do provide the required epistemic warrant, giving epistemic value to the accompanying metaphysics (making it a worthy pursuit), because metaphysics is then part of the enlightened search for the objective features of the world, attested by the uncontroversial material success of science. Nevertheless, as we mentioned, it is not clear that this is something we can already take for granted, and this is the major difficulty for the metaphysics of science. We shall comment more on this latter.

For most metaphysicians engaged with science, whether metaphysicians of science or scientific metaphysicians, the plan to grant value to metaphysics is similar. Given the posited entities of a scientific theory (i.e., its ontology), they intend to provide a metaphysical description of these posits, complementing or taking the scientific description to a deeper level. While scientific metaphysicians try to extract such metaphysical description from science itself (or at least the general guidelines for developing a tailored metaphysical theory), metaphysicians of science take such description from already existing metaphysics, and add it on the top of science. This requirement of complementing a scientific description of the world with a further metaphysical characterization is the way to address what is being called *Chakravartty's challenge*, and was advanced by Steven French (not by Anjan Chakravartty). The plan is that only once one has a metaphysical description of the posits of science does one have a clear enough picture, a picture that is worth the name of a realist picture of reality:

> But how do we obtain this clear picture? A simple answer would be, through physics which gives us a certain picture of the world as including particles, for example. But is this clear enough? Consider the further, but apparently obvious, question, are these particles individual objects, like chairs, tables, or people are? In answering this question, we need to supply, I maintain, or at least allude to, an appropriate metaphysics of individuality, and this exemplifies the general claim that in order to obtain Chakravartty's clear picture and hence obtain an appropriate realist understanding we need to provide an appropriate metaphysics. Those who reject any such need are either closet empiricists or 'ersatz' realists. (French, 2014, p. 48)

To sum up what is the major claim concerning the relation between metaphysics and science: metaphysical theories and research that is related to science are expected to derive epistemic credentials from this very relation, and are, due to these epistemic credentials, respectable and valuable as sources of information about reality. Metaphysics without such credentials is just deprived of epistemic warrant, and as such, fails in contributing to deliver objective knowledge of the world. Thus, despite the analytic metaphysicians' claims to the contrary, analytic metaphysics is not endowed with epistemic value (or, at least, this is what is said). Analytic metaphysics is the poor cousin of constrained metaphysics, and in the absence of any relation with science, has no epistemic value. The last resource, as we shall see, claimed by metaphysicians of science (and scientific metaphysicians alike, but to a lesser degree) to justify free range metaphysics (another term for metaphysics not attached to science) is its value as heuristics; the value of analytic metaphysics, if any, resides in its ability to incubate theories and concepts that may be useful for the philosophers dealing with the metaphysics of science in the future, given that this will spare them some of the efforts of creating these theories by themselves. We shall discuss the heuristic value of metaphysics in section 5. Before doing that, let us check what the arguments against the value of analytic metaphysics are, and whether they really fail to apply also to metaphysics of science and scientific metaphysics, as advertised.

Before we proceed, and given that here we are setting the stage for our discussion, this is the appropriate place to put on the table some of the underlying assumptions that are at work in the literature we are engaging with, and that we shall assume to be on power too. The first point concerns the very epistemic status of science. Given that the major aim of scientific metaphysicians and of metaphysics of science is to grant that metaphysics will inherit the epistemic credentials of science, such a privileged status must be granted to science. This is a common ground for those working in the field, which serves as an initial motivation since Ladyman and Ross' *Every Thing Must Go* (cf. Arenhart and Arroyo, 2021b), and we shall adopt the same starting point,

assuming that science has such epistemic credentials and wears them on its sleeves. That is, we will not question whether science actually has such credentials, list what they are (if they do, on scrutiny), and so on. In order to discuss the fruitfulness of the proposal of scientific metaphysics, we will proceed conditionally: if science has privileged epistemic credentials, then, metaphysics that could somehow inherit such warrant would be better off than metaphysics that does not benefit from such relation to science. Given this conditional, our analysis will then be restricted to the very *possibility* of such credentials being inherited metaphysics properly connected to science.[1]

Something similar happens to the discussion related to the unity of science and its impact on metaphysics connected to science: if science is (as it seems to be) disunified, how are we supposed to spell the influence of science in metaphysics? Should we accept a disunified metaphysics? Which theory or theories should we consider in order to inform our metaphysics? Physics is certainly the preferred candidate, but some could think of biology, or psychology. Probably, the resulting metaphysics would be different in each case, and the relation between metaphysics and science would be different in each case. Now, while those are problems for scientific metaphysicians and those willing to explore the metaphysics of science, they are typically not addressed in the more general methodological discussions concerning how to relate metaphysics and science. We grant that this is a challenge, but our focus in this paper is on the very idea of a connection between science and metaphysics, however that science can be (unified or not).[2]

3 The (lack of) value of free range metaphysics

In this section, we discuss Bryant's (2020) claims that free range metaphysics is poorly constrained by science, and as such, has no epistemic warrant (and, as a consequence, no value, except, perhaps, heuristic, as Bryant also acknowledges). Our suspicion, to be developed in this section, is that, contrary to what Bryant takes for granted, in the absence of a good explanation of how science constrains the valuable metaphysics, even what is considered so far as scientifically respectable metaphysics will fall into the valueless camp (and notice that, if that is the case, then it is hard to see how analytic metaphysics may have heuristic value to begin with, as we discuss later). In other words, unconstrained metaphysics, just as so-called constrained metaphysics, are on the same sinking boat; or so we shall argue. But first things first.

Bryant's (2020) major claims are simple to synthesize. 'Free range metaphysics' is meant to denote metaphysics not adequately constrained by science, and as such, devoid of epistemic warrant. By having no epistemic warrant, in its turn, it fails to establish anything close to a contribution to describing the fundamental features of objective reality (basically, the same conclusion drawn by Ladyman and Ross, 2007). As a consequence, it has no epistemic value. The failure of free range metaphysics is located in its lack of interaction with science:

> But in free range metaphysics, science plays a minimal role. In the construction of free range metaphysical theories, the institutional products of science—data, theories, books and journal articles—are not directly or explicitly appealed to. That is, free range metaphysics does not directly engage with science. (Bryant, 2020, p. 1869)

This kind of analytic metaphysics—free range—does not reach reality. Even if such a theory did, it would simply be impossible to determine whether this is the case. This is because the latitude of possible theories available, due to the inadequate number of constraints, is a symptom of the failure of epistemic constraints established with the help of science: "Lack of robust constraint is problematic if we assume that there is a unique, consistent, and limited set of metaphysical facts that we want our theory to target" (Bryant, 2020, p. 1871). In our attempt to describe the nature of fundamental reality in metaphysical terms, the lack of constraints allowing us to restrict the scope of our choice simply robs the theories available of any epistemic credibility, it seems. They just do not have enough constraints to attach to reality, and as such, float free in the thin air of metaphysical possibility.

[1] We would like to thank an anonymous referee for pointing that out.

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Following this line of reasoning, the problem, as advanced by Bryant, is that when so many candidates are on the table, and no scientific constraint on the number of options is available, no connection is made between the metaphysics and science, resulting that controversy reigns, and theory choice is simply impossible if the constraints are only those available to traditional analytic metaphysical theories: consistency, compatibility with intuition (intuitive plausibility), and simplicity, to mention but a few of them. The virtues that are available to judge the resulting theories, like consistency, simplicity, compatibility with intuition, and so on, are not enough to grant any kind of connection to objective reality, because they are easily satisfied by a too wide array of options:

> So imagine the range of theories that could, actually or potentially (with some manipulation of our intuitions), satisfy our requirement for simplicity, consistency, and intuitive plausibility. It's enormous. This indicates that the constraints on free range metaphysics are not jointly robust. And in some ways, the state of metaphysics reflects this. Though disagreement is a feature of most epistemic life—in the sciences, too—the deep and persistent disagreements that occur in free range metaphysics, and the sheer number of theoretical alternatives on offer for each subject matter, are symptoms of this insufficient constraint. So the constraints on free range metaphysics, both individually and jointly, fail to be sufficiently robust or to secure epistemic warrant. Therefore free range metaphysics is epistemically inadequate. (Bryant, 2020, p. 1880)

The suggestion, in the end, is that free range metaphysicians should stop seeing themselves as contributing to a description of the nature of fundamental reality. In the absence of epistemic warrant, keeping this kind of expectation amounts to a case of *bad faith*. There is perhaps only a heuristic role for analytic metaphysicians left, in providing tools for metaphysicians of science, but we shall comment on that in section 5. Such theories simply have no epistemic warrant, *in clear opposition to scientifically constrained metaphysical theories*.

What is relevant now is the implicit supposition by Bryant that, in opposition to analytic metaphysics (the free range metaphysics), *metaphysics constrained by science is epistemically justified*, or, at least, may have something like epistemic warrant derived by this engagement with science. Is *this* claim warranted? What are the constraints that would attribute any special kind of epistemic warrant to metaphysics related to science? What role does science play in this attribution of an epistemic warrant?

In the absence of any kind of precise explanation of how to understand the relation between metaphysics and science, there is simply no specific case of how metaphysics derives any kind of epistemic warrant from science. This leaves metaphysics of science and scientific metaphysics' claims unwarranted, or, at least, leaves it as (un)warranted as the claims found in analytic metaphysics. Should these metaphysicians working in connection to science also be seen as exhibiting bad faith? Or perhaps as fooling themselves to be dealing with objective features of the world, when they are not? The problem is that the set of constraints imposed by Bryant on a scientifically respectable metaphysics (the mentioning of institutional products of science, such as the papers and books of science literature, scientific data, etc.) is not enough to separate good from bad metaphysics—if such separation is warranted, after all. Let us expand on that claim.

The first part of our claim is that most of the time, all we have to constrain respectable metaphysics (i.e. the one connected with science) is precisely the same set of constraints of analytic metaphysics. Metaphysical theories, analytic or not, are then in the same boat when it comes to discussing constraints that shape theory choice. Here, we consider metaphysics that is developed in close connection with science, for instance, quantum mechanics, and would count as warranted by Bryant's requirements. To have a clear example in mind, consider the specific discussion—which is quite representative of discussions in this field—on the metaphysics of individuality in quantum mechanics by Morganti (2015, Sec. 14.3), where a table listing the many virtues of metaphysical theories under evaluation, and how each of those theories scores in each virtue is registered. There, Morganti considers which one, among the most prominent theories on the nature of particulars, should one choose to describe the metaphysical nature of quantum particles, in the face of indiscernibility of quanta. The choice of a theory of individuality, as illustrated and discussed by Morganti, will have to take into account precisely the virtues that Bryant took as ill-suited to grant epistemic warrant—even though it considers some fit with the evidence as part

of the evaluation process (which in the case of metaphysical theories will have to be understood in a very relaxed manner). In this sense, it seems that such virtues are all we have in the case of theory choice, even in respectable metaphysics of science, and Morganti makes this very explicit: one must check how such theories of individuality score on these virtues, and choose the one that scores best on the virtues assumed to be most important (this may vary from author to author, but that is just as it should be).

What this indicates is that scientific metaphysics and metaphysics of science, so far, has no special constraint on theory choice that 'pure' analytic metaphysics does not have. The fact that a metaphysical theory, at least on what concerns the theory of individuality, is related to quantum mechanics, does not seem to impose further restrictions on the field of available theories. One just cannot perform an experiment and decide which metaphysical view to adopt, even because metaphysical theories are easily adjustable to fit the evidence, when that comes into account—witness the debate on the Principle of Identity of Indiscernible in quantum mechanics, which was once thought definitely refuted by the theory, then saved in a weaker form involving weak discernibility, and now, it seems, is thought by some to hold in a most straightforward sense; see French and Krause (2006, Chapter 4), and also Friebe (2014) for a recent discussion. In other words, in many cases, there is nothing special to the metaphysics of science that distinguishes the choice of theories in the context of metaphysics of science from the choice of theory in the context of analytic metaphysics. The kinds of constraints are the same. So, as we mentioned, *if* this is bad news for analytic metaphysics, it should be bad news for metaphysics of science *too*. Other examples concerning the metaphysics of science would illustrate this as well, such as the metaphysics of properties and relations in the context of structural realism (see the discussion of metaphysical virtues of tropes in Esfeld and Lam, 2011).

On the other hand, mentioning the institutional products of science, as recommended by Bryant as a source of the constraint of metaphysics, is not always a sign that the accompanying metaphysics is effectively engaged with science in a way that may properly allow one to derive epistemic warrant from it. Consider, for instance, the metaphysical theory developed in Lowe (2006) (which, by the way, is one of the targets of Ladyman and Ross in (2007) as a prototype of metaphysics *disengaged* from science). Lowe is openly and admittedly providing for an *a priori* case of metaphysical theory, putting metaphysics first, with no need to address the constraints of science (rather, science is constrained by metaphysics, in Lowe's view). Although he mentions data from science (among them, particle identity and individuality again!), there is no expectation that science will work as providing evidence for any specific metaphysical theory in any sense; rather, it is expected that the metaphysical theory provides the basis for science, whatever it is current or future science. In this sense, the theory has no constraints by science, thus, it is free range. But, according to Bryant's account, it has some constraints, because it attempts to describe how some information of science fits into the metaphysics. In this sense, the constraints, at least as they are presented, are so relaxed that probably any metaphysical theory would pass the test and count as scientifically respectable.

These cases are enough to make it clear that, contrarily to what Bryant suggests, there does not seem to exist any well-determined constraint that a respectable metaphysical theory ought to obey, if we are to follow only the set of constraints she suggests. In this sense, if we stick to Bryant's relaxed restrictions on a scientifically respectable metaphysics, what will result is that metaphysics of science (and scientific metaphysics) is just as unconstrained as any analytic metaphysics, or, perhaps, that analytic metaphysics is just as scientifically constrained as any respectable metaphysics. The distinction, at least on what concerns the epistemic credentials, makes no sense anymore. We believe that Bryant has advanced such a relaxed criterion of metaphysical theory constraint because, so far as we know, no other is available, there is no clear theory of decent metaphysical involvement with science, except the one that, as Morganti (2015) (among many others) advanced, requires that we choose a theory based on its pragmatic virtues. Unfortunately, this is precisely what Bryant thinks is not enough to do the required job. Apart from that, there are known attempts to use science as a guide to metaphysics, but this is mainly a negative guide, i.e., it tells that certain metaphysical devices are incompatible with certain scientific devices (see Hawley, 2006; Arroyo and Arenhart, 2019; Arenhart and Arroyo, 2021a).

A further worry one may have is: any kind of profitable relation between metaphysics and science depends on us having the adequate scientific theory, which will only be available when we

have the final theory. Perhaps the final theory will come with more constraints, so that a definite metaphysical picture is more clearly attached to it. Could it be so? This is the topic of the next section.

4 The (lack of) value of a metaphysics of the final theory

Let us suppose, for the sake of argument, that the metaphysics developed in connection to science is epistemically valuable. McKenzie (2020) argues for the pessimistic conclusion that any metaphysical theory, if it is to have any value in establishing the truth about fundamental reality, would have to wait for the final theory of science (she deals only with the case of physics, which is more concerned with the fundamental level of reality, and that is fine for our purposes). The problem advanced by McKenzie, in a nutshell, is that while one may agree that doing metaphysics related to science may be valuable from an epistemic point of view, science is not stable, it progresses by presenting us constantly new views of the world. This is good for science in general, and for scientific realists in particular, as long as a kind of principle of correspondence holds: old theories, or at least parts of them, are preserved as limiting cases of the newer theories. Progress in science consists in the retention of successful parts of older theories. However, the same cannot be said about metaphysical theories that are connected with scientific theories (however *that* is understood). Metaphysical theories are not related with truth in distinct degrees, but are a matter of *all or nothing*, according to McKenzie (and we follow her on that issue). There is no principle of correspondence in metaphysics, so that metaphysical theories related to science of the past are partially preserved in the metaphysics of current science, which would ensure that, as we progressively approach the final scientific theory, we also progressively approach the final metaphysical theory.

The argument advanced by McKenzie (2020) presents detailed discussions of some case studies of how metaphysical theory change is radical. That casts many doubts on the metaphysics of science when it is performed with current scientific theories. As McKenzie (2020, p. 5) puts it, analytic metaphysics is without epistemic value in great measure because it addresses false science; well, current constrained metaphysics, if there is such a thing, is also valueless, because it addresses physical theories that are not the final one. The final physical theory will overcome current physics, and our metaphysics should address the final theory, if it is supposed to be an attempt to aim at the objective truth. The problem is that even current attempts at doing metaphysics related to science are in danger of being valueless, given that it does not address the appropriate "final" physics.

The challenge, as per McKenzie, is distinct from the one presented by Bryant. While Bryant challenged current *disengaged* metaphysics, McKenzie challenges even current engaged metaphysics, which is performed over a scientific theory that is not the final one (and we may rest assured that the theories we have are not the final, according to McKenzie, because they are not unified yet, for instance). However, what goes unchallenged even by McKenzie is, perhaps, *that one could advance the metaphysics related and constrained by our final physical theory.* That could, at least in principle, be valuable due to its appropriate scientific warrant.

We claim, however, that most of the challenges to current attempts to relate science and metaphysics in an appropriate way do not depend on our having a final theory of physics, but rather on a previous difficulty of spelling the kind of relation itself, given that it is this relation between physics and metaphysics that will confer epistemic warrant to metaphysics. It is not obvious that when we reach a final physical theory (if we ever do), we will be able to connect a metaphysical theory to it in the appropriate way and benefit from this relation to gain the corresponding knowledge about reality. So, in this sense, McKenzie has been willing to concede, at least for the sake of argument, a much more optimistic role to the final theory in its relation to metaphysics than we are (even if that optimism is no relief for current metaphysicians). On the other hand, if we investigate the relation of metaphysics with current science, we may discover something important on epistemic warrant transfer. This, of course, is what most people in the area have been attempting to do, with no clear success. Unless this is done, even in the face of a final theory, the possibility of success of a final metaphysics in deriving any kind of epistemic warrant from physics may be doomed.

One of the main difficulties for metaphysics engaged with science, in the face of a final theory of physics, is precisely the same kind of problem raised by Bryant for analytic metaphysics, and that we discussed in the previous section. It is very likely that, just as it happens to current science, the science we may have in the future will not contribute to restricting the number of available candidates metaphysical theories able to metaphysically 'dress' the posits of a final science. The restrictions imposed by science, whether they are the current or the final theory, over metaphysical theories are just too indirect to provide for a single or preferred candidate metaphysical theory, and even in the face of the final physical theory, theory choice in metaphysics will also have to proceed in terms that, as Bryant mentioned, are not at all favorable to conduce to the required epistemic warrant. In this sense, even a final theory in science would not improve our condition in relation to metaphysical theory choice.

This problematic situation may be better illustrated (and this case could have been made also in our discussion of Bryant's case) by what has been recently called 'metaphysical underdetermination', the claim that sciences underdetermine our best metaphysical theories—see French and Krause (2006, chap. 4) and French (2014). First of all, current science is underdetermined by the data: distinct theories are available to account for the same data. A simple example concerns the distinct interpretations of quantum mechanics. [3] This, as noted by Callender (2020, p. 75), is a pressing issue and the "nightmare" for scientific realists. Distinct interpretations are available which populate the world with distinct sets of posits which, certainly, would give rise to distinct families of candidate metaphysics. Consider the kind of metaphysics that would accompany Bohmian mechanics, Many-worlds interpretations, and wave function realism, to have a nice case of metaphysical underdetermination. That is, following the terminology of section 2, each of the interpretations would postulate a distinct furniture for the world, and each such furniture would require distinct metaphysical profiles. Now, focus on a single interpretation, let us say, wave-function realism. It posits wave function as the fundamental entity. However, in order to have an accompanying metaphysics, one needs to dress this posit in metaphysical terms. Well, even this single posit has more than one metaphysical counterpart (see French, 2013, for discussion). That is, the fact that a metaphysics is engaged with science is not enough to grant epistemic warrant for the metaphysics. The discussion on the distinct metaphysical profiles, and on the superiority of one over another would have to follow a discussion on the virtues that Bryant finds inadequate to grant epistemic warrant. That is: science plays no special role in this case of metaphysical theory choice, given our lack of a special relationship between the scientific and the metaphysical theory.

If metaphysics does indeed have a higher level of generality than science (or, say, fundamental physics), then in fact metaphysical underdetermination is not a problem (but notice that this would already bring metaphysics a degree of independence from science that is not being discussed here). It only becomes a problem when it is assumed that we should use science as a guide to metaphysics (and not metaphysics as a guide to science). When we can associate to the same scientific theory metaphysically distinct and incompatible accounts, we have a problem with not knowing which of the alternatives is, in fact, continuous with science in some privileged sense. The case of metaphysical underdetermination in the (non-)individuality of quantum particles poses the question in a very specific way: both are compatible with quantum theory, so, which one should we choose in the light of what quantum mechanics tells us about reality? Here, the

[3] There is general confusion about how to classify alternatives to understand quantum phenomena, whether they are *interpretations* or *theories*. For greater precision, we refer to the passage by Dürr and Lazarovici (2020), who convincingly pose the question in terms of "different quantum theories", rather than mere "interpretations":

> It is common practice to speak about these as three possible "interpretations" of quantum mechanics. But the term "interpretation" is inappropriate. A poem is interpreted if you want to elicit some deeper meaning from the allegorical language. However, physical theories are not formulated in allegories, but with precise mathematical laws, and these are not interpreted, but analysed. So the goal of physics must be to formulate theories that are so clear and precise that any form of interpretation—what was the author trying to say there?—is superfluous. (Dürr and Lazarovici, 2020, p. vii)

However, this is a considerably new terminology, which is not yet standard (see also Arroyo and da Silva, 2021; Muller, 2015). For this reason, we will keep the term "interpretation" in the rest of the text. Nothing specific in our argument depends on deciding this issue.

problem acquires an even more acute nature, as related to scientific realism, a position typically assumed by those willing to connect science with a metaphysical description of reality, as required by Chakravartty challenge, already mentioned. If our best theories should be able to tell us what the world is like, and if metaphysics is continuous with/derived from science, then we have the problem of not being able to specify which metaphysics, in content, this is. After all, the world is supposed to be one, and it must be described by a scientific theory with a corresponding (scientific) metaphysics. Not being able to specify the content of such scientific metaphysics, underdetermination presents itself not as a feature but as a bug for those linking metaphysics and scientific realism.[4]

The point we would like to stress here is that the situation involving metaphysical underdetermination for current science is very likely to appear also for the final theory. Our lack of epistemic warrant for metaphysics does not improve by the fact that the scientific theory is the final one. This casts a shadow of doubt on the not-so-pessimistic place that McKenzie attributes to the final theory in the relation with metaphysics. There is no reason to believe that the final theory will restrict the scope of metaphysical theories available that are compatible with the theory and may be added on the top of the posits of the theory. In this sense, given the assumption that restriction of the scope of metaphysical theories available would cope with attributing epistemic warrant, metaphysical underdetermination is a clear sign that this restriction is not going to happen. Nothing in a physical theory, *even the final one*, is likely to solve problems such as which theory of individuality we should choose, or which theory of properties and relations (universals, tropes…) is more appropriate, or specify the nature of possible worlds, and so on. Our epistemic situation, on what concerns the attribution of metaphysical profiles, will hardly improve due to physical constraints, because such constraints seem to have little impact on the metaphysical problems we need to address.

What results of these discussions is that in the absence of an appropriate relation between metaphysics and science, not even the final theory could help us borrow epistemic warrant from science to metaphysics. This puts McKenzie in the same boat as Bryant. Both take for granted that the existence of such a relation is not problematic. However, as we have argued, the lack of an appropriate connection between science and metaphysics means that complaints about analytic metaphysics also fall on what is considered to be a scientifically respectable metaphysics; or, perhaps, this lack of such a relation grants, unwillingly, epistemic warrant to analytic metaphysics.

One might wonder whether reducing ontological commitments, as suggested by eliminativist versions of structural realism, for instance, would be the solution to this problem (see French, 2014, chap.2). After all, by attempting to adhere only to naturalized options in ontology that postulate a minimal furniture of the world could be a way to cut down the number of posits which require metaphysical clothing, promising better prospects of engagement with science when it comes to offering such metaphysical profiles. The argument suggests that a metaphysical underdetermination with two options is epistemically preferable to one with three, say. But this will not improve the situation in two ways. Let's start with the first: metaphysics is metaphysics! The question that remains is: how would we describe such ontological commitments (albeit reduced) in terms of metaphysics? This is a rhetorical question because in any case, this description is metaphysical and does not come from science. To maintain Bryant's analogy, be it free range or cooped, a chicken is still a chicken. The second point: underdetermination is underdetermination! And even a naturalized ontology, metaphysically dressed, is subject to a pessimistic metainduction. We know that today some reductionist versions of physicalism are not compatible with an interpretation of quantum mechanics (see Arroyo and Arenhart, 2019), but tomorrow that interpretation may become false and reductionist physicalism may be an option again. In any case, the difference between analytic metaphysics and metaphysics of science is straightforwardly put as its constraining relation with science: the latter have and the former doesn't. Thus, the metaphysics of science has at least an extra constraint. The question is whether this constraint grants epistemic value, and this is what one cannot see coming in the moment.

[4] We would like to thank an anonymous referee for pointing that out.

5 The (lack of) value of metaphysics as heuristics

Perhaps what is common to most criticisms on the epistemic status of analytic metaphysics, such as McKenzie (2020) and Bryant (2020), just as Le Bihan and Barton (2018), is that they all see another possible way to attribute epistemic value to analytic metaphysics by connecting it to science: as a toolbox for metaphysicians of science. The argument relies on the possibility of providing tools for those metaphysicians analyzing science. This, as we mentioned, works basically through an attempt to answer to the aforementioned Chakravartty's challenge, in which metaphysicians of science pick in the analytic metaphysics literature the metaphysical concepts with which to dress the posits of science. This approach is also defended by French (2014, 2019), but with a different terminology: he calls it the 'Viking Approach' to metaphysics. French and McKenzie (2012, 2015), and Morganti and Tahko (2017) maintain a 'Toolbox' terminology: analytic metaphysics provides the toolbox for metaphysicians of science (see also French, 2018). Both approaches, despite the branding differences, are essentially similar: they defend that the free development of metaphysics is epistemically granted in virtue of its (eventual) usefulness to interpret science in metaphysical terms, and this usefulness is cashed out in *epistemic* terms, e.g. as providing understanding.

The plan seems to be rather simple. Given the realist thesis that successful science indicates the furniture of the world, and that, according to Chakravartty's challenge, having those posits is not enough for a completely realist picture, one needs to complement the description with a metaphysical profile. This, of course, is part of what we have described as 'metaphysics of science' in section 2. The metaphysical profile is an addition of metaphysical concepts on the top of the ontological posits, a move needed to satisfy the demands of Chakravartty's challenge on the very idea of scientific realism. These concepts are thought of as borrowed from the analytic metaphysics literature; as a result, such metaphysical tools are crucial. *This* is the relevance of having analytic metaphysics alive and running: it may be useful in the future. The situation is not so clear for scientific metaphysics, which attempts to somehow extract the metaphysics from physics. Unless one may come with a clear picture for how that is to be done, metaphysics of science is, so far, the most promising way to relate science and metaphysics (we leave it open whether a different story may be told for scientific metaphysics, of course, but the main difficulty is that science does not wear its metaphysics on its sleeves, so that the prospects for the view are not good).[5] As Le Bihan and Barton put it, when it comes to metaphysics of science (although they don't use this terminology, for sure):

> Ladyman and Ross and [French and McKenzie] provide many examples of analytic metaphysical theories that discount scientific knowledge although they intend to describe entities about which we have contradictory scientific knowledge; in these cases, analytic metaphysics fails to describe reality and as a consequence, is not valuable, at least when it comes to the value related to adequate descriptions of the world. However, the heuristic justification by [French and McKenzie] suggests that analytic metaphysics has, or may have in the future a different kind of value, namely *heuristic value*. At this point, one may ask whether a potential future heuristic value of analytic metaphysics grants its actual present value *simpliciter*. There are two possible answers to this question but, as we shall see, the two answers lead to the same practical consequences: analytic metaphysics should not be discontinued. (Le Bihan and Barton, 2018, p. 12, original emphasis)

There is much to be discussed in this quotation that concerns our topic. To begin, we find the claim that analytic metaphysics could come up with theories that are contradicted by actual

[5] Concerning metaphysical underdetermination, the Viking/Toolbox approach may have an apparent way out: we can verify in traditional metaphysics metaphysical contents that are useful for science in both cases, both for individuality and non-individuality (cf. Arenhart, 2017b); in the first case, we can point to a transcendental principle of individuality, e.g. haecceities, and in the latter case absence of the haecceities (cf. Caulton, 2022, 581–582). In all cases, it is appropriate to recall the commitment of those advancing such connections of metaphysics and science to the thesis of scientific realism. In the case of the Viking/Toolbox approach, it is notable that its own proponents (cf. McKenzie, 2016; French, 2014, 2020a) have taken metaphysical underdetermination as a motivation for adopting structural realism —which also suffers from metaphysical underdeterminations about the concept of 'structure', (cf. French, 2020b). We would like to thank an anonymous referee for pointing that out.

science. That may be understood in two distinct senses. First, in the sense that metaphysical theories present descriptions of the functioning of reality that rival the descriptions offered by scientific theories. But that makes little sense in the light of the Viking or Toolbox pictures, according to which metaphysics is applied on the top of science. Metaphysics, in this picture, is not a rival to science (it does not present a rival description of reality), but *adds* to the already available description of reality advanced by science (see also the discussion in Bennett, 2014). Then the most reasonable interpretation of the passage is that some metaphysical theories just cannot fit with current science (the Viking cannot plunder the corresponding metaphysical concepts and hope to use them in his science, due to incompatibility). If that is what being is said, Le Bihan and Barton suggest that whenever this happens, metaphysics is not valuable as a description of reality (because science contradicts it), and, still, it is also said that metaphysics (perhaps another metaphysical theory not discarded yet?) is valuable because of its *heuristic value*. It may be applied in future science, and this leaves it open whether such metaphysics is valuable now, or will be valued in the future, but, anyway, the authors think, metaphysics is usable and, therefore, has value.

The plan is that even being incompatible with current science, metaphysical theories may be compatible with scientific theories in the future. This brings many difficulties. The fact that some metaphysics is usable, or will be used in a scientific theory, does not grant the epistemic warrant that is thought to confer value to a metaphysical theory: distinct and incompatible metaphysical theories may be employed with science (metaphysical underdetermination haunts again). The future usability of one theory does not, by itself, place enough constraints to ensure epistemic warrant for these theories (to bring a concern raised by Bryant). And, given that Le Bihan and Barton (2018, p. 2) are willing to concede, if only for the sake of argument, that Ladyman and Ross (2007) could be "right that analytic metaphysics lacks any intrinsic value when it comes to the truth", it seems strange that the attempt to confer value to metaphysics comes from applications in future scientific theories: will not the lack of relation to the truth also appear in future uses of metaphysics? Given that we are looking for the truth, and that metaphysical underdetermination prevents precisely that, it is difficult to see how the expectation that some metaphysical theory will apply to science in the future can give some value to metaphysics in the present.

It seems that the core of the problem concerns the relation between having some value for us and its capability of achieving truth. Given our goals of describing reality and the ambitions of metaphysical theories of grasping the fundamental nature of reality, it seems, having epistemic value is closely connected with the capability of being true. As a result, one that dissociates metaphysics from truth needs no such kind of motivation to grant the value of metaphysics (see Benovsky, 2016, for one such proposal). Recall that Bryant (2020) and McKenzie (2020) attack the credentials of analytic metaphysics due to its lack of connection to the truth. Failing any possibility to connect metaphysical theories with truth, these theories lose interest and value when it is the description of reality that we are seeking—see again our quote of Bryant (2020, p. 1871), when she claims that "we assume that there is a unique, consistent, and limited set of metaphysical facts that we want our theory to target". In this sense, a dubious future purchase value seems too little to guarantee value to metaphysics now, and, as we have seen, our discussion with Bryant and McKenzie provided some reasons to doubt even that there is epistemic value to found for metaphysics of science in the future.

These considerations may address worries that metaphysical underdetermination is not a threat to the fact that some metaphysical theories may indeed reach the truth, but only that it poses a problem for theory choice. That is, it could be suggested that, although we cannot choose the proper theory by eventually applying whatever constraints provided by science, it still may be the case that some of the metaphysical theories may be true. This argument, however, cuts no ice in the present case, given the expectations for a realist approach to science and metaphysics. Indeed, one allowing that the proper theory of metaphysics may be achieved by sheer chance (or a lucky guess), or even by purely metaphysical means, would not bother to seek to grant epistemic warrant for a relationship between metaphysics and science. That is, underdetermination is indeed a threat for those expecting to obtain scientific endorsement for a metaphysical view.

It is worth noting that this allegedly heuristic value is linked with a (vague) notion of 'understanding'. At least in the Viking/Toolbox approach, the desideratum of the (metaphysical) clear picture demanded by Chakravartty's challenge is to give a necessary degree of understanding of the scientific theory, so the philosopher of science can claim a realist attitude towards such theory. It is precisely in this claim of enhancing the understanding (to the point of enabling one's scientific-realist stance) that lies the value of metaphysics. So to say something like 'an electron is not an individual' is not true in the same sense of the proposition 'the electron has spin-$\frac{1}{2}$', but rather furnishes a whole new degree of understanding towards the electron as an entity. We would totally agree with that if metaphysics were determined by science, but as it floats free from it there are no prospects of doing so: metaphysical underdetermination is taken for granted from the start! The real situation in which we find ourselves is precisely this one: we can understand electrons as being individuals and non-individuals (see French and Krause, 2006). So it seems that we did not gain any understanding by couching metaphysics in terms of understanding because of its disengagement with science—which can be and has been cashed out in terms of truth values by the scientific realist traditions. In the numerous scientific realist stances, the common factor is to consider that science has an epistemic goal e.g. knowledge of the actual world, and this goal is cashed out in alethic terms, e.g., scientific theories display knowledge about the actual world because they are true in some sense. But when it comes to the metaphysics of science the goal is not straightforward. Chakravartty (2017) for instance argues that the kind of metaphysics done by fleshing out the metaphysical possibilities that might describe the world given the scientifically warranted facts is not an epistemic goal: metaphysics of science done in this way doesn't bear any epistemic value by itself, but only when taking into account empirical facts given by science, the difference in the epistemic warrant between science and metaphysics bears on the distinction between the empirical and non-empirical, which is a weak one (Chakravartty, 2013). For Chakravartty, metaphysics should have epistemic value on its own, by having prospects to achieve the goal of giving us knowledge about the world *independently* of its being or not being tethered with science. How this should be done, unfortunately, is up for grabs, as we have been arguing.

But there is a further possibility of making the heuristic role of metaphysics clearer. It comes from a widely employed analogy between free range metaphysics and pure mathematics. Just as pure mathematics provides, eventually, the mathematical tools for empirical science, and this usefulness justifies that pure mathematics should not be discontinued, analytic metaphysics is also worth the effort, because it may provide the tools for the metaphysicians of science in the present and in the future (the Viking and the Toolbox images are important here). This has been developed in many places. Consider Morganti and Tahko:

> [...] a priori metaphysics has roughly the same level of independence as pure mathematics, and is similarly relevant for empirical science, in the sense that it is able to become more than a purely abstract exercise in possibility space. (Morganti and Tahko, 2017, p. 2579)

That is, analytic metaphysics is likely to be useful for empirical science, just as pure mathematics is. Le Bihan and Barton put the analogy in the following terms:

> [...] mathematics is sometimes used as a tool in other sciences—physics being an obvious example—in which case it has some actual instrumental value; and because it might serve as a tool in the future, any mathematical construct has some potential instrumental future value. Similarly, as the heuristic justification goes, analytic metaphysics has some potential instrumental future value because of its potential use not only in philosophy of physics—as emphasized by [French and McKenzie]—but also in the scientific domain of applied ontology [...]. (Le Bihan and Barton, 2018, p. 12)

They press the analogy to the work of granting the continuation of the production of analytic metaphysics, they argue that:

> This parallel between mathematics and analytic metaphysics implies that it is not at all obvious that analytic metaphysics should be constrained by the needs of other disciplines (such as philosophy of science or applied ontology). An external observer of mathematics a few centuries ago might have thought that in order to maximize the instrumental value

> of mathematics, it should evolve in a constrained—rather than free—manner. (Le Bihan and Barton, 2018, p. 13)

And they conclude then that:

> [...] as far as the instrumental justification goes, metaphysics and mathematics appear to be in qualitatively similar situations, and one therefore does not need to be ambivalent about the heuristic justification of the former if one does accept the instrumental justification of the latter. Thus, it might be a justification for those who think that metaphysics does not have satisfactory epistemic credentials [...]. (Le Bihan and Barton, 2018, p. 15)

Notice that while Morganti and Tahko believe that analytic metaphysics will have use in empirical science, Le Bihan and Barton suggest that it will have use in more metaphysics. While the suggestion that analytic metaphysics may be useful for science is certainly something that would confer it an intrinsic interest, it is difficult to see how that could really be implemented. It is not as if scientists could look for solutions to scientific problems in metaphysics books. The topics discussed in metaphysics are really so far from science that they simply do not address the same kind of problem to be usable in scientific theories.

Analytic metaphysics does not serve science but the philosophy of science, and no one will say that the two are equivalent. The appropriation of the products of analytic metaphysics made by the philosopher of science is the kind of thing that corresponds to very specific demands (e.g. the Viking/Toolbox approach and the Chakravartty Challenge), which is the demand of the philosophy of science (and the metaphysics of science), not the demand of science itself. In that sense, the analogy is not a good one. Notice that if someone recommended the discontinuation of pure mathematics because it is not applied to physics, it would do little to move this person (a philosopher, very likely) to argue that pure mathematics is applied to pure mathematics (like algebra is applied to geometry in analytic geometry), and that concepts and theories in pure mathematics developed now may be applied to more pure mathematics in the future. However, the main criticism of analytic metaphysics is that it does not contribute to *science* and to the investigation of the objective world, as successfully illustrated by science. Ladyman and Ross (at least their 2007 time-slice) would not be moved if someone claimed that analytic metaphysics contributes to an important area of knowledge, the *metaphysics* of science, which use, well, the concepts of analytic metaphysics!

Perhaps an example of such a use of analytic metaphysics as heuristic, one that has been employed sometimes to propagate the benefits of having analytic metaphysics available concerns the use, by defenders of versions of structural realism (SR) of the notion of ontological dependence (see French, 2014). This is seen as a plundering of theories developed in analytic metaphysics by philosophers of science. Basically, what structural realists claim is that structure is fundamental, or that structure has some kind of priority over objects. As McKenzie (2020) notes, this is not a clear claim, given the complete absence of a clear definition or even characterization of the core notion of 'structure'; but let us not be deterred by that! Given that structure has priority over objects, one may wish to know what kind of relation holds between structures and objects: are objects also fundamental? Or perhaps are they somehow 'derived' from structures? Depending on how one answers such questions, distinct versions of SR appear. French (2010) proposes that current analytic metaphysics literature may be explored, and one finds three main kinds of dependence objects may have on structures:

> *Symmetric dependence*: the identity of the objects is dependent on that of the relations comprising the structure, and vice-versa.
> *Asymmetric dependence*: the identity of the objects is dependent on the identity of the relations of the structure, but not the other way around.
> *Essential dependence*: the constitution of the putative objects is dependent on the relations of the structure (there would be no objects, were not for the relations being as they are). (French, 2010, p. 104–106)

However, notice that this does not grant any kind of epistemic warrant for the metaphysical concepts being employed. It just puts the metaphysical problem of the relationship between

structures (whatever they are) and objects in further metaphysical terms. One still has no information from science concerning which of the relations to choose, or even if such framing of the problem is appropriate (see the discussion in Arenhart, 2017a, sec. 4). What is worst: this very problem could appear in discussions not having any kind of relation to science. In fact, someone could, for strictly metaphysical reasons, claim that structure is fundamental, and that objects depend on structure. Quantum mechanics or general relativity would play no role here (as they typically play no role in determining which of the dependence relations is to be chosen in the case of SR). The heuristic use of analytic metaphysics, then, does not seem to contribute to granting epistemic warrants to analytic metaphysical claims.

Then, the example is a clear case of self-serving metaphysics. Even if the dependence relation could be properly understood, the real work, if epistemic warrant is to be gathered from science, must be done by science: it is physics that must provide an account of how objects arise from structure, whatever it is. Metaphysics does no physical magic here.

6 Final Remarks

From the discussion that preceded, what can one say about the epistemic value of metaphysics? From our discussion of Bryant's proposal, we have suggested that if metaphysics is to be granted value by a constructive relation to science, then, either one will have to concede, as we have seen, that the constraints on metaphysical theorizing are not strong enough to confer value to metaphysics related to science, or that analytic metaphysics, unconstrained by science, is also epistemically warranted. The distinction between valuable and valueless metaphysics is hardly grounded by any kind of constraint imposed by science.

The clues became even more important in our discussion of McKenzie's work. We have argued that even if we have the appropriate scientific theory (the final theory), enforcing epistemic warrant by science to a metaphysical theory will not be an easy task, given the lack of an appropriate relation between science and metaphysics, and the prospects that science will provide any kind of support for a metaphysical theory. Very likely, the distance between science and metaphysics, even at a hypothetical final stage of science, will leave space for metaphysical underdetermination. That means that metaphysics lacks the appropriate constraints, and fails to contribute to a true description of reality attached to the scientific enterprise. That, however, is evidence enough for some to see it as lacking in value.

This line of argumentation may be used also against another attempt to confer value to metaphysics, the heuristic value of metaphysics. As we noted, some have claimed that analytic metaphysics has value due to its use, possibly, in future metaphysics of science. However, we argued, this is not enough to grant the kind of epistemic warrant that is required of analytic metaphysics if it is to have value. Metaphysical underdetermination is still a threat, and analogies with pure mathematics, which suggest that analytic metaphysics provides tools for metaphysics of science just as pure mathematics provides tools for science relies on a weak analogy. Metaphysics, as heuristic, is useful for more metaphysics, and then, as a consequence, cannot confer epistemic value to metaphysics.

The situation in which metaphysics is left, then, is clear: perhaps one should not seek to connect the value of metaphysics in the measure that it is related to science, because such relation is either too thin or else non-existent. Perhaps metaphysics has a value of its own, and then is not in danger if it lacks engagement with science (see Benovsky, 2016). What is clear, however, is that part of our great expectations on metaphysics is just misguided: we hope that metaphysics behaves just as science, engaging with it in a collaborative endeavor to describe the world, and then, transfer some of the demands we put on science to metaphysics. But, in doing that, we take from metaphysics precisely what characterizes it, which is its non-empirical character. Whether that is good or bad, we leave for discussion on another occasion.

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgements We thank the participants of the *2º Colóquio do GT de Metafísica Analítica*, Brazil, for comments made upon an earlier version of this paper. Jonas R. Becker Arenhart would also like to thank the Institute Vienna Circle - University of Vienna, Austria, for a research fellowship that made the research for this paper possible.

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