



Addressing McKenzie's Challenge Regarding Progress in Naturalized Metaphysics

Abordando el desafío de McKenzie respecto del progreso en la metafísica naturalizada

Abordando o desafio de McKenzie quanto ao progresso na metafísica naturalizada

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[RESUMEN]

En este artículo, elaboro una propuesta para superar el argumento de McKenzie contra la posibilidad de un discurso de progreso en metafísica (2020). McKenzie afirma que dicho discurso no es posible en metafísica debido a su carácter de “todo-o-nada”: las teorías metafísicas son verdaderas o no, sin intermediarios, por lo que el lenguaje de aproximación no puede aplicarse significativamente a cambios entre teorías metafísicas. Muestro que las discusiones sobre el tipo de relación metafísica entre dos *relata* son susceptibles de retención y refinamiento, dos criterios que McKenzie considera necesarios para el progreso, siempre que tiendan a un mejor ajuste con lo observable en la realidad. Esto es posible si los tipos de relación metafísica se caracterizan como conjuntos de propiedades, a partir de lo cual se puede utilizar el índice de Jaccard entre dos conjuntos para determinar el grado de similitud o aproximación entre los tipos de relación. Si aquel es el caso, una transición de una tesis de relación a otra puede considerarse progreso siempre que se conserven algunas propiedades y el cambio esté guiado por evidencia empírica. Por lo tanto, el discurso sobre progreso en la metafísica naturalizada es posible según los propios criterios de McKenzie.

[PALABRAS CLAVES]

Metametafísica, Teoría de conjuntos, Índice de Jaccard, Relación metafísica, Metafísica de la biología

[ABSTRACT]

In this article, I elaborate a proposal to overcome McKenzie’s argument against the possibility of progress-talk in metaphysics (2020). McKenzie states that said discourse is not possible in metaphysics due to its “all-or-nothing” character: either metaphysical theories are true or not, without intermediaries, so the language of approximation cannot meaningfully apply to changes between metaphysical theories. I show that discussions regarding the type of metaphysical relationship between two *relata* are susceptible to retention and refinement, two criteria that McKenzie considers necessary for progress, as long as they tend towards better matching what is observable in reality. This is possible if metaphysical relationship types are characterized as sets of properties, from which the Jaccard Index between two sets can be utilised to determine the degree of similarity or approximation between relationship types. If such is the case, then a transition from one relationship thesis to another can be considered progress as long as some properties are retained and the change is guided by empirical evidence. Hence, progress-talk in naturalized metaphysics is possible according to McKenzie’s own criteria.

[KEY WORDS]

Metametaphysics, Set theory, Jaccard Index, Metaphysical relationship, Metaphysics of biology

1. Introduction

In a recent article, McKenzie (2020) argues that, unlike physics, metaphysics cannot be said to make progress in any meaningful sense. She affirms that such is the case by explaining that physics and metaphysics pursue the same goal, namely, arriving at a fundamental theory of everything, as “metaphysics is the study of the fundamental structure of reality” (Bigaj & Wüthrich, 2015, p. 8; as cited in McKenzie, 2020, p. 15), and then noting that physics can affirm to make progress towards said goal through the concept of “correspondence”, which is the case where a central equation to a discarded theory is reduced to a set of limit cases in a central equation of a new theory, so that it may be affirmed that the previous equation is an approximation of the new one.¹ Therefore, she concludes, “where there is correspondence, we have a picture that is, at least in some very important respects, one of retention and refinement—that is, a picture of progress” (McKenzie, 2020, p. 12).² Unlike physics, she states that metaphysical claims are “all-or-nothing” claims where either the theory is true or false, without intermediaries (McKenzie, 2020, p. 24). Then, since physics possesses correspondence, whilst metaphysics does not, she concludes that it is the only discipline of the two where progress towards the goal of a fundamental theory of reality may be objectively accounted for (McKenzie, 2020, pp. 14, 24). There is more to McKenzie’s argument, but I consider that its main conclusion relies on the assumption that the only meaningful way to make progress is through correspondence. Thus, if proven wrong or fallacious, the rest of the argument does not stand.

In this article, I address McKenzie’s argument against progress-talk in naturalized metaphysics. In particular, I will criticise her “all-or-nothing” characterization of metaphysical theories, at least regarding theories about relations between different ontological *relata*. I will hold that McKenzie commits a fallacy of the converse and provide an example on how changes in theories of metaphysical relationships between different ontological *relata* can account for retention and refinement in a metaphysical account of a fundamental theory of the structure of reality, criteria that McKenzie considers necessary and sufficient for progress, thus providing a way through which progress-talk in naturalized metaphysics would be possible according to her own demands.

The structure of this paper is as follows. In §2 I will expose the aforementioned fallacy of the converse and then provide an example through a hypothetical case of progress in metaphysics of biology, showcasing how variations in types of metaphysical relationships between different ontological *relata*, guided by empirical evidence, would allow for some sort of approximation language and progress-talk, which can be generalized to other fields of naturalized metaphysics. In §3 I briefly tie my proposal to considerations of progress in a priori metaphysics and broader theories of progress in philosophy; §4 is the conclusion of this article.

¹It should be clarified that “correspondence”, in this context, does not refer to a match between mathematical equations and empirical evidence, but *between different but similar* mathematical equations, so that it is possible to affirm that one equation in physics is an approximation of a new equation. To avoid confusion, “correspondence” will only be used in the latter sense throughout this article.

²Most philosophers of science would agree with McKenzie’s (2020, pp. 10–12) characterization of correspondence and its use to justify progress in physics, as it is a key aspect of structural realism, which is regarded as the best strategy so far to defend scientific realism (Ladyman, 2023).

2. Retention and refinement in metaphysical relationship theses

McKenzie's critique is aimed at metaphysics *in toto*, but particularly focuses on showing how some of the usual assumptions of naturalist metaphysicists are unjustified. For instance, she comments that naturalist metaphysicists assume that progress in metaphysics is guaranteed whenever there is significant progress in physics (McKenzie, 2020, pp. 6–7), such as the case where science transitioned from classical to quantum mechanics (McKenzie, 2020, p. 3). However, there are some issues with this assumption. First, as she correctly points out, there are good reasons to believe that current fundamental physics theories are wrong, since there are two competing and contradictory theories: general relativity and quantum mechanics (McKenzie, 2020, p. 5). If they are replaced with a unified fundamental physics theory, then our current metaphysics will be proven wrong and completely replaced with a new metaphysical theory, so she asks herself what is the value of engaging in metaphysics of fundamentality if current theories are most likely wrong (McKenzie, 2020, p. 5). In order to prove her point, she examines two “paradigmatical” metaphysical theories that are concerned with what lies at the most fundamental level of reality, namely, Humeanism and ontic structuralism. She claims that the truth value of said theories is discrete, rather than continuous, and as such, if proven wrong, they should be completely discarded (McKenzie, 2020, pp. 14–24). She concludes that, unlike physics, where progress can be accounted for via the use of mathematics (which will be explored thoroughly further in the article), the logical structure of these two metaphysical theories make them “all-or-nothing” theories where there is no meaningful manner in which to affirm that they were approximately true if proven wrong (McKenzie, 2020, p. 24).

Although appealing, there are some issues with McKenzie's thesis. Firstly, she rests on the assumption that changes to our theories about the fundamental level should “seep” into every metaphysical theory about higher ontological levels. For her argument to work, a new fundamental physics theory should impact, for example, our metaphysical theories about the mind-body problem. This is not trivially obvious, as science has offered many reasons to doubt that what happens at higher ontological levels is completely dependent on what happens at lower ontological levels, nor that there is a privileged ontological level, such as the possible ontological autonomy of the chemical world (Hendry, 2019; Lombardi & Labarca, 2005) or the autonomy that each hierarchical level has within a certain biosystem (Souza & do Amaral, 2019). As such, to follow the aforementioned example, a theory about the manner in which the mind is related to neurological features may not require an exhaustive theory about whether the most fundamental physical level is composed of, say, particles or fields. Secondly, and related to the previous point, she seems to disregard another crucial aspect of metaphysical theories, which is the need for an explanation on how the fundamental level of reality is connected to higher ontological levels such as the chemical, biological, psychological and social levels, and also how those higher ontological levels are related to each other (Kim, 2010, pp. 41–44; McKenzie, 2022, pp. 6–7; Wilson, 2021, pp. 1–16). It is a rather canonical assumption in naturalized metaphysics, given patterns observed by the natural sciences, that reality has different levels that are somewhat dependent on lower levels, while also enjoying a certain degree of autonomy from those levels (Kim, 2010, pp. 41–42; McKenzie, 2022, pp. 6–7, 31; pp. 3–6, 12). Therefore, engaging in metaphysics does not only entail discussing what lies at the fundamental level of reality, but also how the different ontological levels are related to one another. Hence, it can be argued that her critique of metaphysics may be successful in convincing naturalist metaphysicists

to delay the discussion about fundamental level metaphysics until physicists are able to offer a unified fundamental physics theory, but she does not give compelling arguments to avoid engaging in discussions about the nature of higher ontological levels and the metaphysical relationship that holds between them.

Another argument that she makes to back her thesis, and which will be the focus of this article, is that, contrary to physics, there is no meaningful manner in which to affirm that progress in metaphysics is made. McKenzie's criteria for considering that there is progress in a scientific discipline are (i) retention of some aspects of a theory and (ii) refinement of the ones that change. More concretely, she claims that "to speak of progress, something must be *retained*" (McKenzie, 2020, p. 12; original emphasis), and that "new theor[ies] offer us a more *refined* description . . . a *better approximation to the truth*" (McKenzie, 2020, p. 12; original emphasis). Hence, it can be argued that, for McKenzie, retention and refinement are two conjointly necessary criteria for progress. Also, as she states that "where there is correspondence, we have a picture that is, at least in some very important respects, one of retention and refinement—that is, a picture of progress" (McKenzie, 2020, p. 12), it can be stated that, for McKenzie, correspondence is sufficient for retention and refinement, and that retention and refinement are conjointly sufficient for progress. In other words, retention and refinement are conjointly equivalent to progress, and thus correspondence is sufficient for progress.

I, along with McKenzie, assume that refinement means being closer to the truth than the previous theory (McKenzie, 2020, p. 12), and that closeness to the truth is a higher level of correlation between theories and empirical data. That criteria (i) and (ii) can be satisfied through correspondence is something that can be easily agreed upon, but she seems to make a transition from considering correspondence as sufficient for progress to considering it sufficient *and* necessary. She says that "the story about progress offered [through correspondence] does not have any clear analogue outside of mathematicalized disciplines" (McKenzie, 2020, p. 13), and that:

in another of the many irresistible ironies of physics—while it has in some sense suffered the most significant changes in its theories, the very fact that it is so mathematicalized makes it more feasible to find clear continuities between them. As such, this nice story is one we can perhaps tell about physics, but not clearly about anything else. (McKenzie, 2020, p. 13)

Of course, there are no a priori reasons to object that correspondence is necessary for progress, but McKenzie does not offer any arguments to argue that such is the case. However, she then claims that "metaphysical claims are paradigmatically not of a sort to which the language of approximation can meaningfully apply" (McKenzie, 2020, p. 15) by virtue of them being "all-or-nothing" claims where either metaphysical theories are true or false, without the admission of intermediaries (McKenzie, 2020, p. 24). As metaphysical theories do not match the language of approximation of physics, which is the language of mathematics and correspondence (McKenzie, 2020, p. 13), McKenzie claims that metaphysics cannot make progress in any significant sense. To claim that the language of progress cannot meaningfully apply to metaphysics, by virtue of it not using mathematics to model its theories, requires arguments or evidence to affirm that correspondence is not only sufficient for progress, but also necessary, something which is not done in McKenzie's article. Thus, if my reading of

McKenzie's thesis is correct, this would mean that she may be inadvertently committing a fallacy of the converse.

Consequently, a manner in which her thesis can be refuted is by showing how other naturalized metaphysics theories can satisfy retention and refinement without resorting to correspondence, with which it can be shown that, as there are other manners to meaningfully assess for progress, correspondence is not necessary for retention and refinement. In order to defend this claim, I will show a possible way through which naturalized metaphysics could make progress according to McKenzie's criteria, through an hypothetical example from the metaphysics of biology. Metaphysics of biology is ideal for this argument, since it is an area of metaphysics that does not engage with the fundamental ontological level and that addresses the metaphysical relationship between the biological level and non-fundamental physicochemical levels of reality. As I will show, the discussion about how biological properties are related to physicochemical properties can be analyzed through a tool from set theory, namely, the Jaccard Index, which can be used in order to assess both the degree of similarity between different theories of metaphysical relationship and how approximate these theories are with what is actually observable about the relationship between biological and physicochemical properties.³

Metaphysics of biology is roughly divided into two streams of thought: *vitalism* and *physicalism* (Sober, 2000, p. 22–24). I shall refer to this debate as the “vitalist-physicalist debate”.⁴ On the one hand, vitalism is a heterogeneous theoretical current which considers that biological properties cannot be reduced to physicochemical ones (cf. Donohue & Wolfe, 2023; Moir, 2023; Wolfe, 2011). Biological physicalism, on the other hand, holds that biological properties are dependent on the physical properties of living things (cf. Sober 2000, p. 22; Pappas, 2009). On the vitalist spectrum of theories, the strongest thesis is that of *substantial vitalism*, that is, the thesis which holds that biological properties are independent of physicochemical properties in light of life being grounded in an “immaterial, uniquely vital principle, force, substance, or property” (Posteraro, 2023, p. 10; see also Moir, 2023; Wolfe, 2011). This means that changes in biological properties of organisms should not necessarily entail a change in their physicochemical properties, nor vice versa. On the other side of the spectrum, the strongest physicalist thesis is that of *reductive physicalism*, which, adjusted to the vitalist-physicalist debate, would claim that biological properties can be reduced to physicochemical properties (cf. Pappas, 2009; Kim, 2011, p. 57).

Now, it can be inferred from experience that physicochemical changes always lead to changes in biological properties, such as variations in viability and fertility (e.g., Rosenberg, 1978), and scientific discoveries have shown that some biological processes are physicochemical in nature, such as the synthesis of urea and fermentation by yeast.⁵ These and many other examples available in any biological textbook (cf. Ball, 2023) provide enough evidence to hold that there is some dependency between biological and physicochemical properties. Regarding the possible theories to account for this dependence, I will address three: *supervenience*, *grounding* and *reduction*. As I will show, vitalism is compatible with the former two, whilst incompatible

³It should be clarified that the aim of this article is not to settle the vitalist-physicalist debate explained below. The debate is only used for illustrative purposes to facilitate the argument in favor of the possibility of progress-talk in naturalized metaphysics.

⁴The debate about how biological properties are metaphysically related to physicochemical properties has not only interested philosophers, but scientists as well, who have employed many arguments that use empirical evidence to defend either position of the debate (Herring & Radick, 2019).

⁵Examples provided by an anonymous referee.

with the latter, and physicalism is compatible with the latter two, but not with the former.

Beginning with the weakest of these theories, supervenience is a kind of relationship that can be expressed as follows: if biological facts about the world supervene in physical facts, then “once all the physical facts about the world are fixed, there is no room for the biological facts to vary” (Chalmers, 1996, p. 22). Alternatively, it may be considered that “a supervenience thesis is a denial of independent variation. . . . To say that so-and-so supervenes on such-and-such is to say that there can be no difference in respect of so-and-so without difference in respect of such-and-such” (Lewis, 1986, p. 358). Alvarado (2013, pp. 67–68) summarizes supervenience as a theory of modal covariation, which is rather weak in virtue of it being compatible with many kinds of dependence relationships. Adjusted to the framing of the vitalist-physicalist debate offered here, if biological properties can be reduced to physicochemical properties, their covariation is trivial, but perhaps biological properties change every time there is a physicochemical change due to causal mechanisms, rather than non-causal, or maybe biological properties are multiply realizable, which are alternatives compatible with the irreducibility of biological properties. Nonetheless, supervenience may be a first step in recognising a connection, but further work would require assessing the nature of said relationship (Alvarado, 2013, p. 68).

One aspect of supervenience that Kim (2011, pp. 12–13) notes is that it does not completely rule out the existence of non-physical properties, as it just states that two *relata* covary.⁶ The main reason to deny the possibility of non-physical biological properties is, once more, experience, since:

Living beings appear to us as discrete physical bodies. Microorganisms, plants, insects, mammals, and so on, are all discrete bodies delimited by certain physical boundaries . . . we might say that being a discrete physical body is a universal condition of living beings. . . . [I]t is hard to think of a living being that is not at the same time a discrete physical body. (Villalobos and Razeto-Barry, 2019, p. 9).

In other words, we as observers have a high number of experiences with physical biological beings, whilst, hitherto, nobody has experienced any interaction with non-physical living things. Hence, through experience, it can be concluded that a biological-physicochemical supervenience thesis is incorrect and in need of change. A stronger form of dependence is that of grounding, which is a non-causal, irreflexive, and asymmetrical relationship between ontological categories or facts about ontological categories (Alvarado, 2013, pp. 63–64; Bliss, 2024, pp. 7, 20; Correia & Schneider, 2012, p. 8). According to it, if *A* is grounded in *B*, then it is impossible for *A* to obtain without *B*. Conversely, if *B* is obtained, as a matter of metaphysical necessity, *A* must obtain as well (Alvarado, 2013, p. 64; Correia & Schneider, 2012, p. 20).

Applied to the vitalist-physicalist debate, if biological properties are grounded in physicochemical properties, then it is impossible for biological properties to obtain if there are no physicochemical properties to ground them; and if the right set of physicochemical properties obtain, then biological properties must obtain as well.

Alternatively, an even stronger thesis may be posited in the form of reduction, which consists in establishing an identity relationship: to say that *A* is reduced to *B* is to affirm that

⁶If biological properties supervene on physicochemical properties, then there is the logical possibility of, at most, one non-physical invariable biological property.

$A = B$ (Alvarado, 2013, p. 68). It shares with the grounding thesis that it proposes a strong dependence relationship between two *relata*, but the grounding thesis is incompatible with the identity relationship, since the former is irreflexive and therefore, as nothing can ground itself, if B grounds A , then $A \neq B$ (Alvarado, 2013, p. 68; Correia & Schneider, 2012, p. 29).

A reason to choose a grounding thesis over a reduction thesis is whether a phenomenon is *multiply realizable*. Multiple realizability can be expressed as follows:

The higher-level property P is said to be multiply realizable; $A_1, A_2, \dots, A_n$ are the different (mutually exclusive and collectively exhaustive) realizations that P might have. ... What does multiple realizability mean? First, it entails the relation of simultaneous determination; necessarily, if something has A_i at time t , then it has P at t ... But there is something more, and it is this second ingredient that is supposed to ensure that the multiple realizability relation is anti-symmetric. An individual that has P has that property solely in virtue of the fact that it has whichever A_i it possesses. Because the higher-level properties are multiply realizable, the mapping from lower to higher is many-to-one. You cannot tell which of the A_i properties is exhibited by a system just from knowing that it has property P ... (Sober, 1999, p. 545)

In summary, if P was reducible to A , then $P = A$ and, therefore, whenever P obtained, it would imply that A obtains as well. However, if P is multiply realizable, then A_i is not necessarily implied when P is obtained, since there are many possible (and mutually exclusive) realizers of P . Thus, P is not identifiable with A_i , or rather $P \neq A_i$. To illustrate, it is believed that two different animals may possess the same (type) mental state at a given time, without sharing the same (type) neurological properties that “underlie” said mental state at said time. If that is the case, then mental states are multiply realizable at the neurological level (Kim, 2011, p. 121). While multiple realizability is incompatible with reduction, it is compatible with grounding, so if a property was multiply realizable at a lower level, the preferred relationship thesis between them should be that of grounding.

It is the case that biological properties are widely accepted, through experience, to be multiply realizable at physicochemical levels (Sober, 1999, p. 542). For instance, two organisms may share the same fitness (and thus the same viability and reproducibility) through “different physical bases” (Sober, 2024, p. 20; see also Rosenberg, 1978, pp. 370–371), which is also considered to be true for other biological phenomena such as behaviour and morphology (Ereshefsky, 2012, p. 394). As previously mentioned, mental states are multiply realizable as well. Since many biological properties are multiply realizable, they are irreducible to physicochemical properties and, hence, a grounding thesis between biological and physicochemical properties is preferable.

To sum up, according to the way in which I characterized the issue, different theories about the relationship between biological and physicochemical properties are incompatible with what is observable in the world, such as modal-ontological independence, supervenience and reduction, leaving out grounding as the theory that best accommodates what can be experienced from reality, at least until a new relationship type that matches even better the kind of relationship observable between biological and physicochemical properties is developed by a priori metaphysics. Grounding is compatible with vitalism in considering that biological

properties are irreducible to physicochemical ones, but with physicalism as well, for it considers that physicochemical properties are necessary for biological properties to obtain.⁷

Now to the issue at hand, which is how this example offers an account of possible metaphysical progress-talk. It is important to keep in mind that the criteria that McKenzie considers necessary and sufficient for progress are (i) retention of some aspects of a theory and (ii) refinement of the ones that change, and that there must be a way in which to meaningfully apply a language of approximation.

On close observation, the previously mentioned theories are theories about the type of metaphysical relation between two ontological *relata*. The general structure of these theories is:

- (1) *A* has an $\langle X \rangle$ relationship with *B*.

Mutatis mutandis, the previously discussed possible theories about the vitalist-physicalist debate would look as follows:

- (2) Biological properties have a $\langle Supervenience \rangle$ relationship with Physicochemical properties.
 (3) Biological properties have a $\langle Grounding \rangle$ relationship with Physicochemical properties.
 (4) Biological properties have a $\langle Reduction \rangle$ relationship with Physicochemical properties.

What varies through propositions (2–4) is the kind of relationship between two ontological *relata*. This relationship types may be better understood as sets of properties, as the following list illustrates:

- (5) Supervenience = {asymmetry, covariation, multiple-realizability}
 (6) Grounding = {asymmetry, ontological-dependence, covariation, multiple-realizability}
 (7) Reduction = {symmetry, ontological-dependence, covariation, identity}⁸

As it is possible to observe, these sets may share some members, whilst differing in others. Now, it is possible to assess the degree of similitude between these sets through their Jaccard Index, which is expressed as:

(8)

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|}$$

⁷Further work should focus on either identifying if a choice must be made between vitalism or physicalism and which of them is preferable, or whether both are compatible. However, giving a definitive answer to the metaphysical relationship between biological and physicochemical properties is not the objective of this paper.

⁸I do not claim that this list is an exhaustive characterization of the mentioned relationship types. However, even if some properties may be added or subtracted from the proposed sets, those changes would be irrelevant to the soundness of the thesis defended in this article.

This index expresses the ratio of the number of members that two sets have in common to the total number of different members that both sets possess. The index value will be 0 if the two sets share no members, and 1 if they share all of their members. For instance, the Jaccard Index between supervenience and grounding, according to the sets characterized above, would be $\frac{3}{4}$, whilst the Jaccard Index between supervenience and reduction would be $\frac{1}{6}$. As I will show, this makes it possible to affirm that supervenience is more similar to grounding than to reduction, which shows that there is a sense in which the language of approximation between relationship theses can meaningfully apply.

If supervenience and grounding shared no theoretical properties, a transition from a thesis of supervenience to a thesis of grounding would be an “all-or-nothing” issue, as McKenzie portrays, since their Jaccard Index would be 0. In such a case, there is no manner in which one thesis could be considered an approximate of the other. However, since both relationship types share theoretical properties, a transition between a thesis of supervenience to one of grounding would not be an “all-or-nothing” change, as in this case there are three theoretical properties that are retained in spite of the transition from one thesis to the other. The use of the Jaccard Index allows a manner of objectively calculating the degree of approximation or similitude between relationship theses, from which it may be affirmed that a thesis of supervenience may be an approximation of a further thesis of grounding. Therefore, it is not only possible to appreciate that there is retention of some aspects of a relationship thesis, namely, some theoretical properties, but also that there is a way in which to affirm that the language of approximation can meaningfully apply, which is through the calculation of their Jaccard Index.

Regarding refinement, although change is not sufficient to achieve it, it is necessary, since something that cannot change cannot be refined. For change to be satisfied, a transition from one thesis to another must imply a difference in at least one property among two different types of relationship. However, change alone is not sufficient for progress, as a circular change from one thesis to another, and then back to the original one, could not be considered “progress”.⁹ Thus, goal-directedness is another necessary condition for refinement, that is, change towards a certain goal or purpose. Following McKenzie (2020, p. 12), I agree that physical equations are refined by being progressively better approximations to the truth in their adjustment to better match empirical data. Roughly speaking, physics does so by lending the tools provided by an a priori science, mathematics, and then applying them to describe or represent whatever phenomena is being observed (Palmgren & Rasa, 2022, pp. 368–371; see also Maddy, 2000, p. 343; Rickles, 2016, Chapter 1). I consider that naturalized metaphysics does something similar when dealing with relationship questions. First, a priori metaphysics develops metaphysically possible sets of properties that the relationship between two ontological *relata* may possess (e.g., supervenience, reduction, grounding). Then, naturalized metaphysics conjectures on which set of properties better matches what can be observed in the actual relationship between two studied phenomena (see Morganti & Tahko, 2016, pp. 2575–2578). In this situation, changes between theories of metaphysical relationship can be considered refinements as long as they tend towards better matching what is observable in the natural world, which could be estimated by calculating the Jaccard Index between the set of properties that a posited thesis of relationship type possesses and the properties that the observed relationship showcases, thus satisfying (ii).

Of course, in the same manner as observation of physical phenomena sometimes leads

⁹As one anonymous referee kindly pointed out.

to a development in mathematics, such as the case of modern calculus, differential equations and vector analysis, among others (Boyer, 1949; Rickles, 2016, Chapter 1, Uhden et al., 2012, p. 488), observations of metaphysical relationships between different phenomena may lead to the development of a new a priori theory of metaphysical relationship. As Morganti and Tahko state:

Much like in the case of pure mathematics, it is often the development of science itself that both stimulates the development of the more abstract a priori work, and turns out to benefit from the enlarged set of conceptual tools defined by such work. (Morganti & Tahko, 2016, p. 2575)

Back to the hypothetical case above, it is through a priori metaphysics that the relationships of supervenience, grounding and reduction are developed and understood, and it is observational experience which guides the choice of which of these relationships better fits what is observable about biological and physicochemical properties. To illustrate, assuming that grounding is the actual metaphysical relationship between biological and physicochemical properties, the Jaccard Index between reduction, supervenience and grounding, and the actual relationship between biological and physicochemical properties would be, respectively, $\frac{1}{3}$, $\frac{3}{4}$ and 1. In this situation, it is possible to objectively state that each consecutive relationship thesis is more similar to reality than the last. Hence, in this hypothetical case of naturalized metaphysics, there would be (i) retention of some properties between posited relationships, and (ii) refinement through change guided by experience. Furthermore, the language of approximation can meaningfully apply in this instance by approaching the issue of similarity between theses as an issue of similarity between the sets of properties that two relationship theses possess.

Of course, the vitalist-physicalist debate is just an example to illustrate this point, but these conclusions are not a priori exclusive to it. Generalizing relevant aspects, this approach to the issue of progress in metaphysics can apply to any debate regarding which type of metaphysical relationship holds between two ontological *relata* belonging to seemingly different ontological levels. One of such examples is the mind-body problem, which is the discussion about the metaphysical relationship that holds between higher-level mental states or processes and lower-level biological states or processes (Kim, 2010, p. 41; 2011, p. 3). Another example, this time from physics, is the idea that space-time may not be a fundamental entity, but an higher-level entity ontologically dependent on quantum phenomena or matter (see e.g., Bain, 2012; Castro et al., 2018; Oriti, 2021), from which it may be further asked which is the metaphysical relationship between space-time and quantum phenomena. The proposed methodology for assessing progress in theories of metaphysical relationship between different ontological *relata* may be used in the aforementioned debates, and as such might help illuminate whether those discussions have been productive or rather stagnant.

Finally, it is widely accepted that metaphysics deals with questions of fundamentality and ontological dependence in order to describe the fundamental structure of reality (see e.g. Arenhart & Arroyo 2021, p. 8; Bigaj & Wüthrich, 2015, p. 8; Lowe, 2011, p. 102). I believe that the approach exposed above can contribute to said goal. If Σ was a conjunction of all the theses of metaphysical relationships between the different *relata* of the actual world, guided by an ideally complete observational experience, Σ would be an account of the overarching, fundamental or abstract structure of reality. Hence, the account that I have presented on how naturalized metaphysics can possess progress-talk is both compatible with the criteria that

McKenzie considers sufficient for progress and with the goal that she considers that metaphysics pursues.

3. Other remarks

I have presented a way in which progress in naturalized metaphysics can be accounted for. However, I do not claim that my proposal is the only possible way to assess progress in metaphysics as a whole. For instance, since a priori metaphysics does not use observational experience to support that its posited theories are closer to the truth, it could not progress in the same manner as naturalized metaphysics may do. Nonetheless, similarly to mathematics, where progress can be understood “as the employment of efficient means to achieve the goals of a particular practice” (Maddy, 2000, p. 351), such as the development of new tools for physical modelling, a priori metaphysics may progress through the characterization of new types of relationship to describe relationships between observable phenomena. A priori metaphysics can develop new theoretical tools that then naturalized metaphysics may or may not apply, since “it is a perfectly legitimate endeavour for metaphysics to engage in an abstract analysis of (metaphysical) possibilities without seeking explicit confirmation from science” (Morganti & Tahko, 2016, p. 2575). If this were to be true, accusing a priori metaphysics of not correctly modelling the structure of the natural world would be a mistake analogous to accusing pure mathematics of not describing it as well. This inquiry, although in need of further analysis, will not be addressed here.

As a last remark, it is important to note that my proposal shares important aspects with the *structural realism* theory of scientific progress, save for the mathematical aspects of their theories (cf. Worrall, 1989), and can be tied with the *noetic approach* of philosophical progress developed by Dellsén and his collaborators, who argue that one way to account for progress in philosophy is the way in which it puts people in a position to increase their understanding, an idea that “is centrally concerned with representing dependence relations” (Dellsén et al., 2024, p. 675), for they consider that “[d]ependence relations are the ontological correlates of explanation . . . the worldly relations that make it true that something explains something else” (Dellsén et al., 2024, p. 675). Connections between these accounts and my own should be explored in the future, as if both structural realism and the noetic approach were considered legitimate ways of accounting for progress in their respective disciplines, it would strengthen my proposal as a way in which progress in naturalized metaphysics can be assessed.

4. Conclusion

I presented a response to McKenzie’s argument regarding the impossibility of progress-talk in metaphysics by providing a hypothetical account through which it can be affirmed that naturalized metaphysics is able to possess progress-talk, that is, through the possibility of approximation talk between the sets of properties of posited relationship theses between different ontological *relata* and the refinement of these theses towards better matching observational experience, which satisfies the same criteria that McKenzie considered that metaphysics could not. This can only apply to naturalized metaphysics, but I also hinted at a possible way of assessing progress in a priori metaphysics, which is evaluating whether there has been

development of theoretical tools that can be used by naturalized metaphysics. Although the latter was not the objective of this article, I consider that it is an idea worth inquiring about in the future. Lastly, it should be noted that what I presented in this work is not by any means an account on *how* metaphysics has made progress nor how it *should* make progress, but rather a way in which it can *possibly* be stated to make progress following McKenzie's criteria, which could or could not be correct. Nonetheless, if retention and refinement, conjointly, were widely considered sufficient and necessary for progress, then progress-talk in naturalized metaphysics is a possibility.

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References

- Alvarado, J. (2013). Fundación y reducción. *Aporía* (6): 59–74.
- Arenhart, J. R. B., & Arroyo, R. W. (2021). Back to the question of ontology (and metaphysics). *Manuscrito*, 44(2), 1–51. <https://doi.org/10.1590/0100-6045.2021.v44n2.jr>
- Bain, J. (2012). The emergence of spacetime in condensed matter approaches to quantum gravity. *Studies in History and Philosophy of Science Part B Studies in History and Philosophy of Modern Physics*, 44(3), 338–345. <https://doi.org/10.1016/j.shpsb.2012.05.001>
- Ball, P. (2023). *How Life Works: A User's Guide to the New Biology*. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226826691>
- Bigaj, T. & Wüthrich, C. (2015). *Metaphysics in Contemporary Physics*. Brill-Rodopi.
- Bliss, R. (2024). *Grounding, Fundamentality and Ultimate Explanations*. Cambridge University Press. <https://doi.org/10.1017/9781009089739>
- Boyer, C. B. (1949). *The Concepts of the Calculus*. Hafner Publishing Company.
- Castro, P., Gatta, M., Croca, J. R., & Moreira, R. (2018). Spacetime as an Emergent phenomenon: A possible way to explain entanglement and the tunnel effect. *Journal of Applied Mathematics and Physics*, 6(10), 2107–2118. <https://doi.org/10.4236/jamp.2018.610177>
- Chalmers, D. J. (1996). *The Conscious Mind: In Search of a Fundamental Theory*. Oxford University Press.
- Correia, F., & Schnieder, B. (2012). Grounding: An opinionated introduction. In F. Correia, B. Schneider (Eds.), *Metaphysical Grounding* (pp. 1–36). Cambridge University Press.
- Dellsén, F., Firing, T., Lawler, I., & Norton, J. (2024). What is philosophical progress? *Philosophy and Phenomenological Research*, 109 (2), 663–693. <https://doi.org/10.1111/phpr.13067>
- Donohue, C., & Wolfe, C. T. (2023). Introduction: vitalism and its legacy in twentieth century life sciences and philosophy. In C. Donohue, C. T. Wolfe (Eds.), *Vitalism and Its Legacy in Twentieth Century Life Sciences and Philosophy* (pp. 1–7). Springer. https://doi.org/10.1007/978-3-031-12604-8_1
- Ereshefsky, M. (2012). Homology thinking. *Biology & Philosophy*, 27(3), 381–400.

<https://doi.org/10.1007/s10539-012-9313-7>

Hendry, R. F. (2019). Emergence in chemistry: substance and structure. In S. Gibb, R. F. Hendry, T. Lancaster (Eds.), *The Routledge Handbook of Emergence* (pp. 339–351). Routledge.

Herring, E., & Radick, G. (2019). Emergence in biology: from organicism to systems biology. In S. Gibb, R. F. Hendry, T. Lancaster (Eds.), *The Routledge Handbook of Emergence* (pp. 352–362). Routledge.

Maddy, P. (2000). Mathematical progress. In E. Grosholz, H. Breger (Eds.), *The Growth of Mathematical Knowledge* (pp. 341–352). Springer. https://doi.org/10.1007/978-94-015-9558-2_23

McKenzie, K. (2020). A curse on both houses: naturalistic versus a priori metaphysics and the problem of progress. *Res Philosophica*, 97(1), 1–29. <https://doi.org/10.11612/resphil.1868>

McKenzie, K. (2022). *Fundamentality and Grounding*. Cambridge University Press. <https://doi.org/10.1017/9781108657617>

Moir, C. (2023). What is living and what is dead in political vitalism? In C. Donohue, C. T. Wolfe (Eds.), *Vitalism and Its Legacy in Twentieth Century Life Sciences and Philosophy* (pp. 239–261). Springer. https://doi.org/10.1007/978-3-031-12604-8_13

Morganti, M., & Tahko, T. E. (2016). Moderately naturalistic metaphysics. *Synthese*, 194(7), 2557–2580. <https://doi.org/10.1007/s11229-016-1068-2>

Kim, J. (2010). *Essays in the Metaphysics of Mind*. Oxford University Press.

Kim, J. (2011). *Philosophy of Mind* (3rd ed.). Westview Press.

Ladyman, J. (2023). Structural Realism. In E. Zalta (Ed.), *The Stanford encyclopedia of philosophy* (Summer 2023 ed.). Stanford University. <https://plato.stanford.edu/archives/sum2023/entries/structural-realism/>

Lewis, D. (1983). New work for a theory of universals. *Australasian Journal of Philosophy*, 61(4), 343–377. <https://doi.org/10.1080/00048408312341131>

Lombardi, O., & Labarca, M. (2005). The ontological autonomy of the chemical world. *Foundations of Chemistry*, 7(2), 125–148. <https://doi.org/10.1007/s10698-004-0980-6>

Lowe, E. J. (2009). The rationality of metaphysics. *Synthese*, 178(1), 99–109. <https://doi.org/10.1007/s11229-009-9514-z>

Oriti, D. (2021). Levels of Spacetime Emergence in Quantum Gravity. In C. Wüthrich, B. Le Bihan, N. Huggett (Eds.), *Philosophy Beyond Spacetime: Implications from Quantum Gravity* (pp. 16–40). Oxford University Press. <https://doi.org/10.1093/oso/9780198844143.003.0002>

Palmgren, E., & Rasa, T. (2022). Modelling roles of Mathematics in Physics. *Science & Education*, 33(2), 365–382. <https://doi.org/10.1007/s11191-022-00393-5>

Pappas, G. S. (2009). Physicalism, materialism. In J. Kim, E. Sosa, G. S. Rosenkrantz (Eds.), *A Companion to Metaphysics* (pp. 484–486). Wiley-Blackwell.

Posteraro, T. S. (2023). Vitalism and the problem of individuation: Another look at Bergson's élan vital. In C. Donohue, C. T. Wolfe (Eds.), *Vitalism and Its Legacy in Twentieth Century Life Sciences and Philosophy* (pp. 9–26). Springer. <https://doi.org/10.1007/978-3->

031-12604-8_2

Rickles, D. (2016). *The Philosophy of Physics*. Polity.

Rosenberg, A. (1978). The supervenience of biological concepts. *Philosophy of Science*, 45(3), 368–386. <https://doi.org/10.1086/288813>

Sober, E. (1999). The multiple realizability argument against reductionism. *Philosophy of Science*, 66(4), 542–564. <https://doi.org/10.1086/392754>

Sober, E. (2024). *The Philosophy of Evolutionary Theory*. Cambridge University Press. <https://doi.org/10.1017/9781009376037>

Souza, G. M., & do Amaral, M. N. (2019). Emergent properties and stability in hierarchical biosystems: There is no privileged level of causation. In L. H. Wegner & U. Lüttge (Eds.), *Emergence and Modularity in Life Sciences* (pp. 217–234). Springer. https://doi.org/10.1007/978-3-030-06128-9_10

Uhden, O., Karam, R., Pietrocola, M., & Pospiech, G. (2011). Modelling mathematical reasoning in Physics education. *Science & Education*, 21(4), 485–506. <https://doi.org/10.1007/s11191-011-9396-6>

Villalobos, M., & Razeto-Barry, P. (2019). Are living beings extended autopoietic systems? An embodied reply. *Adaptive Behavior*, 28(1), 3–13. <https://doi.org/10.1177/1059712318823723>

Worrall, J. (1989). Structural realism: The best of both worlds? *Dialectica*, 43(1–2), 99–124. <https://doi.org/10.1111/j.1746-8361.1989.tb00933.x>