Not So Weak Emergence

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Abstract

In this article, I shall examine Jessica Wilson's schema for weak emergence in connection with two questions: why are only certain proper subsets of the powers borne by lower-level features associated with higher-level, weakly emergent features? Why is a certain proper subset of the powers borne by a given lower-level feature associated with a certain higher-level, weakly emergent feature, and vice versa? I shall consider and criticize four possible answers to these questions, including Wilson's own view. Finally, I shall suggest my own solution, which is based on something akin to grounding categoricalism. I shall also explore some consequences of accepting my view.

Keywords: Emergence, Physicalism, Grounding categoricalism, Powers, Subset account.

1. Introduction

I shall discuss in this contribution Jessica Wilson's schema for weak emergence. I shall show that this schema comes together with two crucial questions. First question: why are only certain proper subsets of the powers borne by lower-level features associated with higher-level, weakly emergent features? Second question: why is a certain proper subset of the powers borne by a given lower-level feature associated with a certain higher-level, weakly emergent feature, and vice versa?

I shall show that answering such questions implies that one rediscusses, *inter alia*, the compatibility between weak emergence and physicalism. In Section 2 I shall briefly introduce Wilson's schema for weak emergence and the two questions I anticipated above. In Section 3 I shall consider three ways of answering (or dissolving) such questions: the suggestion that they ask for explanations of modal facts; primitivism; deflationism about powers. I shall criticize each way. In Section 4 I shall examine and discuss Wilson's own view. Finally, in Section 5, I shall suggest that one should embrace—with respect to higher-level, weakly emergent features and the powers they confer—something akin to grounding categoricalism. I shall also explore some consequences of accepting this view.

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2. Weak Emergence and the Two Questions

Jessica Wilson (2021: 72) presents the following schema for weak emergence:

> (WE) a token feature S weakly emerges (on a given occasion) from a token feature P if and only if, on that occasion, (i) S cotemporally materially depends on P and (ii) S has a non-empty proper subset of the token powers had by P.

Token features are particular property-instances. The properties involved in S and P are properties that belong to different levels of the universe. Cotemporal material dependence may be interpreted in different ways, depending on one's favorite theory of ontological dependence. Finally, token powers need *not* be taken as *sui generis* entities, to be distinguished from P, S and their particular instances. For example, on a deflationary view of token powers, the latter may be taken as descriptions of what token features S and P are able to cause in specific circumstances.

In this contribution, I shall dwell on condition (ii). I shall extend the discussion a bit beyond Wilson's original project of providing a schema for weak emergence. And I shall introduce further issues concerning weak emergence and its compatibility with physicalism.

On condition (ii), token feature P has a certain set of token powers associated with it. Assume that this set includes four token powers: p_1, p_2, p_3 and p_4. Following (ii), token feature S has another set of token powers associated with it. Crucially enough, the latter set includes some, but not all of the token powers associated with token feature P. Namely, the set of token powers associated with token feature S is only a proper subset of the set of token powers associated with token feature P. Assume that the set of token powers associated with token feature S includes three token powers: p_1, p_2 and p_3.

This guarantees that, on the one hand, token feature S is *not* endowed with any novel power with respect to the token feature P on which it depends. If token feature P and all of its powers are physical, the weak emergence of S from P is fully compatible with the acceptance of physicalism. Yet, on the other hand, token feature S has a distinctive causal profile with respect to token feature P. Indeed, the distinctive causal profile of S is associated with distinctive laws of nature and distinctive difference-making considerations.

So far, so good. Let me recall the set of powers associated with P, i.e., p_1, p_2, p_3 and p_4. Call this set the "causal role of P". And the proper subset of powers associated with S, i.e., p_1, p_2 and p_3. Call this proper subset the "causal role of S". Three questions arise.

First question: are *all* of the proper subsets of the causal role of P associated with higher-level token features such as S? For example, is there a token feature S_1 associated with p_1 and p_2, another token feature S_2 associated with p_2 and p_3, and so on?

It seems that the answer to this question must be negative. *Not all* of the proper subsets of the causal role of P are associated with higher-level token features. In most cases, *only some* proper subsets are. In our example, only the proper subset including p_1, p_2 and p_3 is associated with a higher-level token feature such as S. Otherwise, we may turn to postulate the existence of higher-level token features that are scientifically irrelevant. Indeed, their distinctive causal profiles/causal roles may be associated with no distinctive law of nature and no distinctive difference-making

consideration. Thus, such higher-level token features would find no place in the best theories of special sciences.

We grant that *only some* proper subsets of the causal role of P are associated with higher-level token features such as S. In our example, only the proper subset including p_1, p_2 and p_3 (i.e., the causal role of S) is associated with a higher-level token feature, i.e., S itself. The next question is: why is the proper subset made of p_1, p_2 and p_3 the only one (in our case) that is associated with *a* higher-level token feature? Namely, why is it the only one that is relevant for the weak emergence of *a* higher-level token feature?

Another question is in order. Even if we concede—*contra hypothesin*—that every proper subset is associated with a higher-level token feature such as S, it seems that the proper subset made of p_1, p_2 and p_3 is the *only one* that is associated *with S*. And it is associated *only with S*. This seems to happen in the actual world not by sheer coincidence, but at least as a matter of nomological necessity. Thus, why is the very proper subset made of p_1, p_2 and p_3 (i.e., the causal role of S) the only one that is associated with S—and only with S? Why is it not associated with any other higher-level token feature? More strongly: why *can't* it be associated—at least as a matter of nomological necessity—with any other higher-level token feature? And why *can't* S have—at least a matter of nomological necessity—any other proper subset of powers associated with it, i.e., any other causal role? In sum, why must S and its causal role be associated with each other (*and only with each other*) at least as a matter of nomological necessity?

We have two questions to face:

1. Why is the proper subset made of p_1, p_2 and p_3 the only one that is associated with a higher-level token feature?
2. Why must S and the proper subset made of p_1, p_2 and p_3 (i.e., its causal role) be associated with each other (and only with each other) at least as a matter of nomological necessity?[1]

3. Three Attempts

These questions cannot be dismissed by claiming that they look for explanations of *modal* facts. First of all, question (1) is not explicitly put in modal terms. Moreover, many questions in the business of metaphysics and philosophy of science are actually put in modal terms, insofar as they ask for explanations of what *can* and *cannot* happen.

Suppose now that, in order to answer both questions, we embrace some sort of *primitivism*. Namely, suppose that we claim that it is a primitive and inexplicable fact of the matter that the proper subset made of p_1, p_2 and p_3 (i.e., the causal role of S) is the only one that is associated with a higher-level token feature. And, more crucially, that that proper subset is only associated with token feature S and S is only associated with that proper subset.

[1] Elder (2004 and 2011) considers similar questions with respect to the restricted composition of everyday objects and with respect to micro-physical causation. In a similar vein, Inman (2018) raises the following problem with respect to the essences of natural substantial kinds: if such essences were nothing but sets of specific properties, why would such properties be unified/clustered together? He criticizes several attempts to solve this problem, e.g., by appealing to homeostatic mechanisms or to specific laws of nature. And, as we shall see, he embraces a non-reductionist solution similar to the one I suggest here.

To make sense of this situation from an ontological standpoint, we may hold that there is some irreducible relation R that links S (and only S) with its causal role (and only with it). Consider now P, i.e., the physical, lower-level token feature. As far as P and its token powers are concerned, R does *not* link any other proper subset of those powers with any other higher-level token feature. Moreover, that R holds between S and its causal role has no further metaphysical explanation. Finally, R may be taken as a nomologically necessitating relation, i.e., as a relation that implies certain nomologically necessary goings-on. This seems to answer both questions.

There are three problems with primitivism. The first problem is that it seems to overpopulate our ontology with many irreducible facts of the matter such as: the fact that R holds between S and the very causal role associated with it.

Secondly, such facts are *not* enough in order to answer question (2). It is *not* enough that R holds between S and its causal role in order to guarantee that S is *only* associated with that role and that role is *only* associated with S. In a given possible world, R may hold between S and its (actual) causal role. But it may *also* hold between S and another causal role. In another possible world, R may *not* hold between S and its (actual) causal role, but between S and another causal role. In sum, there should be something else (a negative fact? A totality fact?) that guarantees that S is *only* associated with its causal role and its causal role is *only* associated with S—both in a given possible world and across possible worlds.

Thirdly and finally, that R holds between S and its causal role is an irreducible fact of the matter. Thus, it is a *fundamental* fact. Moreover, this fact constitutively includes a non-physical token feature such as S. Thus, there are fundamental facts with non-physical token features such as S. The constituents of fundamental facts are fundamental.[2] Therefore, non-physical token features such as S are fundamental.

This conclusion may be hard to swallow for physicalists. True: on one plausible interpretation of physicalism (the one embraced by Wilson 2021), physicalism is only taken to hold that the only powers existing in the (actual) universe are physical powers primarily and non-derivatively borne and exercised by physical entities. Therefore, according to this interpretation, every causal going-on turns out to be exhaustively produced and explained by physical powers. This version of physicalism is fully compatible with there being fundamental facts such as: the fact that R holds between S and its causal role. It is also compatible with S's being a fundamental entity, insofar as S is not endowed with novel powers.

However, that R holds between S and its causal role is *not* a purely physical fact. The former also includes S, which is non-physical. Moreover, that R holds between S and its causal role cannot be fully explained in fully physical terms, since it is a fundamental fact. Thus, that R holds between S and its causal role is at odds with a stronger version of physicalism, according to which everything (at least in the actual universe) is physical or can be fully explained in fully physical terms (i.e., in the end, it entirely depends on the physical and only on the physical).

Invoking deflationism about token powers, causal roles and/or properties does not help either. Assume that "S" is nothing but a scientifically relevant but non-physical predicate and the causal role of S is nothing but a complex description of the nomological regularities connected with "S". In this context, it still

[2] See Sider 2011: 126-32.

makes sense to ask why "S" is associated with *a* description of nomological regularities, why it is associated with *that* description and not with other descriptions, why that description is *only* associated with "S", and so on. From the standpoint of physicalists, the answers to such questions should not (irreducibly) invoke non-physical terms and predicates.

Alternatively, one may hold that causal roles are nothing but complex descriptions of possibly regular behaviors, without the need to invoke non-physical predicates such as "S". Fine. Still, some sets of such descriptions may turn out to *correctly* describe the universe and/or be *useful* when describing the universe. And other sets may turn out to be incorrect and/or useless for such purposes. What accounts for the relevant distinction between correct/useful sets of descriptions and incorrect/useless ones? In order to answer this question, one should find some feature or another in the universe. The alternative would be to adopt a radically anti-realist stance on the bearings of such descriptions. But this would be a non-starter for a project on the metaphysics of emergence. And, more importantly, it would leave something unexplained i.e., the fact that only certain sets of descriptions are correct/useful.

4. Wilson's Physicalist Solution

Wilson (2010; 2021: 177-85) puts forward an account of weak emergence based on degrees of freedom. I cannot enter into detail here. Roughly, the idea is that a weakly emergent entity emerges from its base if, *inter alia*, at least one of the degrees of freedom required to characterize its base is eliminated by imposing certain constraints on the base. Such constraints should be entirely placed at the level of the base. In the end, these constraints must be entirely physical or entirely dependent on the physical.

By eliminating specific degrees of freedom, the powers associated with such degrees are eliminated. Thus, weakly emergent entities turn out to have only a proper subset of the powers associated with their bases.

This mechanism is compatible with the acceptance of physicalism, even in its stronger version. Nevertheless, it is necessary to clarify what one means by "physical constraints". Indeed, by "physical constraints", one may first mean "naturalistically acceptable constraints", i.e., constraints that do *not* involve the existence and/or the action of supernatural entities. This understanding is too weak. For it is compatible with the possibility that some of such constraints are irreducibly non-physical and/or result from the exercise of non-physical powers—even if they still belong to the 'natural world'. For example, some of such constraints may irreducibly belong to the biological level of the universe, so that they still belong to the 'natural world', even if they are not physical.

Secondly, by "physical constraints", one may mean "constraints that necessarily operate through and come together with specific physical processes and changes". This understanding is still too weak. Indeed, if one were to believe in irreducible downward causation, some of such constraints could still be non-physical and/or be caused by irreducibly non-physical entities and/or result from the exercise of non-physical powers—insofar as, in all such cases, the relevant constraints operate through and/or are caused through specific physical processes and changes (by downward causation). For example, an irreducibly biological constraint may still operate through and/or be caused through specific physical processes and changes (by downward causation).

The relevant understanding of "physical constraints" at work here is a stronger one. A physical constraint is one that only involves (in itself and in its own causes) entities and processes that are entirely physical[3] and/or entities and processes that entirely depend on further entities and processes that are entirely physical. This understanding of "physical constraints" makes Wilson's mechanism fully compatible with all versions of physicalism. But it may run into the risk of narrowing down the range of weakly emergent phenomena. Some of such phenomena may result from constraints that—for what we know—do *not* clearly satisfy the third characterization of physical constraints. In other terms, we cannot now assume—and we cannot be now sure—that all of the constraints that contribute to weak emergence are such that they only involve entirely physical entities and processes and/or entities and processes that entirely depend on further entities and processes that are entirely physical.

At any rate, with respect to questions (1) and (2), Wilson's mechanism does *not* provide satisfactory answers. First of all, the characterization of weak emergence in terms of degrees of freedom only provides a *sufficient* condition for weak emergence. Thus, it is *not* guaranteed that every weakly emergent entity will arise through this sort of mechanism. Secondly and more importantly, it seems that *not* every possible elimination of the degrees of freedom required to characterize a base is also able to bring about the causal role of a weakly emergent entity (in our case, of a weakly emergent token instance). On the contrary, it seems that only the elimination of *specific* degrees of freedom—and not others—guarantees this result. Why so? Question (1) is left unanswered.

Thirdly and finally, one must still explain why a certain weakly emergent token feature is only associated with a certain causal role and why the latter is only associated with the former. Question (2) is left unanswered.

In reply to this last worry, one may well embrace a view of token features according to which they are nothing but bundles of token powers. Yet, first, one would then be committed to token powers instead of token features. And, secondly, one would still need to explain why *only certain* bundles of token powers (and not others) seem to 'give rise to' or 'be legitimately describable as' token features.

5. Grounding Categoricalism, or Something Near Enough

In my opinion, the best way to answer questions (1) and (2) consists in embracing something akin to 'grounding categoricalism', i.e., the doctrine according to which the causal roles of categorical properties are somehow grounded on those very properties (see, among others, Tugby 2012, 2021, 2022a, 2022b, Yates 2018, Kimpton-Nye 2021 and Paolini Paoletti 2022).

In Paolini Paoletti 2022, I have defended the following form of grounding categoricalism: by virtue of its own essence, the causal role C of a categorical property P (i) is the causal role *of* P, so that it essentially depends (also) on P, (ii) it depends for its origins on P (i.e., it starts to exist as a causal role thanks to P or thanks to the instantiation of P) and (iii) it depends for its continuing to exist (also) on P (i.e., it continues to exist also or only thanks to P or to the instantiation of P). This entails

[3] An entirely physical entity/process is one that, in principle, can be only characterized (with respect to its essence and with respect to all of its features) in physical terms.

that, as a matter of necessity, the existence of C implies the existence of P: necessarily, C cannot exist without P. And it also entails that, as a matter of necessity, C is the causal role of P and of no other property distinct from P.[4]

By the "essence" of something (be it a property or something else), I mean what that entity non-derivatively is (or could be) in all possible circumstances. Namely, the features to be included in the essence of an entity should *not* derive from other features of that entity and they should necessarily come together with that entity whenever it exists. This view of essences is compatible with the possibility that the essence of an entity is identical with that entity or it is only a description of that entity.

My view is compatible with different conceptions of causal roles. Indeed, causal roles may be nothing but descriptions of regular behaviors.

Please also note that, if one believes that all the (nomologically) possible causal roles exist even if they are not associated with any property, one could modify my view as follows: by virtue of its own essence, the causal role C of a categorical property P (i) is the causal role *of* P, so that it essentially depends (also) on P, and (iv) it (also or only) depends on P for its being a causal role that correctly describes the universe and/or that is 'useful' for the purpose of describing the universe. Indeed, not all the (nomologically) possible causal roles that exist correctly describe the universe and/or are 'useful' for this purpose.

At any rate, if, by virtue of its own essence, the causal role C of a categorical property depends in such-and-such a way on P itself, it seems that C obviously depends on the essence of P, i.e., on what P non-derivatively is (or could be) in all possible circumstances.

We can now apply this view to weakly emergent features and their causal roles.

Roughly, there are three facts to be accounted for: that the proper subset that only includes powers p_1, p_2, p_3 is the causal role of *a* token feature; that it is the causal role *of* token feature S and *only* of token feature S (at least as a matter of nomological necessity); that S *cannot* have any other causal role (at least as a matter of nomological necessity).

The first two facts are easily accounted for by my doctrine. The causal role of a token feature S depends on the property involved in that token feature, i.e., the weakly emergent property in S. It is (also or only) by virtue of the property involved in S that causal powers p_1, p_2 and p_3 are put together so as to constitute the causal role of *a* token feature, so that the relevant causal role starts and continues to exist.

Secondly, it is by virtue of that property that such powers constitute the causal role *of* token feature S, and only of it (or only of token features of that property). And this seems to be part of the essence of the causal role of S[5]. Yet,

[4] I offer a proof of this latter thesis in Paolini Paoletti 2022.

[5] The connection between the weakly emergent property involved in S and the causal role C does not merely hold as a matter of nomological necessity. For there is no possible world with other laws of nature in which C is associated with a property distinct from the one involved in S. C, by virtue of its own essence, is only associated with the property involved in S. This seems reasonable in light of the physicalist commitments of weakly emergentists. Indeed, if C were associated with the property involved in S in one possible circumstance and with some other property in another possible circumstance, then there would be nothing at the level of C (nor at the level of the causal powers included in C) to account for this difference.

my view does *not* entail that powers p_1, p_2 and p_3 turn out to be non-physical. Indeed, such powers may well be physical powers, so that they do *not* depend for what they are on token feature S, nor on the weakly emergent property involved in S. It is only the relevant causal role made of powers p_1, p_2 and p_3 that depends on the weakly emergent property involved in S.

In Paolini Paoletti 2022, I have also defended the following thesis: the categorical property P can have other causal roles different from C in other possible worlds and/or at other times. When applied to weakly emergent properties/token features and the causal roles associated with them, this is at odds with the third fact to be accounted for: that the token feature S (and, presumably, the weakly emergent property involved in it) cannot have any other causal role (at least as a matter of nomological necessity).

If we wish to stick to this fact, we can argue that, as a matter of metaphysical necessity, the weakly emergent property involved in S is realized by causal role C and only by C, so that it cannot have any other causal role. Namely, the weakly emergent property involved in S necessarily depends for its being causally effective on (i.e., is realized by) causal role C and only on it. I assume that dependence for causal effectiveness (i.e., realization) and the other relations of dependence mentioned above are distinct and non-equivalent. I shall expand on this point in a few lines.

Something similar to the solution I suggest here is explored by Wilson (2021: 96-97) in reply to Melnyk (2006). Wilson objects to this solution that scientific truths about scientific features do *not* depend on the presence or on the absence of quiddities (i.e., of qualitative aspects of properties). Moreover, she claims that quiddities are mostly required for transworld individuation, whereas the individuation of properties in worlds that share our laws of nature only proceeds by reference to powers.

What I suggest here is that we *do* need quiddities for metaphysical reasons, i.e., in order to answer questions (1) and (2). Or, at least, we need to appeal to (the essence of) higher-level properties, not fully exhausted by their causal powers. Additionally, not all the facts mentioned in such questions as *explananda* are 'other-wordly' facts. For example, that the proper subset with p_1, p_2 and p_3 is associated with a higher-level token feature is not an 'other-wordly' fact.

In a similar vein and in the footsteps of other authors[6] Inman (2018) suggests that the irreducible essences of higher-level substantial kinds play two roles. First, they structure the modal profiles associated with such kinds, i.e., they connect all the possible ways the relevant substances can be characterized and modified. Secondly, the irreducible essences of higher-level substantial kinds fix the causal profiles associated with such kinds, i.e., all the causal powers the relevant substances possess by necessity whenever they exist.

By embracing my solution, we avoid introducing primitive and *sui generis* connections between token features and proper subsets of powers. However, two problems are left open.

The first problem is that this solution is incompatible with some versions of physicalism. If the causal role of token feature S depends on the higher-level and weakly emergent property involved in S, then it is *not* the case that everything depends on the physical. Secondly, assume that token feature P is physical. P does

[6] Inman (2018: 49) cites Scaltsas (1994: 78-80), Des Chene (1996: 71-75), the Early Modern metaphysician Francisco Suárez (2000), Lowe (2006: 135) and Oderberg (2011).

not depend on the property involved in S. Nor do its physical causal powers depend on that property. However, on the one hand, it seems that the causal role of S depends on the property involved in S. Yet, on the other hand, it seems that the property in S depends—for its being causally effective—on that very causal role. There seems to be a circle of dependence here.

To solve these problems, I suggest that we should first swallow the fact that weak emergence is not so weak. Weak emergence is incompatible with the idea that everything whatsoever is physical or fully depends on the physical.

Moreover, I also suggest that different dependence relations may actually be at stake with the property involved in S and the causal role of S. Indeed, the causal role of S may depend *in a certain respect* (e.g., for its being the causal role of S and for its starting and continuing to exist) on the property involved in S. Yet, the property involved in S may depend *in another respect* (e.g., for its being causally effective, or 'realized') on the causal role of S. Such respects are associated with distinct and non-equivalent dependence relations that may run in opposite directions and still remain by themselves asymmetrical.[7]

By invoking distinct dependence relations, we can then construct distinct and non-equivalent versions of physicalism. We can also generalize in order to make sense of the idea that the physical is more fundamental than the non-physical. Intuitively, we can take into account all the dependence relations that involve physical entities and all those that involve non-physical entities. We can then determine the overall degree of dependence of the former and the overall degree of dependence of the latter. Finally, we can find out that the overall degree of dependence of physical entities is lower than that of non-physical entities, so that the former are more fundamental than the latter.

In sum, there are two lessons to be learnt here. The first lesson is that weak emergence should be accepted in conjunction with metaontological pluralism, i.e., the view that distinct and non-equivalent dependence relations are at stake in the universe. The second lesson is that weak emergence is *not always* compatible with physicalism, i.e., it is not compatible with all forms of physicalism.

It may be objected that my approach is no better than primitivism. Indeed, even primitivism is somehow incompatible with physicalism. And even primitivism turns out to take higher-level, weakly emergent properties as fundamental. However, unlike primitivism, my approach does *not* take the *explanandum* (i.e., the connection between S and its causal role) as a primitive fact of the matter. On the contrary, it explains this connection by appealing to the weakly emergent property involved in S. And my approach postulates no special entity such as the relation R. On the contrary, only the weakly emergent property involved in S and the relevant causal role are taken into account.[8] In turn, the weakly emergent property involved in S is something we are already committed to if we believe that S is a token *feature*. And it need *not* be a universal property. Therefore, *ceteris paribus*, my approach is also ontologically more parsimonious than primitivism.[9]

[7] More on this in Paolini Paoletti 2019 and 2021.

[8] The dependence relations at stake in my approach turn out to be internal relations, i.e., relations whose presence is determined just by the essence and/or the existence of their own relata. On the contrary, the relation R postulated by primitivism is *not* internal. For the weakly emergent property involved in S and its causal role are *not* enough (through their essence and/or existence) to make it the case that R holds between them.

[9] I wish to thank Jessica Wilson and the audience at the Sixth Italian Conference on Analytic Metaphysics and Ontology (L'Aquila 2022).

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