



Causal Emergence and Epiphenomenal Emergence

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Abstract

According to one conception of strong emergence, strongly emergent properties are nomologically necessitated by their base properties and have novel causal powers relative to them. In this paper, I raise a difficulty for this conception of strong emergence, arguing that these two features (i.e., nomological necessitation and causal novelty) are incompatible. Instead of presenting this as an objection to the friends of strong emergence, I argue that this indicates that there are distinct varieties of strong emergence: *causal emergence* and *epiphenomenal emergence*. I then explore the prospects of emergentism with this distinction in the background.

1 Introduction

In this paper, I problematise a conception of strong emergence according to which strongly emergent properties are nomologically necessitated by their base properties, and have novel causal powers relative to their base properties. I aim to show that no strongly emergent property can satisfy these two criteria (i.e., causal novelty and nomological necessitation) at the same time. I will suggest that this should lead strong emergentists to make a distinction between two varieties of strong emergence: *causal emergence* and *epiphenomenal emergence*. If such a distinction can be maintained, strong emergentists may wish to convince us that some higher-level properties are causally emergent, whereas others are epiphenomenally emergent. Since my focus will be on strong emergence, I will not always qualify ‘emergence’, ‘emergent’ or ‘emergentism’ with ‘strong’ or ‘strongly’. Unless I explicitly state otherwise, emergent properties that I shall talk about are meant to be strongly emergent.

2 Two Features of Emergence

There is ample discussion of how to understand or formulate emergence in the context of the status of higher-level properties. In what follows, I shall focus on two putatively characteristic features of emergence:

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Causal Novelty (CN): An emergent property has, or confers on its bearer, novel causal powers (i.e., causal powers that its base physical properties do not have, or confer).

Nomological Necessitation (NN): An emergent property of an object is nomologically necessitated by its physical properties.

CN is sometimes associated with the idea that cases of emergence involve ‘downward causation’, i.e., some higher-level properties ‘influence motion in ways unanticipated by laws governing less complex kinds and conditions concerning the arrangements of particles’ (McLaughlin 1992, 51). A link from the doctrine of downward causation to CN is that if some higher-level properties are capable of causally influencing physical goings-on in ways that physical properties may not, then it makes sense to think that some higher-level properties have causal powers that physical properties do not have.¹ Alongside McLaughlin (1992), many others have taken emergentism to involve this sort of downward causation or an endorsement of CN (Broad 1925; O’Connor 1994; Kim 1999; Crane 2001; Wilson 1999, 2005, 2015; Yates 2016).

NN is sometimes presented as a response to a challenge raised by Horgan (1993). The challenge is that both emergentism and non-reductive physicalism are typically characterised as holding that higher-level properties are necessitated by physical properties, but there must be a difference between emergentism and non-reductive physicalism, purely because the former is meant to be an anti-physicalist view (about higher-level properties).² NN is thought to be helpful in overcoming this challenge. What distinguishes non-reductive physicalism from emergentism is the difference in the modal strengths of the necessitation claims they make regarding higher-level properties and physical properties. On this proposal, whereas non-reductive physicalism holds that higher-level properties are *metaphysically* necessitated by physical properties, emergentism is committed to a *nomological* necessitation thesis (van Cleve 1990; McLaughlin 1997; Noordhof 2003, 2010). Since NN says that higher-level properties are nomologically necessitated by their base properties, and is silent about metaphysical necessitation, it is instrumental in responding to Horgan’s challenge. The reason for the emergentist to narrow the scope of necessitation from metaphysical to nomological is that unless trans-ordinal bridge laws (henceforth, *emergence laws*) are held fixed, or included in the necessitation base, higher-level properties will not be necessitated, metaphysically, by lower-level physical properties. The thought here is that such laws, if emergentism is true, will be on a par with fundamental physical laws (i.e., not derivable from other fundamental laws), hence their inclusion to the base is required

¹ Though, the converse of this link is questionable. One might think that higher-level properties have, relative to physical properties, novel causal powers that have nothing to do with physical goings-on. If so, then CN itself does not support the doctrine of downward causation. Thanks to an anonymous referee for pointing this out.

² I should note here that although emergentism is typically characterised as an anti-physicalist view about higher-level properties, it is not characterised as a non-naturalist view. In fact, non-reductive physicalism and emergentism are understood as naturalist rivals. They both hold that the instantiations of higher-level properties depend on the instantiations of natural properties. This marks an important difference between emergentism and other anti-physicalist views such as classical substance dualism.

to ensure that the obtaining of a physical state of affairs guarantees the obtaining of some emergent state of affairs.

My question here is not whether CN and NN are good or independently plausible criteria for emergence. My question is whether CN and NN are compatible. In that sense, a central aim of this paper is to clarify the logical space that is available to emergentists. For this, I will ask: Can some higher-level property be nomologically necessitated by some lower-level property and yet have novel causal powers? In what follows, I will argue for a negative answer, at least insofar as causal novelty and nomological necessitation are understood along the lines of CN and NN respectively.

3 *Relata* of the Emergence Relation

The central claim of this paper is that the criteria CN and NN cannot be satisfied simultaneously: for all properties *F* and *G*, it is not possible for *G* to be nomologically necessitated by *F* and yet have novel causal powers relative to *F*. But before presenting this argument, I shall first clarify what sorts of properties the emergence relation, as I understand it, should take as its *relata*.

Take two properties: *LOW* and *HIGH*. Here, *LOW* is a complex (broadly) physical property that includes some micro-structural ‘core’ component—as in *being made up of such-and-such micro entities with such-and-such properties and related to each other by such-and-such relations*—and an ‘extrinsic’ component—as in *being instantiated in a such-and-such situation*. We will take *LOW* and *HIGH* to be numerically distinct properties that can be simultaneously instantiated by the same object. For example, *HIGH* may be a mental property of an organism and *LOW* may be a neurophysiological property of the same organism. The best descriptions of these properties will refer to entities that belong to different levels: whereas *HIGH* will be a higher-level property because its best description will refer to some macro entity (e.g., an organism), *LOW* will be a lower-level property because its best description will refer to some (relatively) micro entities (e.g., neurons). Although their descriptions refer to entities from different levels, they can be instantiated by the very same object.³ We will explore whether *HIGH* could be an emergent property that is nomologically necessitated by *LOW* and yet have novel causal powers relative to *LOW*.

What are the reasons for stipulating these features for *LOW* and *HIGH*? First, I want to preserve the idea that the emergence relation between emergent properties and their base properties has a ‘compositional’ nature, but I want to do this in a way that doesn’t rule out that the emergence relation *can* be a same-subject relation—i.e., a relation that relates the properties of the same object. One way of doing this is by taking *LOW* to be a micro-structural property of a macro object. Second, I want to ensure that the nomological necessitation constraint on emergence doesn’t automatically fail to be satisfied. If *LOW* doesn’t involve background conditions, we

³ In Kim’s (1998) terms, *LOW* will be a ‘micro-based macro property’. Micro-based properties can be properties of macro objects. A macro object has a micro-based property in virtue of having some micro components that are specified in the description of the micro-based property in question.

can't hope to show that it necessitates any interesting higher-level property. Suppose that '*LOW*' stands for *C-fibre stimulation*, '*HIGH*' stands for *pain*, and *C-fibre stimulation* brings about painful sensations. We know very well that a *C-fibre stimulation* instance alone doesn't necessitate, nomologically or metaphysically, a *pain* instance, as *C-fibres* that are stimulated in a Petri dish don't bring about painful sensations (Shoemaker 1981). So, *LOW* must involve at least some background conditions such as *being instantiated in the nervous system of a functioning organism*. Third, if *LOW* isn't a lower-level property that is nevertheless instantiated by a macro object—i.e., an object that could instantiate *HIGH* as well—then instances of *LOW* wouldn't necessitate, nomologically or metaphysically, instances of *HIGH* for the simple reason that a property of a single micro object doesn't necessitate any property of a macro object, trivial cases put aside—i.e., cases that involve properties such as *being a micro part of a macro whole that instantiates HIGH*. Fourth, *LOW* should be a property that can be instantiated by an object that can also instantiate *HIGH* so that we make sure that the causal novelty constraint on emergence is not trivially satisfied. Again, aside from trivial cases, wholes have causal powers that their proper parts don't have. By making *LOW* and *HIGH* properties of potentially the same bearer, we make the question as to whether emergent properties could have novel causal powers relative to their base properties more interesting than the question as to whether wholes have causal powers that their proper parts don't have.

So, as far as the argument to be presented is concerned, I will assume that (1) *LOW* is a lower-level property, (2) *HIGH* is a higher-level property, (3) *LOW* and *HIGH* could be had by the same object, and (4) *HIGH* is nomologically necessitated by *LOW*.

4 Conferring a Causal Power

Having laid out in the previous section the important characteristics of the *relata* of a putative instance of the emergence relation, my question is the following: if *LOW* nomologically necessitates *HIGH*, could *HIGH* have any novel causal powers relative to *LOW*?

To pursue this question, I shall adopt a particular thesis about the relationship between properties and the causal powers they are said to confer on their bearers. In so doing, I will presuppose no substantial views about properties or causal powers. So the thesis I adopt is meant to be compatible with a range of views.⁴ Here is the thesis:

⁴ An anonymous referee raises the concern that the very talk of properties *conferring* causal powers presupposes that properties are more fundamental than causal powers, since in an ontology whereby powers are fundamental and properties are constructions out of, or clusters of, powers, it would not make sense to say that properties confer powers. My view is that it *does* make sense insofar as one can understand power conferral in terms of there being the relevant relationship between a property and the causal powers that the former is a cluster of. On a view according to which properties are clusters of causal powers, the conferral relation between a property and its causal powers would be nothing over and above there being such clustering relation: a property confers some causal power insofar as that causal power is a member of the cluster that is identical with that property.

The Nomic Bearers Thesis (NBT) A property F confers on its bearers a causal power C if and only if, as a matter of nomological necessity, all bearers of F have C (Baysan 2018).⁵

Why adopt **NBT**? We do need an account of what it is for properties to confer causal powers on their bearers so as to make sense of **CN**. And if an account has to be assumed, it is better to assume one that doesn't rely on a notion of conferring a power that goes beyond a relation of nomological necessitation.⁶ There are two relations that I think of that go beyond nomological necessitation: (1) metaphysical necessitation and (2) 'in virtue of' relation. Neither seems preferable to nomological necessitation.

An appeal to metaphysical necessitation would presuppose a necessitarian view about laws of nature (assuming realism about laws of nature). If necessitarianism about laws of nature is true, then nomological necessities would coincide with metaphysical necessities, in which case a necessitarian may as well subscribe to **NBT**. In other words, if we were to explain the conferring relationship between a property and its causal powers in terms of a metaphysical necessitation relation, we would have reasons to think that nomological necessities are metaphysical necessities. So, an appeal to metaphysical necessitation doesn't give us a real alternative to **NBT**, hence it is not preferable to it.

An appeal to 'in virtue of' relation would suggest that a property confers on its bearers some causal power just in case its bearers have that causal power in virtue of having that property. About this option, I have two reservations. First, I find this use of 'in virtue of' unhelpful. Inspired by Wilson (2014), I believe that such generic 'in virtue of' claims need something that explains them. If the causal powers a property confers on its bearers are the ones that objects have in virtue of having that property, the next question should be why it is that this property and this causal power are related this way. Is it because of the essence of the property? Is it because there is some law that guarantees this relationship? Or is there something else that connects this property and this causal power by this grounding relation? A mere 'in virtue of' explanation leaves these questions unanswered. Second, an 'in virtue of' claim along these lines seems to presuppose that objects have their causal powers in virtue of their properties. That properties are constructions out of causal powers is a possible view; and to some, it is a plausible one (e.g., Shoemaker 1980). On such views, objects can be naturally said to have their properties in virtue of their causal

⁵ **NBT** does not distinguish between conditional powers and powers *simpliciter*. Conditional powers are powers that objects have conditionally on having certain properties. For example, an object which is made of steel has the power to cut bread conditionally on being knife-shaped, whereas an object which is both knife-shaped and made of steel has the power *simpliciter* to cut bread (Shoemaker 1980). For the same reason that an object has more conditional powers than powers *simpliciter*, it is reasonable to assume that a property confers on its bearers more conditional powers than powers *simpliciter*. It is up to the defenders of emergence to decide if they want to understand **CN** in terms of novel conditional powers or novel powers *simpliciter*. **NBT** can accommodate both understandings.

⁶ Thanks to an anonymous referee for suggesting this way of putting this.

powers (and not vice versa).⁷ So, an appeal to an ‘in virtue of’ relation would presuppose views that **NBT** is neutral about.

For these reasons, I believe that **NBT** is preferable to alternatives that go beyond a relation of nomological necessitation. Without further argument, I will assume **NBT** in the discussion to follow.

5 Incompatibility of CN and NN

Let us go back to our main question. Could *HIGH* be nomologically necessitated by *LOW* and nevertheless have novel causal powers relative to *LOW*? I will argue for a negative answer by using **NBT** that I have presented in the previous section.

5.1 The Incompatibility Argument

Suppose that there is some causal power, *CP-1*, conferred by *HIGH* on its bearers. The question of **CN** is whether *CP-1* may fail to be a causal power of *LOW*, given that *HIGH* is meant to be emergent from *LOW*. Assuming **NN**, *LOW* nomologically necessitates *HIGH*; so, as a matter of nomological necessity, all bearers of *LOW* are also bearers of *HIGH*. Now, if *CP-1* is a power conferred by *HIGH*, **NBT** suggests that it must be a matter of nomological necessity that all bearers of *HIGH* have *CP-1*. From these two, it follows that it is a nomological necessity that all bearers of *LOW* have *CP-1*. According to **NBT**, this entails that *LOW* also confers on its bearers *CP-1*. Therefore, *CP-1* does *not* fail to be a causal power of *LOW*. That is, if *CP-1* is a causal power of *HIGH*, it is also a causal power of *LOW*. The conclusion easily generalises from *CP-1* to any causal power we might want to attribute to *HIGH*. So, we have the following result:

Incompatibility: For all properties *F* and *G*, and for all causal powers *C*, if *F* nomologically necessitates *G* and *C* is a causal power of *G*, then *C* is a causal power of *F* too.

5.2 Emergence Laws

In the incompatibility argument, the notion of nomological necessity plays a central role. What is a nomological necessity? For those who take laws of nature ontologically seriously, a nomological necessity is necessity that is dictated by the laws of nature.⁸ Recall that, according to some, it is an emergentist doctrine that fundamental laws of nature include emergence laws. In the case of the mind–body relations, psycho-physical laws are meant to be such laws according to the emergentist about the mind. The putative fundamentality of such a psycho-physical

⁷ The reader who finds this ‘in virtue of’ option more plausible than **NBT** (which I endorse) should see Yates (2016). Yates prefers the ‘in virtue of’ route that I considered above and examines **CN** in light of this.

⁸ Of course, all metaphysical necessities are also nomological necessities. So, some nomological necessities, namely those which are also metaphysical necessities, may be necessities not due to the laws of nature.

law is the main motivation for restricting the necessitation claim that the emergentist makes to nomologically possible worlds: without the inclusion of such arguably contingent emergence laws, there would be no guarantee that a physical state of affairs necessitates an emergent state of affairs.⁹

Now, we can make the following observation.¹⁰ If the relevant sense of necessitation is nomological necessitation, for the necessitation of *HIGH* by *LOW*, we must be given, or hold fixed, the relevant laws. Given that *HIGH* is meant to be an emergent property, the natural thing to do here is to take the relevant laws to include some emergence laws. So, only with the help of emergence laws, *LOW* brings about instances of *HIGH*. In order to explain the relationship between a property and the causal powers it confers on its bearers, we have appealed to **NBT**, which links properties and causal powers with nomological necessities. If the causal power *CP-I* that *HIGH* confers on its bearers is meant to be explained by a nomological necessity as **NBT** suggests, it is again natural to assume that the nomological necessitation in question would depend on some emergence laws. My conclusion above was that if *HIGH* confers on its bearers *CP-I* and *HIGH* is nomologically necessitated by *LOW*, then *LOW* must confer on its bearers *CP-I* too. But the considerations we have just seen suggest that *only with the inclusion of emergence laws can LOW confer on its bearers CP-I*. This would suggest that if emergentism is true, then some causal powers that *physical* properties confer on their bearers will be conferred partially thanks to some emergence laws. Likewise, in the case of emergentist philosophy of mind, the implication would be that some physical properties confer causal powers on their bearers with the help of psycho-physical laws.

Although one might think that this has the consequence that emergent properties ‘pollute’ the physical emergence base (see Howell 2009, 93; Morris 2014), one might equally argue that this is something that emergentists would be happy with. After all, the doctrine that some arrangements of physical particles have some of their causal powers in virtue of there being special kinds of laws that are not derivable from purely physical laws is something that an emergentist would subscribe to.

5.3 The Causal Inheritance Principle

The conclusion of my argument in Sect. 5.1—i.e., that the nomological necessitation and the causal novelty features of the emergence relation cannot be satisfied at once—resembles Kim’s ‘causal inheritance principle’, which he states as follows:

⁹ Among others, Clarke (1999) and Melnyk (2003) emphasise the requirement of such laws for emergentism. Clarke characterises the role of these laws as that of ‘supersession’: in circumstances, the lower-level (physical) laws are “‘superseded” (though not contravened)’ by the laws of emergence (1999, 309). Melnyk considers (and dismisses, with arguments that I don’t have space to survey here) the anti-physicalist hypothesis that certain higher-level goings-on are due to ‘fundamental law[s] of emergence’ (2003, 244).

¹⁰ Thanks to an anonymous referee for pointing this out.

If mental property M is realized in a system at t in virtue of physical realization base P , the causal powers of this instance of M are identical with the causal powers of P . (1992, 18)

The similarity between my conclusion and the causal inheritance principle is that the latter too says that the causal powers of a higher-level feature (i.e., ‘mental property M ’) must also be causal powers of its base feature (i.e., ‘physical realization base P ’). However, although I agree with the causal inheritance principle (see Baysan 2016), there are important differences between **Incompatibility** and Kim’s version of the causal inheritance principle, which I shall explain below.

First, Kim’s intention in putting forward the causal inheritance principle is to show that the causal powers of a mental property are identical with the causal powers of its physical realizer, thereby to put pressure on the non-reductive physicalist’s contention that mental properties are numerically distinct from physical properties. Kim seems to hold that the causal powers of an instance of a property F are the causal powers of the property F . Thanks to this, since the causal powers of an M instance and a P instance are identical, the causal powers of properties M and P must be identical too. If instance-identity entails property-identity (something that Kim appears to hold) and properties are individuated by their causal powers (as Kim believes), then the properties M and P must be the same property. I don’t share this set of beliefs with Kim, and agree with Wilson (1999, 2011), Clapp (2001), and Shoemaker (2001, 2007) that the causal inheritance principle indicates a *proper subset* relation between the causal powers of mental properties and their physical realizers.¹¹

Second, Kim’s causal inheritance principle—and likewise Wilson’s and Shoemaker’s ‘proper subset’ versions of it—concern the *realization* relation, not the emergence relation,¹² and realization is the relation that non-reductive physicalists postulate in order to explain the dependence of the mental on the physical. This becomes very clear when we see Kim’s reason for accepting the causal inheritance principle in the first place:

Why should we accept [the causal inheritance] principle? ... To deny it would be to accept *emergent* causal powers: causal powers that magically emerge at a higher-level and of which there is no accounting in terms of lower-level properties and their causal powers and nomic connections. This leads to the notorious problem of ‘downward causation’ and the attendant violation of the causal closure of the physical domain. I believe that a serious physicalist would find these consequences intolerable. (Kim 1992, 18, emphasis in the original)

¹¹ Among others, Pereboom (2011, Chapter 7) rejects the Wilson-Shoemaker view on the grounds that it identifies causal powers of mental properties with those of physical properties. In so doing, he doesn’t reject physicalism. Pereboom’s view is that causal powers of mental properties are constituted by (and hence are not identical with) the causal powers of physical properties.

¹² Note that Wilson (2015) sometimes uses the term ‘weak emergence’ to refer to what I mean by ‘realization’ here.

So, Kim thinks that the causal inheritance principle should be true for physicalists. However, **Incompatibility** is not restricted to physicalism and the realization relation. It applies to any same-subject nomological necessitation relation and hence to the emergence relation too, assuming that the emergence relation is a same-subject nomological necessitation relation. So, in this sense, **Incompatibility** has wider consequences than Kim's causal inheritance principle.

6 Responses to the Incompatibility Argument

The incompatibility argument I presented in Sect. 5.1 shows that, for all properties F and G , and for all causal powers C , if F nomologically necessitates G and C is a causal power of G , then C is a causal power of F too. Before explaining what I think the lesson from this should be, I want to present two possible solutions to the problem.

One thing that the emergentist who wants to preserve both the nomological necessitation and the causal novelty features of the emergence relation—i.e., the type of emergentist that Wilson (2015) takes to be the typical defender of the view—can do is to appeal to Wilson's (2002) strategy and relativise causal novelty to a set of fundamental forces and interactions (henceforth, simply interactions). Wilson's strategy is to, strictly speaking, accept that all causal powers of the emergent property *HIGH* are also causal powers of *LOW*, but hold that the causal powers of *HIGH* include some causal powers that are not grounded in fundamental physical interactions. So, in a way, *HIGH* has some novel causal powers *relative to the set of causal powers of LOW that are grounded in fundamental physical interactions*, but strictly speaking, *HIGH* does not have novel causal powers relative to *all* causal powers of *LOW*.

Although this yields a coherent way of showing that there could be *some* causal novelty that *HIGH* can exercise even if it is nomologically necessitated by *LOW*, this strategy hinders the plausibility of emergentism by making emergentism more controversial than it should be: it commits emergentism to claims about fundamental interactions, and moreover to a grounding relationship between causal powers of properties and such physical interactions. Moreover, regardless of the plausibility (or implausibility) of this strategy, it is clear that, on this conception, CN is not satisfied; CN is simply replaced with a different criterion about causal novelty.

A second option for the emergentist who wants to preserve both the nomological necessitation and the causal novelty features of the emergence relation would be to allow for the nomological necessitation relation to relate properties of different objects. In other words, the emergentist could give up the 'same-subject' feature of the nomological necessitation relation. This, I believe, is a coherent view¹³ and makes emergentism more similar to the type of view that has been defended by O'Connor and Jacobs (2003) and also some contemporary substance dualists (Lowe 2006; Nida-Rümelin 2006). However, as per the previous solution, this is not a way

¹³ See Baysan and Wilson (2018, 89) for a presentation of this account of 'strongly emergent objects'.

of showing that CN and NN are compatible. Here, NN is simply replaced by a criterion whereby the nomological necessitation relation is *not* a same-subject one.

7 Causal Emergence and Epiphenomenal Emergence

I have argued that two criteria for emergence, namely CN and NN, cannot be satisfied simultaneously. In this final section, I want to suggest that it is more plausible to think of emergentism as comprising two different views about higher-level properties.

According to the first view, some higher-level properties have novel causal powers relative to their base properties, yet such higher-level properties are *not* nomologically necessitated by their base properties (in the sense that they do not supervene, even nomologically, on physical ‘base’ properties). Call this first variety of emergence ‘causal emergence’, and the variety of emergentism that takes higher-level properties to be emergent in this sense ‘causal emergentism’. According to the second view, some higher-level properties are nomologically necessitated by their base properties, but they do *not* have any novel causal powers. Call this second variety ‘epiphenomenal emergence’, and the variety of emergentism that takes higher-level properties to be emergent in this sense ‘epiphenomenal emergentism’.

Strictly speaking, causal emergentism and epiphenomenal emergentism are not incompatible views as long as they take different higher-level properties to be causally or epiphenomenally emergent. A single property cannot be causally and epiphenomenally emergent, yet some properties might be causally emergent whereas some others might be epiphenomenally emergent. For example, an emergentist (in philosophy of mind) might think that phenomenally conscious properties are epiphenomenally emergent and some intentional mental properties are causally emergent.

For the causal emergentist, causally emergent properties will not nomologically supervene on their physical base properties—as far as supervenience is understood as strong supervenience.¹⁴ It is standard to take physicalism in philosophy of mind to be committed to the metaphysical supervenience of the mental on the physical, and anti-physicalist property dualism (of which emergentism is the typical example) to be committed to only the nomological supervenience of the mental—in particular the phenomenal—on the physical (Chalmers 1996). Here, causal emergentism must depart from even this nomological supervenience thesis. If it implies that nomological supervenience fails, can causal emergentism be classified as a naturalist view? We can understand naturalism (about higher-level properties) to be the view that higher-level properties depend on natural properties for their instantiations. Dependence of some property on other properties need not imply the supervenience of the former on the latter. So, the causal emergentist may wish to argue that her view is naturalist in this sense.

¹⁴ A-properties strongly nomologically supervene on B-properties just in case, for any individual x and any property F in A, if x has F, then there is some property G in B such that x has G, and as a matter of nomological necessity, for any individual y, if y has G then y has F.

What about epiphenomenal emergentism? An epiphenomenal emergentist holds on to the nomological necessitation of the emergent properties by their base properties, so arguably is not committed to the failure of the nomological supervenience of higher-level properties on physical properties. But, for the sake of consistency, she cannot attribute any novel causal powers to higher-level properties that are nomologically necessitated by base properties if my incompatibility argument is sound. But you might ask: if this view implies that higher-level properties do not have any novel causal powers, in what sense can this view be an anti-physicalist view?

First, in accepting the nomological necessitation of *HIGH* by *LOW*, an epiphenomenal emergentist is not thereby committed to the metaphysical necessitation of *HIGH* by *LOW*, and this might be sufficient to render epiphenomenal emergentism an anti-physicalist view. If so, this version of emergentism should be committed to the nomological–metaphysical distinction, which is rejected by necessitarian views about laws of nature. Then, this way of understanding emergence bears resemblance to a view in metaphysics of mind according to which zombies are metaphysically possible (Chalmers 1996). Zombies are creatures which are physically indistinguishable from phenomenally conscious creatures like us, yet despite the physical exact-resemblance they bear to us, they have no phenomenal consciousness. The *possibility* of zombies, then, would imply that consciousness is an emergent feature of our world, in the sense of epiphenomenal emergence. *LOW* may be a physical property that underlies a phenomenally conscious property, say *HIGH*, in the actual world and nomologically similar worlds. In worlds where laws are different than the ones in our world (e.g., by lacking the relevant emergence laws), *LOW* could fail to bring about *HIGH*. This should be a welcome result for an anti-physicalist, as phenomenal consciousness is exactly the type of phenomenon that anti-physicalists focus on in their attacks on physicalism.

Second, note that epiphenomenal emergentism, as the name suggests, is not committed to the rejection of epiphenomenalism. Here, epiphenomenalism about a domain of properties can be understood as the view that properties in that domain are causally inert. When saying that *LOW* nomologically necessitates *HIGH* and that *HIGH* doesn't have any novel causal powers relative to *LOW*, we leave it open as to whether *HIGH* has *any* causal powers at all. Perhaps the causal novelty constraint for *HIGH* fails just because *HIGH* does not have *any* causal powers. It should go without saying that the idea behind epiphenomenal emergentism is in tension with how some classical theories of emergence conceive of their target phenomena: i.e., in terms of their causal novelty. What I am offering here is a revision of this classical conception. I don't mean to suggest that epiphenomenalism about higher-level properties is a plausible view. At least, this is not something that I wish to argue for here. But I think it is a virtue of this understanding of emergence that it is compatible with a view (i.e., epiphenomenalism) which may strike some anti-physicalists to be not so implausible.

There is a potential problem for causal emergentism that does not affect epiphenomenal emergentism. For the causal emergentist, the challenge is to spell out the nature of the dependence relation which is supposed to relate causally

emergent properties to their bases. This can be put in terms of a dilemma. The causal emergentist should either posit a *sui generis* dependence relation—call this ‘the causal emergence relation’—or spell out a notion of dependence which is a plausible candidate to relate higher-level properties to physical properties. If the causal emergentist does the former, she should convince us that we should accept the positing of a new primitive dependence relation. This does not seem to be very a satisfactory option, as one is left wondering how higher-level properties causally emerge. If the causal emergentist wishes to do the latter, the challenge is to find a relation of dependence which does not entail nomological supervenience, and further to persuade us that some higher-level properties are dependent on physical properties in this way. Whether these two can be done remains to be seen.

8 Concluding Remarks

To sum up, then we have (at least) two varieties of emergentism about higher-level properties, and this distinction does not map on to a distinction that is often drawn between weak and strong emergence (Chalmers 2006; Wilson 2015). These varieties are causal emergentism and epiphenomenal emergentism. Causal emergence and epiphenomenal emergence are distinct and mutually exclusive varieties of strong emergence. Causal emergentism takes an emergent property to be causally novel, whereas epiphenomenal emergentism allows it to be a causally inert property. Also, whereas the former takes emergent properties to fail to be nomologically necessitated by their base properties (because of **Incompatibility** that I argued for in Sect. 5), the latter can hold on to the nomological necessitation feature of emergence.

Whereas previous work on emergence has mainly focused on distinguishing between weak emergence and strong emergence, distinguishing between varieties of strong emergence is an option which has been underexplored. Even when others have discussed different *understandings* of strong emergence, their primary aim has been either to show that they are somewhat equivalent and hence cover the same target phenomena, or to argue that one understanding of strong emergence is superior to others. My claim in this paper is that there are different varieties—not merely different understandings—of strong emergence. They cover mutually exclusive target phenomena, but the accounts that dwell on them—i.e., causal emergentism and epiphenomenal emergentism—are not competitors. An emergentist can take some higher-level properties to be causally emergent and some others to be epiphenomenally emergent. I take this to be a progress in understanding emergentism about higher-level properties.

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