The Emerging Limits of Emergentism: Systematicity

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Abstract

Taking steps from Wilson's distinction between strong and weak emergence, in this paper I cast doubts on the prospect of weak emergence. After discussing the relationship between properties set at different levels and supporting different counterfactuals and laws, I discuss one crucial condition for a property to be weakly emergent, one that is usually taken as the primary motivation for emergence, that of being "realization indifferent". I set an argument aimed at showing that this realization indifference does not accord with systematic relations holding between properties set at the mental level *vis-a-vis* their realizers. Since it is not possible to have mental properties which are not systematic, mental properties cannot be weakly emergent properties.

Keywords: Emergence, Systematicity, Multiple realization, Realization indifference, Subset.

1. The Making of Emergence

The issue of emergence still is the issue of whether special sciences are autonomous with respect to non-special, or fundamental, sciences. Such an issue was set by the debate, spanned over the years, between Jerry Fodor (1974, 1997) and Jaegwon Kim (1992, 1998 and 1999). The issue of emergence has both an epistemological side—the knowledge and methodology that we use to understand some properties in the world is absolutely specific to those properties?—and an ontological side—are there independent chunks of reality? How do they connect with other chunks?

Thus construed, emergence is seen as an articulated and robust phenomenon. *Articulated* inasmuch there are relations among properties (often called higher-level properties) which are taken to be *independent*, so distinct, of other properties (often called lower-level properties); *robust* inasmuch those relations support counterfactuals, thus allowing for predictions and explanations, that is, for a complex interrelation of epistemological procedures, tenets, and constraints. Or at least those who defend emergence seem to think.

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In her book *Metaphysical Emergence*, Jessica Wilson (2021, but see also 2015) argues that we have metaphysical emergence when macro-entities like humans, trees, rocks, and artifacts—as chairs and skyscrapers—are cotemporally materially dependent on but ontologically and causally autonomous from micro-entities, such as quarks and leptons, that ultimately form their base. On this general picture, two varieties of emergence are discussed: weak emergence, which occurs when a high-level feature (be it a property, state or behavior)[1] is both ontologically and causally autonomous and cotemporally materially dependent on a lower-level property or feature—where autonomy is guaranteed by having a subset of the powers had by its base features; and strong emergence, in which along with cotemporally material dependence there is a degree of autonomy to be found in the presence of a new causal power, not to be found in the base features. As such, strong emergence abandons the principle of the causal closure of the physical world, so a high-level feature occurrence cannot be traced back to the occurrence of lower-level physical features. The strong version of emergence proves to be very difficult to defend, while the weak version seems reasonable. But is this the case?

Emergence can be tackled via conceptual analysis and via metaphysics. On the conceptual side, Nicholas Humphreys (2016) has argued along two paths: one is positing that the presence of some properties cannot be derived from the presence of other properties. The other path says that taking certain configurations or patterns as evidence of emergence depends on our conceptualization of those configurations. The first path is conceptual because the notion of *derivation* is not the direct result of the adoption of the nomological-deductive method of science. So, it is a specially tailored notion. The second path, one that applies to phenomena such as flocks of birds or traffic jams, depends on our, presumably *Gestaltic*, capacity of recognizing groups of individual entities moving in a coordinated way as singular entities.

On the metaphysical side, Kim has argued that the nomological relations connecting higher-level *properties*, such as the movement of a flock, could be substituted by lower-level properties, the movements of each bird, thus favoring local reductions. Such local reductions have the burden to show that nothing is lost when the higher-level properties are split into lower-level properties, thus dissolving or reducing the seeming higher-level properties.

How did the attack on special sciences properties develop? One of the attacking points is to consider the predicates used by the special sciences to establish their own domains. For, any new science is characterized by a specific vocabulary, with its predicates and relations. Now, the predicates admissible in laws must be projectible and such that the laws mentioning them support counterfactuals. Being projectible means that the future applications of a predicate are warranted and supported by its past successes. Basically, it is a measure of inductive success, a measure of the force or strength of predicates.[2] Being counterfactual supporting means that the predicates that make a counterfactual true are those that can be included in science because they guarantee the truth of the covering

[1] Somehow betraying Wilson's wording, I will use "features" and "properties" interchangeably.

[2] As a side note in the philosophy of science, one may take it as a sign of resistance to change in science. E.g. "climate change" has not a deep entrenching in past scientific discussions, hence its projectability is modest. Consequently, it is very difficult to take it as a serious player in discussions on the future of climate.

law. Now, the wideness in the support of counterfactuals by a law is a measure of the scope of the application of the law itself. Such wideness can be evaluated both by the number and by the differences of these counterfactuals.

The number of counterfactuals is evidence of how much the law is applied, say, in the same field, thus providing more and more robustness to the projectability of its predicates. The difference in counterfactuals is to be considered in terms of type rather than of token. That is to say, a type different counterfactual establishes specific new relations and it is applied to type different entities and conditions. Clearly, there are cases where there can be type different counterfactuals, and a very high number of them, without this fact providing much insight, as when we say, e.g., that water freezes at 0°C or below and then we may formulate a counterfactual for each fraction of degree below 0°C, which is not very informative. But there are cases in which this number is of interest, as when we consider the angle at which an object bounces in a billiard table or a re-entry trajectory in the atmosphere is to be calculated. Also in this case, we may provide a counterfactual for each value, but the result could prove to be of great importance.[3]

Of greater importance is the number of *type* different counterfactuals supported by a law. Such a number depends on the adaptability of the predicates to new conditions, so by the inductive strength they have. Such strength is made evident exactly by the type-difference of the counterfactuals that the law supports, that is, as said, by the scope of the applicability of the law.

So, the number and types of counterfactuals that a law supports are determined by the strength of the projectability of its predicates, and how much a predicate is projectible depends on the inductive support given by it to successful applications of the law, success measured by the number of conditions in which the law holds. This may sound circular, but since the data and conditions are continuously changing, the circle is not vicious but rather virtuous. In a way, projectability and counterfactual support show us that conceptual analysis and metaphysics are the two sides of the same coin.

It seems, then, that what matters for the inclusion of a predicate into a law is what I would call predicate's *robustness*, namely its projectability and the counterfactual support of the law in which such predicate is included.

One of the most striking examples of this complexity is the way predicates used in psychology are now used in neurology and Artificial Intelligence. Let me contrast three different uses of "is perceiving". 1) A person is visually perceiving satisfactorily if she orientates and navigates herself properly into the world, namely if she finds her way, and does not bump into obstacles. 2) A person is visually perceiving if her eyes, lateral geniculate nuclei, and occipital areas V1-V5 are working and responding to the impinging stimuli determining the appropriate responses from the motor cortex. 3) A robot is perceiving if its cameras, processors, and CPU are such to activate its motor control engine to minimize the number of damaging interactions with the physical world while navigating it appropriately. So, the predicate "x is perceiving the environment" is used in several and type-different ways.[4]

This variety of applications, and this robustness, may come at a cost. On the one side, the wider the application, the wider the projectability and the support

[3] Thanks to Larry Shapiro for having pointed out this problem to me.

[4] I am not getting into the consciousness domain on purpose now, because I do not want to mix the issues.

for a variety of counterfactuals. On the other side, the counterexamples to the inductive base of such large-spectrum predicates can be quite different and revealing of their distinctness. This point was noted by Kim and discussed by Fodor, and the discussion was in terms of potentially disjunctive sets of confirmation.

In their original example, Fodor and Kim were considering "jade": a noun used to refer to two chemically different gemstones, jadeite and nephrite. Now, the sentence "jade is hard" is true both of jadeite and nephrite but this could be the case for different physical-chemical structures.

Fodor stressed that a high-level property could have an open or a closed set of realizers, where it being open is a crucial feature of special sciences. Now, I take the idea of an open set as quite idealized: a set should be closed for it to be defined, so let's say that what Fodor had in mind was an ideally very heterogeneous set. Let's consider pain: supposedly, in humans, it is realized by C-fiber firing, but it could be differently realized in other sentient beings and the realizers form an open set. So, we may take the property of being in pain as one that at a very high level can be shared by different entities, from human beings to other mammals, to other animals up to potentially extra-terrestrial individuals. At a finer level of detail, being in pain is multiply realized by structures that may have nothing in common.

So, is the latency, the wideness in the applicability of predicates and laws, tightly linked and supported by the projectability and number of counterfactuals or should we accept a loose relationship between the underlying (lower-level) structures supporting the higher-level phenomena?

2. Setting a Discussion

The above question bears directly to the issue of emergence, for emergence necessarily entails some form of autonomy between properties (and predicates) as referring to different levels of reality (whatever these levels are). In what follows I will consider weak emergence only, as the strong version seems to have little to no-prospects to be right. Indeed, strong emergentism entails abandoning the principle of causal closure which physicalists take to be non-negotiable. Vice versa, weak emergentism accepts the principle and tries to show that high-level and low-level features do not determine the pernicious overdetermination of so-called double-throw rock variety. Wilson's take on weak emergence is crucially set on the proper subset of power condition (PSPC) according to which a weak emergent feature S has on a given occasion powers that are a proper subset of the powers had by the Ps features on which, in that occasion, S cotemporally materially depend (CMD) (cf. Wilson 2021: 59).[5] In the terms of pain, we may say that John being in pain has both a special science feature (the phenomenal experience John is having) and a physical feature (his C-fibers firing) so that the S CMD on the Ps while being ontologically and causally autonomous from Ps. This PSPC is the way in which this autonomy is spelled out, and such condition is, in a way or another, endorsed or satisfied by all the weak emergentist parties, Wilson argues. This satisfaction, though, comes in different varieties. All these varieties are form of realization. These could be functional, constitutive-mechanistic, mereological, determinable-based or ontologically explanatory realization. Now, some of these varieties of realizations entail multiple realizability: surely functional realization does, but so mereological and determinable-based as well. To wit: one can multiply realize a wall out of the same bricks by

[5] From now on, references to Wilson's book will be just numbers in brackets.

having these parts rearranged (unless endorsing the very much debated constitution as identity thesis) or one may realize red by having either, say, crimson or scarlet and this goes hand in hand with the determinable type having fewer powers than its determinate types, thus satisfying the PSPC (65). Even if I prefer to leave it open whether all forms of realizations entail multiple realizability, we may stress that in most of the central cases of emergence, the way in which the weakly emerging property occurs is indifferent with respect to how it is realized, thus entailing some form of multiple realizability. I will say more on this later on, while defending the second premise of an argument that, I believe, could represent a problem for weak emergence. The argument goes as follows:

(i) Mental features are systematic;
(ii) (Many cases of) Emergence entails realization indifference;
(iii) Systematicity entails that realization indifference cannot hold;
(iv) Therefore, (in many cases) mental features can't be emergent.

3. Defending Premise (i)

We need to defend these premises. One crucial issue is whether mental properties Ss are systematic, as I will argue. That mental properties are systematic can be established via a sort of slippery slope: if some properties are in systematic relations, then you have a lot of systematicity.

Why accept systematicity? For the mental such acceptance is crucial: the more systematic the mental relations are, the less viable a complete reduction of them is. This was Davidson's point (1970) in stressing the anomaly of the mental (and hence its normative nature), or Fodor's (1975) point in stressing the holistic (*Quinean*: each belief is somehow confirmed by every other belief) and deeply inferential (*isotropic*: every belief is somehow pertinent to every other belief) nature of central systems.

The idea of such systematicity is that one can go from one mental state to another via logical or deductive relations. Now, this is surely true of intentional states: assuming rationality (Dennett 1971) or the principle of charity (Davidson 1974) amounts to assuming that crediting one subject with the belief that *p* entails also crediting the subject with those beliefs that follow from *p* at least directly and straightforwardly. Clearly, one has to refrain from assuming logical omniscience, but this can be limited, as I said, by taking only direct inferential links as acceptable. But is that true of qualitative or phenomenal states as well?

I think there are systematic relations also in the case of phenomenal states. Compare two phenomenal state tokens or properties Ss, say the property of feeling pain. We can consider many systematic relations. Let me make two cases for phenomenal states and one in which phenomenal and intentional states are mixed.

From stimulus to phenomenal state: if a subject is stimulated by stimulus R and enters into a phenomenal state S, it could be proved that if the subject receives stimulus 2R (double intensity) it will get into a state nS related to state S by some ratio (as per Weber-Fechner law). So, if these Ss are happening to the same subject along a short interval, we should imagine them being in a mathematical relation that somehow mirrors the values of the stimuli. This relation was supposed to be logarithmic, even if Johnson et al. (2002) have now demonstrated that the basic law of psychophysics vindicates linearity between a subjective experience (or magnitude, as they call it) and the neural activity on which it is based. According to them:

> [the] subjective magnitude, m, depends on a single, unidimensional measure, c, of the complex, multivariate neural response studied in the neurophysiological experiments: m = m(c). [Where] c = c(N), in which c(N) is the function (the operation) that yields the neural coding measure, c. If, for example, c is the mean firing rate of a population of neurons, then c(N) is the operation, summation, required to obtain c (Johnson et al. 2002: 113).

So, a set of phenomenal states, triggered by the same kind of stimuli, present internal relations that can be discovered empirically.

Let me now consider systematic relations among phenomenal states: if the subject gets a phenomenal state S such as to determine some sort of reaction (withdrawal, anxiety) it is natural to imagine that 2S will determine a modification in the speed or intensity of the reactions, even if the amount for such modifications can be hard to determine and may take a lot of empirical work, as happened in the case of the Weber-Fechner law. Again, we can imagine, and we can introspect ourselves to reveal the presence of internal relations between our phenomenal states. If both these cases were to hold, this would be in support of systematicity not only in the case of intentional features but also in the case of phenomenal features.

Finally, I take that there are systematic relations also if we consider a mix of intentional and phenomenal states in a practical argument. One may teach: if the fish stinks like that [experience this smell], throw it away. Then imagine the subject experiences the phenomenal odor of a rotten fish which prompts him to throw it away. However, if the odor is faint, the subject may take time to decide whether to throw the fish away, and this reaction time is systematically linked to the strength of the odor. So, there are systematic relations among phenomenal and intentional states as well as shown by the above *modus ponens*.

If there is systematicity at a high level, the mental, is there systematicity at a low level, the physical? This issue has to be faced by confronting the cotemporally material dependence (CMD) on which Wilson insists. Surely, if one aims at satisfying the PSPC and "realization indifference" as well, one is saying that for each single token S there could be wildly different Ps on which S supervenes. But if we consider the causal relations in which S is involved, and we should consider these because is on these that we assert that there are high-level laws of the sort discussed by special sciences, we may require a sort of systematic counterpart of supervenience: there cannot be systematic variations at a high level without systematic variations at a low level. And this should not be surprising: laws describe systematic relations. Laws in psychophysics, for instance, do exactly this: describe in mathematical terms the stable ratio between the felt sensation and the stimulus causing it.

This ratio determines a difference in the reactions, in the successive expectations, in the latency of the recovery from the stimulations, and so on. In the case of phenomenal features, the variations are embedded in systematic empirical relations.

Now, the more one considers the systematicity of the mental, the more constraints to be placed on the realizers even in case of singular realization. Systematic relations are constraints on realizability. Hence, not all realizers are fit to support all the systematic relations that you discover at the high phenomenal level.

The overall point, then, is that systematicity is a pervasive property of the relations among mental properties such that if you have some systematicity you have a lot of systematicity, and if you have systematicity all the way through, you can't have realization indifference.

4. Defending Premise (ii)

As I have discussed above, a feature being multiply realized is a primary motivation for the weak emergence of such a feature. However, Wilson denies that multiple realizability is a necessary condition for the proper subset condition to be met. Sometimes it looks like it could be a sufficient one:

> while multiple realizability is a good indicator of when a comparatively abstract ontological and causal joint is in place, that there is such a comparatively abstract joint does not hinge on multiple realizability (68).

However (see Ch. 5 on complex systems), Wilson argues that multiple realizability, if not coupled with the satisfaction of PSPC, is not even sufficient for emergence for in many (most) cases candidates for weak emergence are singularly realized. When this single realizability is the case, reductionist have an easy play and it is difficult to make a strong case for weak emergence in these terms. So, what really make the case for weak emergence are those cases in which a feature's powers are a subset of the powers of the realizers on which it cotemporally materially depends, and this may happen to be multiply realized.

As we have seen above, though, many analyses of realization crucially insist on having the weakly emerging features as multiply realized. This is the case with, at least, functional, mereological and determinable-based realization, but there are appeals to multiple realization also in ontologically explanatory realization. I think this appeal is due to the point I was mentioning in the first section: the more a feature or property can figure in type different counterfactuals the more its causal power is well established and robust. So, even in cases in which a feature is singularly realized, more than considering its actual subset of powers, one considers its *counterfactual* subset of powers, those that guarantees distinctive efficacy with respect to the superset powers on which it CMD. It is this the way in which the causal autonomy is robustly vindicated: we can establish the causal autonomy only if a feature makes some difference in a number of significant and causally different scenarios. And the best way to put it is to say that the Ss must determine a "realization indifferent regularity" (cf. Antony and Levine 1997), where the Ps are the differential realizers, no matter whether singularly or multiply. This means that a weakly emergent feature is a "tracker" (82) of difference makers (being causally efficacious) that could determine (potentially, i.e. counterfactually) a realization indifferent regularities (66-69). Such indifference can be as permissive as one can imagine it to be, as per Fodor's (1974) famous schema for special sciences. If S causes S* while CMD on P and P* respectively, this does not amount to S being a new power, for P* may well be caused by a disjunction of low-level properties P1, P2, …, Pn in each case S is instantiated. Suffice that all these Ps have a power in common, the one that satisfy the PSPC via S. I think this is enough to maintain premise (ii). In what follows I will refer to this premise in the shorthand terms: Emergence entails realization indifference.

5. Defending Premise (iii)

The third premise asserts that systematicity entails that realization indifference cannot hold. The following argument runs in support of this premise.

(1) If property S is systematic, the properties logically or empirically related to it are mentioned by or are causally covered by the same or similar laws and regularities.
(2) The Ps on which S cotemporally materially depends (CMD), should follow the same pattern of systematicity shown by S.
(3) If property S is realization indifferent, then it CMD on Ps that are not covered by the same law.
(4) If they are not covered by the same law, the Ps have different projectability patterns and support different counterfactuals.
(5) If they have different projectability patterns and support different counterfactuals, they do not establish the same systematic relations.
(6) If they do not establish the same systematic relation, property S cannot be realization indifferent.

Consider again the case of doubling the intensity of the stimulus. This case rests on using the same predicate, referring to the same property, as being in pain, so using the same projectability, and then embedding that predicate into the same law. But if we want serious realization indifference, this is not allowed, for the pattern of the projectability and counterfactual support of predicates and properties at the high-level disregard the patterns of predicates and properties at the low level. If these patterns are so distant, how can the patterns of projectability and counterfactual support at a high level be the same? These can be the same to a very limited range. For instance, you may realize a lever with iron or with wood to be included in the same machine or in two functionally identical machines: possibly the rigidity of the lever could be the same, but they may differ concerning resistance to fire or oxidation. One may say, this is not relevant. That really depends on the context. For, one may operate with the lever in certain contexts that make their resistance to fire or oxidation relevant, and this cannot be established a priori.

Similarly, if the S is a phenomenal property, it establishes systematic relations to other phenomenal or non-phenomenal properties. Consider seeing a ripe tomato. This produces a phenomenal property of appearance of full red. As such, this property is related to appearances of scarlet or crimson by a similarity relation, which could eventually be subsumed under being a determinate of the same determinable relations to those other shades. Now consider the Ps on which the S in question CMD. If the S is to be realization indifferent and respectful of PSPC, it could well be the case that the Ps on which it supervenes do not match the systematic relations established at the phenomenal level. The subset strategy would apply to them as well. But how far? Up to the point where just the P that happens to be CMD on the S in that token case? That would prevent the subset strategy of its generalization power.

One may wonder why the emergentist should accept premise (2) of this subargument. The emergentist can stress that each "level of reality", whatever that expression designates, is characterized by its laws and hence by its own projectability and counterfactual patterns, contra steps (3) and (4), and these laws could be such to determine different systematic relations or the same relations with a different degree of strength.[6] So, what consequences would bear having different systematic relations, if any at all?

[6] For this point I am indebted to Ivan Cotumaccio and Michele Paolini Paoletti, whom I thank.

According to the subset strategy a property is individuated by the set of its causal powers had by all its instances, hence these should be preserved by all its realizers (which are a subset of the causal power had by the single instances and their realizers). So, this set comprises all the properties that share the causal powers had by the realized property. But the causal powers defining the set do have causal relations to other powers. Say, a rubber band is elastic and green. Elasticity is shared among all elastic entities no matter their color. But elasticity determines fragility in cold conditions. Should we consider this as a condition on other elastic entities? I think we should but suppose we rather think not. Then we may ask a different question: should the elasticity also involve a specific ratio between, say, thickness and length of stretchability? If so, then it could be the case that only a specific realizer fits the bill. But if this is the case, then it seems Kim was right after all: each disjunct has its own merits and the high level is just a measure of our ignorance. Here, the slippery slope on systematicity I was mentioning is reflected in a similar slippery slope on causal powers: once the set is determined, several further causal relations are connected to the causal powers belonging to the set and is very difficult to imagine this being a matter of degree, because fixing the degree of resemblance sounds quite arbitrary.

I think this is a metaphysical point. The identity conditions of a property, what a property is, are determined by its causal relations, sometimes called its causal profile: what causes the property and what the property causes. If such relations are not preserved by its realizers, we can firmly question whether the realizing properties are just a superficial simulation of the property we are considering, mimickers of its behavioral performances in the *specific occasion* at hand, rather than the proper realizer of the high-level property we are considering.

6. Previous Attacks

A different and much more articulated attack on realization indifference comes from Tom Polger and Lawrence Shapiro (2016). Consider, they say, two types of entities A and B which are taken to be of the same kind by taxonomic system S1 and of a different kind by taxonomic system S2. If the factors that lead A and B to be differently classified by S2 are among those that lead them to be commonly classified by S1 and the relevant S2-variation between A and B is distinct from the S1 intra-kind variation between A and B, then we have a real case of multiple realization. However, they continue, no real-life examples come to the rescue. This may seem like an a posteriori argument, open to empirical challenges, though. They confront this argument with possible realizers as well, stressing multiple realiza*bility* rather than multiple realizations, but one may wonder how much their point generalizes.

Also, Paul Thagard (2022) has argued that realization indifference (which he calls "substrate independence") is false. Here is his argument, resting on the assumption that any mental process is an information process:

(1) Real-world information processing depends on energy.
(2) Energy depends on material substrates.
(3) Therefore, information processing depends on material substrates.
(4) Therefore, substrate independence is false.

However, one may defend realization indifference by noting that the kind of difference that energy consumption may make is not relevant to the realization of content.

Another attack comes from Matthew Rellihan (2023). He has argued that realization indifference, which is a basic tenet of functionalism, is a much weaker identity criterion than the one defended by the subset theory of realization. This point is much more relevant than the previous one, being devoted to the strategy at issue in Wilson's book. Realization indifference allows for substituting a causal element for another, provided that it satisfies the same functional role. But these elements may have very different causal powers, and having the same causal powers is required by the subset model. So, such realization indifference is not a guarantee of the sameness of causal power. Consider again the lever of iron and that of wood: they may play the same functional role in their respective machine, but the lever in iron may have a different breaking point from that of wood. So same functional role but different causal power: realization indifference is then to be relativized.

Even if I think this is an effective argument, the reply could be that functional identity has to be all the way down: the two levers must respect the same functional definition in all the relevant aspects. Even if this were the case, it is obscure why we should place such a restrictive constraint. With phenomenal properties, this contextual problem is much deeper.

As I have argued, it is not the external condition that constrain the viability of realization indifference, but systematic relations in which the high-level properties are embedded. After all, these are the properties that determine how a subject feels or what it associates that condition with something else. It is now very difficult to see how this can be guaranteed by realization indifference. Such systematic relations by themselves constrain the realizations allowed.

7. A Different Look at the Whole Argument

An alternative way to put the argument I have been defending so far is the following, which I provide in probabilistic terms:

(1) The higher the similarity in the systematicity of the relations, the lower and less probable that the realizers are wildly realization indifferent;
(2) The lower the probability of realization indifference the higher the probability of having the same realizers;
(3) The higher the probability of having the same realizers, the higher the probability of having the same laws involved;
(4) The higher the probability of the same laws involved the less distinct or causally relevant the Ss involved;
(5) The less distinct and causally relevant the Ss involved, the less their projectability and use in appropriate counterfactuals;
(6) The less their projectability and use in counterfactuals the less the autonomy of the special sciences, *pace* Fodor.

What the argument is saying is that if there is a stable relation between an isolated (not systematic) S property and a P property (these Ss and Ps are kinds) then the S is not realization indifferent, and reduction is viable. If, on the contrary, S is embedded in a pattern of regular and rational relations, hence systematic, then the viability of realization indifference is threatened if not completely undermined. I have used "threatened" and "undermined" because the argument has a

probabilistic nature. So, I admit, it is not a knockdown argument, but one that makes the relation between empirical and logical features evident, and the empirical features, as per scientific practice, point to probability rather than certainty.

On the other hand, if to defend the distinctness and causal relevance of the mental one defends their being nonsystematic, possibly one gains the realization indifference but gets closer to local reductions of the sort advocated by Kim. Now, I agree with Wilson that emergence comes in only two varieties and that the strong one comes with a very high cost that would run against physicalism. If I am right that systematicity puts a serious constraint on the viability of weak emergence, at least the one in which multiple realizability plays a crucial role, it seems that emergence in general has very few hopes to be a viable option in metaphysics.[7]

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