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Marc SLORS* — *Why Functional Properties can be Emergent : An Argument against Kim*

INTRODUCTION

According to the doctrine of emergentism, complex systems may exhibit properties that are not theoretically predictable and not reductively explainable in terms of these systems' (micro-) physical properties. When 'reduction' is understood as Nagelian intertheoretic reduction, it seems likely that emergentism is not an empty doctrine, i.e. that some systems do in fact have emergent properties. For even if we were to possess bridge laws between the realms of e.g. the mental and the physical, we would not be able to explain and predict mental states in physical terms as long as such laws are merely contingent and inductive.

In "The Concepts of Explanation, Prediction, and Reduction in Emergentism", Jaegwon Kim presents a non-Nagelian, functional model of reduction that ties together reduction, explanation and theoretical prediction. According to Kim's model of reduction, only non-functionalizable properties of systems can possibly be emergent properties. Restricting ourselves to the philosophy of mind, this would imply that only phenomenal properties may possibly count as emergents¹ ; all propositional attitudes would be reducible to and therefore — if Kim is right — explainable and predictable in terms of micro-physical properties. Thus, while Kim's direct aim is to elucidate the main tenets of emergentism, he also develops an argument for the claim that a large number of candidates for the title 'emergent property' turn out not to earn it.²

* *University of Nijmegen (KUN)*

E-mail : mvpslors@euronel.nl

¹ *Putting aside Quinean worries.*

² *In the wider context of several debates within the philosophy of mind and cognitive science, it serves a third and very useful purpose : that of making explicit an account of reduction that was already implicitly pervasive.*

I will claim that the functional model, even though it is a model of explanation and prediction in some sense, is not a model of *reductive* explanation and prediction. Therefore, I will argue, Kim does not succeed in defining a kind of reduction that would render emergentism an (almost)³ empty doctrine. Functionalizable properties, then, may well be emergent.

FUNCTIONAL REDUCTION

In order for property E to be reductively explainable and predictable, according to Kim, E must first be functionalised, that is reconstrued as a property defined by its causal/nomic relations to other properties, especially properties in the reduction base B. A certain system *s* having E, then, can be defined as *s* having a property P in B, where P is defined in terms of what base properties it is caused to be instantiated by and what base properties it causes to be instantiated. The next step is to find out whether, indeed, the defined realiser of E — P in this case — is a property of the system. If it is, one finally has to find a theory at the reduction base level that explains how P performs the causal role ascribed to it in the first step.

Suppose a system *s*'s higher property E has an identifiable realiser base P whose causal relations with other base properties — defining it as an E-realiser — can actually be explained scientifically. In such a case, Kim claims, we can explain E in terms of P. Furthermore, Kim says, we can predict that the system must exhibit E on the basis of our knowledge of its having P. With the important proviso that we already have a grasp of the concept of E and its functional definition prior to these explanations and predictions, I have no problems with these two claims. But Kim also maintains that these predictions and explanations are reductive. And here I am less quick to concede.

What is meant by 'reductive'? "Central to the concept of reduction" Kim writes "is the idea that what has been reduced need not be countenanced as an independent existent beyond the entities in the reduction base (...)." I find this characterisation suggestive but not very informative. Talk of 'entities' suggests that what is at issue is the existence of other 'things' than lumps of matter. I agree with Kim that this might be an issue when we discuss the question whether a specific *instantiation* of a functionally characterised property is something

³ Since non-functionalizable properties such as phenomenal properties are possibly causally inefficacious anyway, we might as well say that Kim's argument empties emergentism entirely.

‘over and above’ its physical realiser. As soon as we are discussing (relational) properties proper, so to speak, or instantiations of E as instantiations of *type* E,⁴ however, the issue does *not* seem to be whether there exists some other ‘stuff’ than matter. Reductionists and non-reductionists may well agree on this. What seems to be at issue with the (non-) reducibility of higher properties — especially relational properties — to base properties is whether the former could somehow be cast in terms of the latter without explanatory and/or semantical loss.

As to possible explanatory loss due to the reduction of functionalised higher properties to micro-physical properties, Kim is clear : there is no explanatory loss since there wasn’t any scientifically respectable explanatory value attached to higher properties in the first place. Higher properties are multiply realisable, and therefore nomologically heterogeneous. Higher properties are thus unfit to figure in (strict) laws, unlike their (physical) realisers.

As to the possible semantical loss, while discussing the theoretical prediction of functionalised higher properties from knowledge of what goes on at the reduction base level, Kim writes that “[i]t is clear that what enables the ascent from the reduction base to the higher properties is the *conceptual connections* provided by the functionalisation of higher properties” (p. 51, emphasis mine). Such conceptual connections would prevent semantical loss.

Why does Kim think that functionalisation secures such conceptual connections ? While describing the first step of reduction, Kim elaborates on the idea of functionalisation of property E as follows: “(...) E must be construed, or reconstrued, as a property defined by its causal/nomic relations to other properties, specifically properties in the reduction base B.” (p. 49) Functionalising a higher property, Kim seems to say, just *means* defining it in terms of causal/nomic relations. Hence a very strong conceptual connection. And hence the idea that whenever a property can be functionalised, it can be described in terms of causally/nomologically related base items without semantical loss.

A SYMPTOMATIC PROBLEM

⁴ Kim discusses (1) the reduction of an instantiation of a property to its physical realiser and (2) the reduction of properties proper to physically characterisable properties. I have no quarrels with his discussion of the reduction of instantiations, but take this discussion not to include instantiations of higher properties as tokens of higher property-types.

Kim cannot have his cake and eat it. His argument for lack of explanatory loss *implies* semantical loss. Let me explain this.

If higher properties are nomologically heterogeneous — which they have to be in order to sustain the argument against explanatory loss — does this mean that the functions in terms of which these properties are defined are actually heterogeneous themselves? Does it mean anything to say that a *function* is heterogeneous (which is to say quite something else than that a property has several functions)? Even if it does (which I doubt) to say this would be to deny the idea that *one* kind of higher property can be realised in multiple ways.⁵ Kim allows for multiple realisation. Thus, the *functions* in terms of which higher properties must be defined cannot be heterogeneous; *one* higher property (type) should be defined in terms of *one* specific (set of) function(s).

How do we square this with the assertion that a functional property can be *defined* in specific⁶ causal/nomic terms without semantical loss? How can one function be defined in *different* specific causal terms and yet be the same in each case? One ‘answer’ would be to say that while different realisations of a functional property differ in many respects, they are the same precisely in their functional aspects. Rather than *defining* functional properties, then, specific causal/nomic descriptions *capture* them (as well as a number of other things) so to speak.

Is ‘capturing’ enough to secure a conceptual connection between functional property and reduction base? I would say: no. Functional properties tell us something about their various realisers, namely that they have something in common and what that is. What various realisers have in common cannot be explained in their own terms; we need an overarching perspective for that. We cannot infer from a given realiser that it is possible that one of its ‘aspects’ can also be realised differently, unless we possess the concept of that aspect — the functional property — *independently* of its realisation, thus rendering that realisation contingent. And that means that there is no true conceptual connection between functional properties and their causally characterised realisers.

⁵ This connects the multiple realisation issue to the rule-following issue: there is no limit in principle to the number of different realiser-types of a given functional property. Speaking of one functional property *f* that is multiply realisable, then, implies possessing a rule by means of we can discern an *f*, however realised, whenever we see one.

⁶ Kim stresses that the definition of a higher property in functional terms should include specifically causal relation between the property to be defined and reduction base properties.

The claim that functional reduction does not involve explanatory loss, then, seems incompatible with the claim that it does not involve semantical loss.

Kim seems to bite the bullet here and give up part of the claim that reduction precludes semantical loss. True, he seems to be saying, the fact that a given functional property can be instantiated by various realisers is not conceptually implied by a specific realiser, but *that* aspect of functional properties is causally/scientifically impotent anyway; functional properties are scientifically respectable only as instantiated by specific causal/nomic (physical) realisers. If this looks much like denying reality to functional properties, then Kim agrees : his reduction is of an eliminative kind (p. 53).

Is ‘eliminative reduction’ a solution here ? I don’t think so. Eliminative reduction is a way of treating a symptom of a deeper problem. The problem itself is left wholly intact and issues further symptoms, partly as a consequence of our repressing the first. Here’s one: how can one be an *eliminative* reductionist and yet claim that different realisers of the same functional property really have something in common ?

Here’s another (more serious) one : What about theoretical prediction of higher properties on the basis of knowledge of a given reduction base ? Not only is it entirely unclear *what* we are supposed to be predicting (since it is eliminated as soon as it is predicted) and what *purpose* such a prediction would serve (for what is predicted has no scientific status whatsoever). The main problem is that the lack of conceptual connections between reduction-base terms and functional terms that is implied by the ‘multiple-realisation-implies-nomological-heterogeneity argument’ precludes theoretical prediction altogether. Let me explain.

Can we speak of true *theoretical* prediction within a reductive framework when the concept of what is going to be predicted is in no way explainable in terms of the data on the basis of which the prediction is made ? This (obviously rhetorical) question can only be answered negatively. The point is that when conceptual connections between reduction base and functional properties are out of the question (as is argued on the basis of the fact that one multiply realisable function cannot be defined in heterogeneous terms), we cannot explain the concept of what is predicted in terms of the data from which it is predicted. Thus, *theoretical* prediction is ruled out.

A DIAGNOSIS

The real problem here, as I see it, is that claiming that functional properties can be defined in causal/nomic terms is to fail to see that functions and causal/nomic relations belong to perspectives that cannot be translated in each others terms. Causal/nomic relations are, to put it roughly, of an ‘if *A* then *B*’ form. There is no purpose in them ; they just hold ‘blindly’, mechanistically. Functional properties, on the other hand, have a general ‘in order to...’ character. They serve a specific *purpose*, given their place in a (possibly mechanical) system, a purpose relative to which they can be called ‘functional’. While there *can be no* purposes from the causal/nomic perspective, just ‘blind’ regularities, there *must be* purposes in order for there to be functional properties.

This does not mean that functional properties cannot be instantiated by what are ‘blind’ mechanisms from a physical perspective. It does mean, however, that functional properties cannot *as such* be *defined* in terms of causal/nomic relations⁷. Causal/nomic relations can be said to instantiate a functional property when regarded from an ‘in order to...’ perspective. The perspective is crucial,⁸ though, and not itself translatable or explainable in causal/nomic terms.

My diagnosis of the problem, then, is that Kim ignores the relevance of perspectives and their differences. This would explain why he does not see the incompatibility of multiple realisability and a conceptual connection between reduction base and functional property. Multiple realisability is conceivable in virtue of the fact that what is identical from one perspective (functionality) is radically different from another (e.g. electronic configurations, neural configurations, etc.). It therefore *requires* mutual intranslatability of these perspectives. For how can a very substantial physical difference between two realisers (say a neural and a digital one) be translated into identity without the total collapse of the semantical structure underlying both descriptions ? The point, then, is that Kim ignores that the whole idea of multiple realisation depends on a clear separation of perspectives.

The consequence of the idea that multiple realisation requires separate perspectives has the implication I mentioned above : that there can be no true theoretical prediction of higher functional properties on the basis of reduction base information. This unpredictability is of the kind Kim himself discusses in his first section. It is the result of our not

⁷ Hence, I disagree with Lewis (e.g. Lewis, D., “Psychophysical and Theoretical Identifications”, *Australasian Journal of Philosophy* L (3), 1972), on which Kim seems to rely.

⁸ The point made here is reminiscent of Dennett’s *Intentional Stance Theory*. See Dennett, D.C., *The Intentional Stance*, Cambridge Mass.: MIT, 1987.

even having the concept of a given functional property because it lies outside the conceptual domain in terms of which the realisation base is described.

The absence of conceptual connections also denies the claim that explanation of functional properties in realisation base terms can be reductive explanation. *Given* our prior possession of the concepts of functional properties, we can explain how they are realised in causal/nomic (physical) structures. But unless we can explain these concepts rather than their instantiations in causal/nomic terms, such explanation is not reductive. And we can't explain purposefulness in terms of blind regularities.

Denying the reductive explainability and theoretical predictability of functional properties does not deprive them of scientific respectability *a priori*. Now that functional properties are conceptually detached from their realisers, we need not worry about their nomological heterogeneity. Whether or not they can figure in laws of their own — and are therefore scientifically respectable even by Kim's standards — is an empirical issue. The intuition that this would still not make them scientifically respectable derives, I suspect, from the vague idea that purposes should have no place in science. But this idea merely betrays a 'physical chauvinism' — physics being one of the few areas in science where purposes play no role (compare for instance biology, psychology, and even chemistry where systems strive to reach a state of maximal entropy).

Functional properties, then, are not reductively explainable to and not theoretically predictable from the base domain. There is no *a priori* reason to deny them explanatory value. Nevertheless they are realised by the items described in the base domain. These characteristics, I would say, make them excellent candidates for the title 'emergent property'.