Causation, supervenience, and special sciences

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Abstract: Ross & Spurrett (R&S) argue that Kim's reductionism rests on a restricted account of supervenience and a misunderstanding about causality. I contend that broadening supervenience does nothing to avoid Kim's argument and that it is difficult to see how employing different notions of causality helps to avoid the problem. I end by sketching a different solution.

The problem of whether properties proprietal to the special (nonphysical) sciences can exert any distinctive causal influence on the world is not new, as shown by the long history of the debate concerning the possibility of genuinely emergent properties. In this context, emergent properties are not just those properties that are possessed by wholes but not by the parts making up those wholes. The controversy concerns whether emergent properties exert a causal influence and have causal powers, which cannot be understood as arising simply from the conjunction of causal powers of the properties of the parts. Jaegwon Kim has sharpened the debate by making explicit some of the assumptions underlying the controversy, in particular the supervenience of special science properties and the causal closure of physics. In simple terms, one set of properties, the A-set, is supervenient on another set of properties, the B-set, when there can be no change in the A-set set without a change in the B-set. If mental properties supervene on physical properties, then one cannot change one's mind without there being a physical change (the precise modal force of "can" and "cannot" is left to one side, but it is important that there is modal force). For our purposes, the causal closure of the physical is the claim that any cause that has a physical effect must itself be physical. Kim's claim is that these assumptions lead to the conclusion that the only way that the supervening properties can be causally efficacious is if they are identical to physical properties. Reduction is the way to go.

Ross & Spurrett (R&S) have done us a service by taking these metaphysical arguments seriously and noting the dire consequences of Kim's conclusion for cognitive scientists. They argue that Kim's pessimistic conclusions rest on a too-restricted view of supervenience and a muddled picture of causation. With regard to supervenience, the complaint is twofold: the picture presented by Kim assumes that there is a one-way dependence of the mental on the physical, and the physical properties forming the supervenience base are localised *intrinsic* physical properties. These two aspects are sometimes treated as though they are the same, but they clearly differ, and differentiating between them is crucial to evaluate their argument against Kim. Putting to one side the issue of intrinsicality (the question is whether relational properties only hold in virtue of the intrinsic properties of the relata), the objection to localised supervenience is that our mental properties can change without necessitating *local* physical change, say, in our brains or bodies. Let us say this is true. It does not follow that supervenience does not hold. What follows is that the set of physical properties can include nonlocal (environmental) properties – supervenience must be broadened. For some reason, R&S think that broad supervenience entails "multiple supervenience," or a two-way dependence of the mental on the physical and *vice versa.* It is difficult to see why this follows. Broadening supervenience just enlarges the base; it does not, by itself, show that there is a two-way dependency relation (or not in any way that goes beyond the covariation implied by supervenience).

The argument from multiple supervenience is taken from Meyering (2000), who uses the fact that a categorical base can realize different dispositional properties (the thermal conductivity-electrical conductivity example) to support the conclusion that there are "emergent effects that have no salience at the level of physics." But unless this is taken to mean that the lack of "salience" is ontological (rather than epistemological), it is difficult to see that Kim's main claim is endangered. Meyering's argument shows that when a categorical base supports different dispositions, *which* disposition is triggered in a particular case depends on the context, the initial conditions. Again, this shows only that specific causes require specific contexts, an unremarkable conclusion, and not one that by itself supports anything Kim would deny. Perhaps it is the terminology ("multiple supervenience") that is getting in the way of understanding R&S's main point here, which seems to concern the essentially *relational* nature of the properties forming the subject matter of the special sciences. With this I have much sympathy (see also Millikan 1999).

The charge that Kim's reductionism rests on a misunderstanding of causality in physics is more convincing, but it is unclear what the consequence is. That is, let us say that Redhead is right that physicists concerned with "fundamental" physics do not use causal terminology and that Loewer is right that deep down it is a matter of the state of the universe at one time compared with the state of the universe at a different time. What are the consequences for our understanding of, say, chemical interactions? Or to our understanding of how our visual system works or how bats echolocate? R&S claim there is no single concept of "cause" that will do the work required by Kim's argument, that he assumes some kind of "folk" concept that incorporates agent-causality, and this is appropriate, if at all, only in some domains and not others. In particular, it is not applicable in physics.

The problem here is that the domains are not separate. R&S are themselves convinced of what could be called the multiplexity of interactions between various facets of the ontologies subsumed by the different sciences. Take a particular chemical process like photosynthesis; this will have a causal explanation invoking chemical and physical properties, and it will also be biologically explainable in terms of the exercise of the functions of those properties. Is the functional explanation also a causal explanation? If it is, one has to show how the two causal explanations of this phenomenon work in harmony and that the invoked causes do not "compete." One does not achieve anything by disuniting the notion of cause operating in the two explanations – or so it seems to me.

R&S are right in seeing Kim's argument and conclusion as radically revisionary of practice in the human sciences. Like them, I believe that the argument generalises to any science whose properties supervene on physical properties, and I agree with them that reduction is not necessarily the way to go. Given my disagreement with their diagnosis as to what has gone wrong, what is to be done? The basic mistake made by Kim is, I suggest, in thinking that only property identity will ensure the causal efficacy of the special science properties. Reduction captures causal efficacy without attendant problems of overdetermination or causal competition between the properties because it ensures the *coinstantiation* of reduced and reducing properties. However, this shows that there is a stopping place short of the reductionist solution and that is *property-instance* identity (coinstantiation) without property identity. Biological (for example) and physical properties can be distinct but still be coinstantiated. The analogy with determinable and determinate properties show how this works; "being colored" is a different property from "being blue," but any instance of blueness is (the "is" of identity) an instance of being colored. It is plausible to hold that where we have supervenience between sets of properties, then whenever the supervening properties are instantiated, they will be coinstanced with the supervened on properties (see Macdonald 1989; Macdonald & Macdonald 1986, for the original presentation of this solution. A more recent elaboration is given in Macdonald & Macdonald 1995). This ensures causal efficacy without overdetermination. It also permits nonreduction, given the distinctness of the supervening properties from the base properties. The remaining problem is: Why does supervenience hold? But that is a different problem (for some thoughts on this, see Macdonald 1992).

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