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Spurious Causal Kinds: A Problem for the Causal-Power Conception of Kinds

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Abstract There is an assumption common in the philosophy of mind literature that kinds in our sciences—or causal kinds, at least—are individuated by the causal powers that objects have in virtue of the properties they instantiate. While this assumption might not be problematic by itself, some authors take the assumption to mean that falling under a kind and instantiating a property amount to the same thing. I call this assumption the "Property-Kind Individuation Principle". A problem with this principle arises because there are cases where we can sort objects by their possession of common causal powers, and yet those objects do not intuitively form a causal kind. In this short note, I discuss why the Property-Kind Individuation Principle is thus not a warranted metaphysical assumption.

Keywords Causal powers · Property individuation · Property-Kind Individuation Principle · Spurious kinds

I

There is an assumption common in the philosophy of mind literature that kinds in our sciences—or causal kinds, at least—are individuated by the causal powers that objects have in virtue of the properties they instantiate. While this assumption might not be problematic by itself, some authors take the assumption to mean that falling under a kind and instantiating a property amount to the same thing. We find this assumption, for example, in Jaegwon Kim's work on the causal exclusion problem:

> Kinds in science are individuated on the basis of causal powers; that is, objects and events fall under a kind, or share in a property, insofar as they have similar causal powers." (1993, p. 326)

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Jerry Fodor seems to endorse this thesis as well:

> We want science to give causal explanations of such things (events, whatever) in nature as can be causally explained. Giving such explanations essentially involves projecting and confirming causal generalizations. And causal generalizations subsume the things they apply to in virtue of the causal properties of the things they apply to. Of course.
>
> In short, what you need in order to do science is a taxonomic apparatus that distinguishes between things insofar as they have different causal properties and that groups things together insofar as they have the same causal properties. (Fodor 1987; original footnote excluded).

We can take this assumption to be the conjunction of two claims: first, that kinds in science are individuated by their (causal) properties, and second, that such properties themselves are individuated by the causal powers they bestow. These claims can be seen as the application of a particular theory of properties in conjunction with a general principle, often only tacitly endorsed, about the relation between kinds and properties.

The latter claim—that properties are individuated by the powers they bestow—can be called the "causal view of properties". I will not defend this view here, but note that many authors have defended the view.[1] The claim that properties are individuated by their causal powers entails that, for any property, there is some set of causal powers possession of which is necessary and sufficient for that property.

The former claim—that kinds in a science are individuated by their (causal) properties—is a further claim that is rarely discussed, but that is clearly at work in the above mentioned authors. We can call this claim the "property view of kinds". This view entails that, for any given kind in a science, there is a property (or set of properties) possession of which is necessary and sufficient for falling under that kind.[2]

If one holds both of these views, an interesting result follows. Since sufficiency is transitive, then for any given kind in a science, there is a set of causal powers possession of which is necessary and sufficient for falling under that kind.

Although the causal view of properties has been widely discussed, the property view of kinds is little discussed, though used widely: the belief in this claim usually manifests itself when authors treat "falling under a kind" and "instantiating a property (or properties)" as being equivalent (see the quotation from Kim above). The property view of kinds lends itself, in other words, to a general principle. Let us give this principle a name: the Property-Kind Individuation Principle.

> *Property-Kind Individuation Principle*: Objects and events fall under a kind when they instantiate one or more causal properties, and so anything that individuates or groups causal properties also individuates or groups kinds.

[1] The idea that properties are individuated by their causal powers has an impressive pedigree; see, for example: Armstrong (1978, 1983, 1997); Harré (1970, 1986); Harré and Madden (1975); Heil (1999, 2003); Mellor (2000; Mellor and Oliver 1997); Shoemaker (2003); and Swoyer (1982).

[2] Note that possession of a set of properties can be necessary and sufficient for falling under a kind without any particular property being necessary if the set has sets as members that are unions.

Generally, commitment to the Property-Kind Individuation Principle is revealed when talk about kinds is translated into talk about properties, and vice versa. For example, if gold is a kind, then *being gold* will turn out to be a property; and if *green* (or *being green*, if one prefers) is a causal property, then the set of green objects will form a kind. If the criteria for individuating properties turn out to be the same criteria for individuating kinds, such translation should be unproblematic. And indeed, it is often assumed to be so.

Of course, not everything that we wish to taxonomize in the sciences will be causal kinds in the sense under discussion. Biology, for example, builds taxonomies of things like species and traits, which themselves are individuated (at least partly) by their histories (for a similar point, see Post 1995). But for the present discussion, I will be considering kinds that are not individuated by anything like a history, but rather are individuated by possession of one or more genuine *internal* properties.

A problem arises when we combine the Property-Kind Individuation Principle with the now popular theory mentioned above, whereby properties are individuated by their causal powers. The problem arises because there are cases where we can sort objects by their possession of common causal powers, and yet those objects do not intuitively form a causal kind. Thus, one of the two claims above must be false: either properties are often individuated by something other than causal powers, or we are mistaken in adopting the Property-Kind Individuation Principle.

II

Let us assume that the causal view of properties is correct, and that properties are individuated by their causal powers. On this theory, what makes a property the specific property that it is, is the cluster of causal powers that an object has in virtue of instantiating that property. If under all possible circumstances properties *X* and *Y* make the same contribution to the causal powers of the things that have them, *X* and *Y* are the same property (c.f. Shoemaker 1984/2003 p.212).

We can, of course, find sets of objects that share sets of causal powers, but which do not therefore fall under some one single scientific *kind*. Kim's case of jadeite and nephrite (Kim 1993, 1998) provides one such example; here are two others:

Salt-sugar Consider first common sugar (sucrose) and table salt (NaCl). Both substances appear to have some superficial properties in common: both are white, crystalline powders; both dissolve in water; both are used in cooking, etc. For ease of exposition, I will focus on one causal power here: dissolving when immersed in water. Both sugar and salt have this causal power. But salt and sugar are very different substances in the eyes of our best science.

Salt is a crystal formed by strong ionic bonds between sodium ions (Na^+) and chlorine ions (Cl^-), which usually arise when chlorine atoms strip sodium of its outermost electrons. When this crystal is placed in water, the charged dipoles of the water molecules pull the ions apart, which can now "swim freely" in the water, separate from each other. On the other hand sugar (sucrose specifically) is formed by weaker covalent bonds between carbon and oxygen atoms in a tight ring; two such rings link together by means of a glycosidic bond between two extended oxygen atoms, a process which releases a molecule of water (aptly named "dehydration synthesis"). Sugar

crystals form when these double-ring molecules of sugar pack together tightly; when placed in water, these crystals form hydrogen bonds with the water and separate from each other. The sugar molecules themselves do not break down, unless the water is allowed to hydrolize the glycosidic bond.

When we consider the causal powers of sugar and salt, we see that both substances share causal powers in common. Both can dissolve in water. Both appear white to normal viewers in normal conditions. Both are ingestible, etc.

But our sciences—be it chemistry, biology, or physics—do not classify these two substances together as one kind: there is no kind "salt-sugar" that features in scientific explanations.

This is not to say that they cannot fall under some more general kind—solids, or crystals, or something along those lines. But these specific substances by themselves do not form a kind *qua* this set of causal powers. If anything, they fall under a more general kind (together with many other substances).

Furthermore, the way in which both these substances dissolve in water, for example, is substantially different. Each takes place by way of a different mechanism governed by its own set of laws. The superficial similarity here is a coincidence. Salt and sugar, then, are much more like Kim's jadeite and nephrite case then they are samples of a single scientific kind.

Green stuff For the second example, take two objects that appear to be the same shade of green—a holly leaf and a glass bottle. Both have the causal power to appear green to normal viewers under normal conditions. But again, the appearance of green in each case is due to the operation of different mechanisms. In the case of the holly leaf, the leaf (or rather, the two compounds of chlorophyll in the leaf) absorbs most visible wavelengths of light save green, which it reflects. Thus, it is green light that reaches our retinas from the leaf. Green glass, however, blocks (or reflects) all but green light, which passes through the glass. A holly leaf possesses quite different properties from green glass, although these different properties have the same effect of allowing green light to reach our retinas.

Again, in this case we have evidence that the causal power of each kind here arises from a different mechanism according to different laws. Accordingly, there is no scientific kind corresponding to this set of green objects. Rather, the superficial similarity is a mere coincidence, rather than the possession of someone property by all instances falling under the predicate.

It seems plainly obvious that sugar and salt belong to exclusive scientific kinds, and that holly leaves and green glass belong to exclusive scientific kinds—in fact, these examples were chosen because their "spurious nature" would be obvious. While there are some superficial similarities between the objects in each spurious kind, there are also a number of dissimilarities. And where we do have similarities, we also have evidence that the causal powers manifest in each case are manifest because of the exercise of completely different mechanisms according to different sets of laws. The properties and laws that explain this similarity are found again and again in chemistry and physics, whereas the spurious kinds are limited to special cases. The fact that these objects share some causal powers is a coincidence. But, it can plausibly be argued that the causal powers in question do define some property had in common by these objects. It seems, then, that the Property-Kind Individuation Principle does not hold in these examples.

But why could it not be the case that these examples *are* examples of kinds, albeit diverse and rather uninteresting ones? To accept this consequence would jeopardize the possibility of the kinds being *projectible*: that is, such kinds could not appear in statements that are confirmed by their positive instances (see Kim 1993, pp.320–321, 327 for an argument to this effect.) Furthermore, the superficial similarities that these objects share would do little to extend our knowledge of them, because we would have little reason to expect to find other similarities based on the knowledge that these objects did fall under the kind. Though working out these worries would go beyond the scope of this paper, they should be enough to demand more strenuous criteria for kindhood.

III

One might object to the preceding examples along the following lines: of course salt and sugar do not fall under some unique kind even though they share *some* causal powers, because they also differ in many of their causal powers, including the causal powers that differentiate NaCl from sucrose in laboratory tests. We should not expect *every* shared set of causal powers to determine a kind (or a property, for that matter). Although it might be true that, for all kinds, there is a set of causal powers possession of which is necessary and sufficient for falling under the kind, we need not endorse the claim that, for all set of causal powers, there is some kind under which an object falls because it possesses that set of causal powers. Rather, we would expect to have a kind when there is a cluster of causal powers that, for example, features in our explanations again and again.

This response seems right, but it creates two expository burdens. First, we need a clear theory as to why some such clusters should count as definitive for a property/kind, and why others do not. It is not adequate that a cluster simply appear in a number of explanations—after all, phlogiston and ether appeared in a number of explanations, but these turned out not to be real kinds. Indeed, *green stuff* could appear in numerous explanations without thereby being a kind.

Second, we need a way of determining how inclusive our kinds are independent of causal powers. Samples of salt and samples of sugar share the causal power to dissolve when placed in water, but so do many other substances. Do all of these substances fall under some kind defined by water solubility? Or are there multiple properties that bestow the causal power to dissolve in water? And does the existence of more than one such property suggest that there are multiple kinds of water-soluble stuff? If so, why could not salt-sugar be one of these kinds? Answering these questions will require looking beyond clusters of causal powers and the way that they feature in explanations.

IV

I take it that the examples in Section II are not just quirky examples, but rather point the way toward a general method for generating sets of objects that share causal powers and yet fail to fall under some one kind. I call the sets thus

generated "spurious kinds". At this point, one may naturally ask the question: Why should we care that sharing causal powers in this way sometimes leads to spurious kinds?

First, the possibility of spurious kinds creates a problem for those authors who hold a subset view of the realization relation (Shoemaker 2001 and Clapp 2001, for example). According to this view, property *F* realizes property *G* just in case property *G* bestows some set of causal powers that is a proper subset of the causal powers of *G*. (Thus, all Gs must share in common some set of causal powers that is a proper subset of the causal powers of *G*'s realizers.) The idea is that *G* is a property in good standing along with *F*, since *G* bestows some set of causal powers and can appear in causal explanations. But, following the subset view, *being salt* is a realizer property of *being salt-sugar*. And, as we saw above, salt-sugar is not a causal kind. Thus the proponent of a subset view of realization must give us some reason for believing that realized properties (like, for example, mental properties) are in fact genuine properties that define a real causal kind, as opposed to a spurious kind like salt-sugar.

Second, we should worry about spurious kinds because they suggest that our scientific taxonomy of kinds might come apart from our taxonomy of properties, even for causal kinds. At the very least, it suggests an asymmetry between the two: although every instance of falling under a kind may also be thought of as the instantiation of some property, the converse does not hold.

Thus we should take the problem of spurious kinds seriously. And it seems that the problem of spurious kinds arises the Property-Kind Individuation Principle itself. Although the sharing of causal powers seems to be a necessary condition for grouping objects under a kind, it does not appear to be a sufficient condition, even for non-historical causal kinds. The options appear to be 1) give up on the view that causal powers are sufficient for property instantiation, 2) give up on the view that property instantiation is sufficient for kinds, or 3) give a more precise theory of when the Property-Kind Individuation Principle can and cannot be used, such that spurious kinds are always ruled out.

In conclusion, the relationship between kindhood, property instantiation, and causal power possession is more complicated than most authors assume, and more work needs to be done to work out these relations.

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