

Supervenience and Dependence

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The idea

To say that the A -properties or facts are supervenient on the B -properties or facts is to say that the A -facts are, in a sense, redundant, since they are already implicitly specified when one has specified all the B -facts. A -facts are not fact ‘over and above’ the B -facts, not something ‘separate’. To state an A -fact, or ascribe an A -property, is to describe the same reality in a different way, at a different level of abstraction, by carving the same world at different joints. (Stalnaker 1996: 87)

Three key ingredients:

1. covariance
2. dependence
3. nonreducibility

Intra-world supervenience: nonreductionism without covariance

Definition 1 (Intra-world supervenience). *A set of properties A intra-worldly supervenes upon a set of properties B iff, for any possible world w , if x and y are B -indiscernible in w , then they are A -indiscernible in w .*

$$(1) \quad \Box \forall x \forall F \in A (Fx \rightarrow \exists G \in B (Gx \wedge \forall y (Gy \rightarrow Fy)))$$

Intra-world supervenience does not capture relational dependencies and does not support counterfactuals. The covariance might be purely accidental.

Inter-world supervenience: covariance without non-reductionism

Definition 2 (Inter-world supervenience). *A set of properties A inter-worldly supervenes upon a set of properties B iff, for any worlds w and v and any individuals x and y , if x has the same B -properties in w than y has in v , then x has in w the same A -properties than y has in v .*

$$(2) \quad \Box \forall x \forall F \in A (Fx \rightarrow \exists G \in B (Gx \wedge \Box \forall y (Gy \rightarrow Fy)))$$

Strong, inter-world, supervenience entails, but is not entailed by, weak, intra-world, supervenience.

Global supervenience: covariance & nonreductionism without dependency

Definition 3 (Global supervenience). *A set of properties A globally supervenes upon a set of properties B iff all possible worlds that are B -indiscernible are A -indiscernible.*

Should we identify indiscernible worlds?

$$(3) \quad \forall w, v (w \neq v \rightarrow \exists p (w \models p \wedge v \not\models p))^1$$

Global supervenience logically follows from, but does not logically entail, strong supervenience. They are, however, metaphysically equivalent (hold at the same worlds) if both the supervening properties A and the subvening properties B are all intrinsic (? : 850) and if both A and B may both contain extrinsic properties and are closed under infinitary Boolean truth-functions, identity and quantification (Stalnaker 1996: 104–105).

Kim (1987: 85–86) argues global supervenience, in the absence of strong supervenience, is of little use in metaphysics. Independent of assumptions about the realm of possibilities, it does not rule out worlds containing B -indiscernibles that are A -discernible; neither does it specify property-to-property correlations and does not say of any one individual that *its* A -properties depend on or are exemplified in virtue of *its* B -properties.

(Paull and Sider 1992: 842)’s response to (Kim 1989: 41)’s ‘wayward atom’ argument:

Clearly, something is wrong. If *strong* supervenience isn’t strong enough to be an adequate dependency relation, no supervenience relation is. (Paull and Sider 1992: 842)

World isomorphisms to the rescue?

What does it mean that two worlds are indiscernible with respect to some properties?

What does it mean for a supervenience thesis to hold across different domains?

Definition 4 (Multiple domain supervenience). *$\langle A, D_1 \rangle$ supervenes on $\langle B, D_2 \rangle$ iff every complete distribution of B over D_2 entails a unique complete distribution of A over D_1 .*

How do we individuate distributions?

Definition 5 (Φ -preserving isomorphisms between worlds). *For some set of properties Φ and worlds w and w' , some function $f : |w| \rightarrow |w'|$ is a Φ -preserving isomorphism iff it is one-one and for every $F \in \Phi$: $F(x)$ in w iff $F(f(x))$ in w' .*

The domains are thus assumed to have the same cardinality:

Even for worlds with domains of different sizes it should be meaningful, and sometimes true, to say that they are “alike” in physical, or psychological, respects, in a sense of “alike” that is relevant to claims of supervenience [...] we would want to say that a large and a small cube of sugar are both water-soluble in virtue of the fact that their respective parts (molecules) are in ‘the same micro-state.’ (Kim 1988: 119, 125)

Switching from functions to relations?

Definition 6 (Weak coordinated domains supervenience). *$\langle A, D_1 \rangle$ supervenes on $\langle B, D_2 \rangle$ relative to relation R iff, for every x and y in D_1 , if $R|x$ is B -indiscernible from $R|y$, then x is A -indiscernible from y .*

Definition 7 (Strong coordinated domains supervenience). $\langle A, D_1 \rangle$ supervenes on $\langle B, D_2 \rangle$ relative to relation R iff, for every x and y in D_1 and any worlds w and v , if $R|x$ in w is B -indiscernible from $R|y$ in v , then x in w is A -indiscernible from y in v .

With the notion of Φ -preserving isomorphism in place, we can distinguish weak and strong global supervenience (cf. Stalnaker (1996: 227), McLaughlin (1997: 214), Sider (1999: 917)), depending on whether we require every B -preserving isomorphism between x and y to be itself an A -isomorphism or just to entail the existence of a A -isomorphism:

Definition 8 (Weak global supervenience). A set of properties A weakly globally supervenes upon a set of properties B iff, for all possible worlds w and w' , if there is a B -preserving isomorphism between w and w' , then there is a A -preserving isomorphism between w and w' .

Definition 9 (Strong global supervenience). A set of properties A strongly globally supervenes upon a set of properties B iff, for all possible worlds w and w' , every B -preserving isomorphism between w and w' is A -preserving.

Bennett (2001: 26–31) proves that they come out equivalent if the supervening set contains only intrinsic properties and the subvening set does not contain any haecceistic properties (properties that distinguish between any counterparts). (9) is equivalent to strong supervenience if the subvening set is closed under Boolean operators, quantification and identity. The upshot is a negative one:

Global supervenience is of little independent value. [(9)] has certain rhetorical and epistemic virtues, but no metaphysically distinctive function, and neither [middling supervenience] nor [(8)] is strong enough to capture any interesting dependencies. [...] In order to capture the real dependence of A on B , even when those properties are instantiated by entirely different sets of things, there has to be some kind of tie between the distribution of B -properties and the distribution of A -properties. (Bennett 2001: 22)

Strong covariance without dependency

Dependence and determination are asymmetric relations – supervenience, according to all definitions above, is not:

All this points to the conclusion that the idea of dependence, whether causal or supervenient, is metaphysically deeper and richer than what can be captured by property covariance, even when the latter is supplemented with the usual modal notions. [...] ...property covariation by itself does not warrant the use of “because”, “in virtue of”, etc., in describing the relationship any more than it warrants the attribution of dependence. (Kim 1990: 147)

The contingency problem

Many supervenience claims, and most of the prominent ones, are usually taken to hold contingently:

Materialism is meant to be a contingent thesis, a merit of our world that not all other worlds share. Two worlds could indeed differ without differing physically, if at least one of them is a world where Materialism is false. (Lewis 1983: 35)
 ... physicalism is not a claim about every possible world, but only a claim about *our* world to the effect that its physical nature exhausts all its nature. (Jackson 1998: 11)

If we keep **S5** for metaphysical modality, the easy way to achieve contingency is restricting the range of worlds quantified over:

Among worlds where no natural properties alien to our world are instantiated, no two differ without differing physically; any two such worlds that are exactly alike physically are duplicates. (Lewis 1983: 37)

Any world which is a minimal physical duplicate of our world is a duplicate simpliciter of our world, where a minimal physical duplicate is what you get if you ‘stop right there’. (Jackson 1998: 12)

The two accounts are not equivalent, but neither is necessary nor sufficient.

Stalnaker thinks they are vacuous:

... what is interesting, and disquieting, about this way of solving the problem [of making supervenience hold contingently] is that the concept of supervenience is no longer what is doing the work of formulating the reductionist thesis in a way that isolates its metaphysical component. On this account, the materialist’s global supervenience thesis is this: relative to all possible worlds that have the same total set of properties and relations as our world, the mental globally supervenes on the physical. But this thesis is a trivial consequence of the materialist thesis that was stated without the notion of supervenience: that the set of all basic properties and relations of our world is the set of physical properties and relations. (Stalnaker 1996: 98)

Morals

- Whether or not the accounts are equivalent, depends on the what kinds of properties we include in the subvening and supervening sets and on which recombination principles we accept for the realm of possibilities. Given plausible assumptions, they all stand and fall together for intrinsic properties.
- We do not want strong supervenience.
- Global supervenience needs some coordination of the respective inhabitants.
- Asymmetry is a problem.
- Contingency is a problem.

Supervenience as dependence

Some authors, most notably Armstrong, have talked of supervenience between objects, suggesting that the supervenient comes as an free ontological lunch (Armstrong 1997: 12). Though they have taken supervenience to be entailment, what they meant is existential dependence. The difference between these two concepts parallels the one between necessary covariance and supervenience. As Fine (1994) famously argued, the singleton {Socrates} supervenes or existentially depends upon Socrates, but not the other way round, while the existence of Socrates both is strictly implied and necessarily covaries with that of his singleton. Correia (2002) has spelt out this notion of existential dependence in much detail, and given an account of object supervenience in terms of his primitive notion of grounding.

Whenever some properties A supervene on other properties B , what makes that something has a B -property *ipso facto* makes it true that it has a A -property. There is just one truthmaking involved, nothing further is required: the physicalists’ commitment is “to the physical nature of the world making true the psychological account of the world” (Jackson 1998: 68).

What might be the truthmakers of atomic predications? According to an idea going back to Fine (1982), qua-object might do the job. Here is how Lewis conceives of them:

Imagine something, call it *Long qua black*, that is very like Long in most ways, but differs from him in essence. Long is accidentally black, and might have been striped, orange all over, or even green. Long qua black, however, is essentially black. Long has counterparts of many colours, whereas all counterparts of Long qua black are black. Indeed, the counterparts of Long qua black are all and only the black counterparts of Long. Long qua black, if there were such a thing, would be a truthmaker for the truth that Long is black. Every world where Long qua black had a counterpart would be a world where Long is black. (Lewis 2003: 30)

Different counterpart relations are distinguished by the fact that they derive from different properties of one and the same thing:

... counterpart relations are a matter of over-all resemblance in a variety of respects. If we vary the relative importances of different respects of similarity and dissimilarity, we will get different counterpart relations. Two respects of similarity and dissimilarity among enduring things are, first, personhood and personal traits, and, second, bodyhood and bodily traits. If we assign great weight to the former, we get the *personal counterpart* relation. Only a person, or something very like a person, can resemble a person in respect of personhood and personal traits enough to be his personal counterpart. But if we assign great weight to the latter, we get the *bodily counterpart* relation. Only a body, or something very like a body, can resemble a body in respect to bodyhood and bodily traits enough to be its bodily counterpart. (Lewis 1971: 51–52)

It is by the multiplicity of counterpart relations that we get our truthmakers:

Thanks to the multiplicity of counterpart relations, we have no need to multiply entities. [...] One identical thing can have different potentialities and different essences if it has them relative to different counterpart relations. (Lewis 2003: 28)

Suppose now that Long's blackness supervenes on his surface having a certain reflectance property ϕ . What makes it true that he has this reflectance property *ipso facto* makes it true that he is black. If this supervenience holds contingently, Long qua black and Long qua ϕ are different things. They stand, however, in a relation of existential dependence if, and only if, his blackness supervenes on his being ϕ . This supervenience is anchored to real things, not analysed in modal terms and asymmetric. It is a genuine dependence relation, but does not depend on the structure of modal space but rather on how we trace our counterparts to them. We seem finally to have found a relation which is deep, objective, contingent, non-reductionist, non-modal and non-accidental all at the same time. Too good to be true?

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