Strong global supervenience is valuable

Abstract: It is generally assumed that everything that can be said about dependence with the notion of strong global supervenience can also be said with the notion of strong supervenience. It is argued here, however, that strong global supervenience has a metaphysically distinctive role to play. It is shown that when the relevant sets include *relations*, strong global supervenience and strong supervenience are distinct. It is then concluded that there are claims about dependence of relations that can be made with the global notion of strong supervenience but not with the "local" (individual) one.

1. Introduction

It is generally assumed that everything that can be said about dependence with the notion of strong global supervenience can also be said with the notion of strong supervenience. Thus Karen Bennett (2004: 506) argues that "every claim made with SGS [strong global supervenience] can also be made with strong supervenience. SGS has no metaphysically distinctive role to play". I argue that SGS does have a metaphysically distinctive role. There are claims about dependence of *relations* that can be made with strong global supervenience but not with strong supervenience.

2. Strong and global supervenience

Kim (1984, 1987) defines strong supervenience and distinguishes it from weak supervenience; following Bennett and McLaughlin (2005) I use here the label strong *individual* supervenience (SIS) to distinguish it from strong global supervenience (SGS). The SIS of *A* on *B*, where *A* and *B* are sets of properties, amounts to the claim that any pair of possible objects that are *B*-indiscernible (have exactly the same *B*-properties) are also *A*-indiscernible.[1]

Kim (1984, 1987) also defines global supervenience in terms of indiscernibility of worlds. The global supervenience of *A* on *B* comes down to the claim that any pair of possible worlds that are *B*-indiscernible are also *A*-indiscernible.[2] The indiscernibility of worlds is characterized in terms of an isomorphism: Two worlds w_1 and w_2 are Ψ-indiscernible if there is a one-to-one function *f* from the domain of (i.e., set of objects existing at) w_1 onto the domain of w_2, and for any Ψ-property, *P*, and for any object *a* in w_1, $P(a)$ iff $P(f(a))$. Stalnaker (1996) and McLaughlin (1997) characterize a strong version of this condition, which is SGS, and distinguish it from a weak version. The strong version (SGS) says that any *B*-isomorphism from w_1's domain onto w_2's domain is also an *A*-isomorphism.[3]

Paull and Sider (1992) prove that SGS and SIS are not equivalent. They introduce a scenario in which we can express the dependence of *A* on *B* in terms of the SGS of *A* on *B*, but not in terms of the SIS of *A* on *B*. This seems to contradict Bennett's claim that "anything that can be said with SGS can also be said with strong supervenience [SIS]" (2004: 507). But as Bennett correctly points out, we can express the dependence of *A* on *B* in terms of SIS; we just have to enlarge the *B*-base to include extrinsic properties. More generally, Bennett relies on Stalnaker's theorem (Stalnaker, 1996: 238) which states the equivalence of SGS of *A* on *B* and the SIS of

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[1] Here is Kim's (1987) definition: *A*-properties *strongly supervene* on *B*-properties if and only if for any possible worlds w_1 and w_2 and any objects *x* in w_1 and *y* in w_2, if *x* in w_1 is *B*-indiscernible from *y* in w_2, then *x* in w_1 is *A*-indiscernible from *y* in w_2.

[2] Global supervenience was first introduced by Horgan (1982) as a relation between the *B*-properties and *A*-properties of the entire objects in any possible world.

[3] The weak version says that if there is a *B*-isomorphism, there is an *A*-isomorphism. Shagrir (2002) and Bennett (2004) define intermediate global supervenience which is arguably what Kim had in mind when defining global supervenience.

A on maximal *B*-properties.[4] This ensures that everything said with SGS *about properties* can be said with SIS when the base is enlarged to maximal *B*-properties.[5]

Sider (1999) provides a more general definition of global supervenience that takes into account also *relations*. The notions of global supervenience are defined, as before, in terms of indiscernibility of worlds, which is characterized by means of an isomorphism between the worlds. But the Ψ-isomorphism, *f*, is defined over relations: it requires that for any *n*-place Ψ-relation, *R*, and for any *n* objects in *f*'s domain, $R(a_1,\ldots a_n)$ iff $R(f(a_1),\ldots f(a_n))$. SIS, however, is inherently defined over properties of individuals. These can be monadic, extrinsic, and even maximal properties of an individual, but not relations. The more general definition of SGS puts into question the generality of Stalnaker's theorem, which is about properties, not relations, and thus also challenges Bennett's contention.

3. SGS and SIS are distinct

Consider the following scenario (I):

(I) w_1

Mab, *Mbc*, *Mcd*, *Mda*

Rab, *Rba*, *Rcd*, *Rdc*

[4] A maximal B-property is (roughly) a complete world perspective of an object *x* in terms of B-properties; see Stalnaker (1996), and Sider (1999).

[5] Bennett (2004) also demonstrates that if the *A*-properties are intrinsic there is no need to enlarge the *B*-base: she proves that SGS and SIS of *A* on *B* are equivalent whenever the *A*-properties are intrinsic.

The scenario mentions a world, w_1, that inhabits exactly four objects, *a, b*, *c*, and *d*. There are two different relations at play here, *M* and *R*; for example, *R* is symmetric and *M* is not. Our concern is with the supervenience relations between these relations, and, more precisely, with the supervenience of the set $\{M\}$ on the set $\{R\}$.

The SGS of $\{M\}$ on $\{R\}$ fails. The function *f* from w_1 onto w_1, that maps *a* to *b*, *b* to *a*, *c* to *c*, and *d* to *d*, is an $\{R\}$-isomorphism. Yet *f* is not an $\{M\}$-isomorphism, as *Mbc*, but $\neg M(f(b),f(c))$.

What about SIS? Bennett (2004) does not address the issue of relations, and for good reason. As Kim (1993) notes, it is far from trivial to apply the individual notions of supervenience directly to relations.[6] It is more natural to convert relations to properties of individuals that express these relations. Consider the relation *Rxb* (with respect to *x*). We can convert it to the relational property $\exists yRxy$. The problem with this conversion, however, is the loss of important pieces of information, namely, that *x* stands in relation *R* to an individual that might have other relevant properties. Indeed, we can note that scenario (I) does not violate SIS: each object *x* has exactly the same relational *R*-properties $\exists yRxy$ and $\exists yRyx$, but also the same relational *M*-properties $\exists yMxy$ and $\exists yMyx$.

Alternatively, we could express this relation in terms of the property $\exists y(Rxy \;\&\; y=b)$. But this expression is not supervenience-friendly. On this conversion, two objects, one having $\exists y(Rxy \;\&\; y=b)$ and the other $\exists y(Rxy \;\&\; y=c)$, have *different*

[6] Kim (1993) examines several ways to account for relations, but he is satisfied with none of them. He finally (p. 164) settles on the notion of isomorphism over sets of individuals, which is really yet another version of global supervenience. Indeed, I think that the way to make Kim's suggestions adequate is in terms of SGS.

properties even if all the difference in the world is the naming of *y*.[7] Obviously, we want to say, at least in some cases, that the objects are indiscernible with respect to their *R*-relation.[8]

Another alternative is to present relations as part of the *maximal* property of *x*. In scenario (I) the maximal {*R*}-property is: *there are exactly three objects in the world, y, z, v, other than x. x stands in relation R to y, y stands in relation R to x, z stands in relation R to v, v stands in relation R to z. All the other pairs do not stand in R-relation*. Correspondingly, the maximal {*M*}-property is: *there are exactly three objects, y, z, v, in the world, other than x. x stands in relation M to y, y stands in relation M to z, z stands in relation M to v, v stands in relation M to x. All the other pairs do not stand in M-relation*. This conversion has the advantage that it encompasses in a single description *all* the properties and relations in the world (of the given set), whether *x* is involved or not.[9] It also seems to fit with Stalnaker's theorem; the thought is that the theorem holds when the base includes properties and relations. But we can see that even under this conversion, scenario (I) does not violate SIS: the objects *a*,*b*,*c* and *d* all have the same maximal {*R*}-property, yet they also have the same maximal {*M*}-property.

We can now stipulate that this pattern of *M*-relations holds precisely in all worlds with exactly four objects that all have this very maximal {*R*}-property. In none of the other worlds objects stand to each other in *M*-relation (Alternatively, we can <u>define</u> *Mxy* by the complex term: {*x* has the maximal {*R*}-property (specified above), and *x* is different from *y*, and for the only other two objects in the world, *u* and *v*,

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[7] See McLaughlin and Bennett (2005) section 5.3.
[8] See Kim (1993) who argues for this point when discussing relations.
[9] Hoffmann and Newen (2007) argue that a *B*-base that includes all the intrinsic and extrinsic properties (and relations) is too weak, as it does not distinguish between the relevant and irrelevant *B*-properties. I discuss this argument elsewhere (Author, forthcoming).

exactly the following *M*-relations hold: *Myu*, *Muv* and *Mvx*}). Either way, it is apparent that the set of maximal {*M*}-properties *strongly individually supervenes* on the set of the maximal {*R*}-properties.

It has been shown that the SIS of maximal *A*-properties on maximal *B*-properties does not entail the SGS of *A* on *B*, when the sets *A* and *B* include relations. Moreover, we can note that, on the one hand, even the SGS of {*M*, maximal *M*-properties} on {*R*, maximal *R*-properties} fails. The function *f* described above keeps preserving the base-relations (this is simply because all objects have the same maximal *R*-properties), but fails to preserve the set of supervenient properties and relations (as it fails to preserve *M*-relations). On the other hand, however, the SIS of {*∃yMxy*, *∃yMyx,* maximal *M*-properties} on {*∃yRxy*, *∃yRyx*, maximal *R*-properties} still holds because all objects have the same base-properties and the same supervenient properties.

We can conclude that SGS and SIS are distinct in the context of relations. This is *not* to say that SGS is stronger than SIS, since, strictly speaking, the pertinent sets are different. SGS is applied to sets that include relations, whereas SIS is applied to sets that include relations-being-converted-to-properties. My argument, rather, is that SGS and SIS are distinct in the following precise sense: there are cases in which the SGS of *A* on *B* fails, but we cannot express this failure in terms of SIS, even when we approximate relations by relational or maximal properties (or both). It is in this sense that SIS does not entail SGS.

4. Dependence

The notion of SGS captures an important feature of (non-)dependence in scenario (I). That $\{M\}$ does not strongly globally supervene on $\{R\}$ indicates that the set $\{M\}$ does not depend on $\{R\}$. The reason why there is no dependence here is that we have two objects, *a* and *b*, that are indistinguishable in their *R*-relations: they stand in relation *R* to each other, and each of them stands in *R* relation to no other object. Still, there is some difference between them concerning their *M*-relations. The difference is that *a* stands in relation *M* to *b*, but *b* does not stand in a relation *M* to *a*, but to *c*. It thus follows that there is a difference about the *M*-relations of *a* and *b* that is not dependent on their *R*-relations: Nothing in the *R*-relations of *a* and *b* determines that, or explains why, *a* stands in *M*-relation to *b*, but not vice versa, and why it is *b*, and not *a*, that stands in *M*-relation to *c*.

The notion of SIS does *not* capture the non-dependence of $\{M\}$ on $\{R\}$. On any reasonable way we convert relations to properties, we get that the set of *M*-properties strongly individually supervenes on the set of *R*-properties. This does not mean that SIS is too weak, in the sense that it allows non-dependence scenarios. SIS is not defined over *M*-relations and *R*-relations, but over (maximal) *M*-properties and *R*-properties. With respect to these properties, SIS works exactly right: for the maximal *M*-properties depend on the maximal *R*-properties; in particular, there is *no difference* between *a* and *b* with respect to their maximal *M*-properties. The trouble with SIS, rather, is that it sometimes cannot reflect (non)dependencies of sets that include relations. If we want to express these (non)dependencies, we have to switch to SGS.

It follows that SGS does have a metaphysically distinctive role to play. We can sometime use SGS to state the fact that {*M*} does not depend on {*R*}, but we cannot state this non-dependency with SIS.

5. Objection

It could be argued that the pattern of *M*-relations in scenario (I), i.e., the maximal *M*-property, is, fundamentally, a four-place *M*-relation. This (set of) four-place *M*-relation does strongly globally supervene on {*R*} (also, the maximal *M*-property that expresses this relation strongly individually supervenes on the maximal {*R*}-properties). Thus, the objection goes, there is no gap between SIS and SGS at the metaphysical level: they both capture the dependence of {*M*} on {*R*}. The two-place *M*-relations in the example are only an artifact of the language we ordinarily speak, and are metaphysically second rate. So while these two-place *M*-relations do not strongly globally supervene on the *R*-relations, this supervenience-failure has no metaphysical import. The supervenience-failure does not reflect real metaphysical non-dependence.

This objection is inspired by Sider (2008), who advances a novel reply to the supervenience argument on behalf of coincidentalism (Coincidentalism is the view that there are pairs of entities, say a statue and lump of matter, that are numerically distinct, even if they are made of the same parts). Sider concedes that the supervenience of the modal on the non-modal should be of the *strong* variety. But he suggests that there is a (fundamental) modal *relation* between a statue and the lump of matter. This relation, of *opposite-possibly surviving being squashed*, means that exactly one might have survived being squashed. It strongly globally supervenes on BASE properties-and-relations (and it also strongly individually supervenes on maximal-BASE properties). The so-called modal (monadic) *properties*, e.g., *surviving being squashed*, fail to strongly (globally/individually) supervene on BASE. But these properties are artifacts of the language we ordinarily speak, and so the supervenience-failure does not indicate a real metaphysical non-dependence.

I am not sure how to reply to this objection, as I have no criterion for telling real (metaphysical) properties from properties that are metaphysically second rate. But I would still like to raise the following considerations. First, I do not deny that the *M*-pattern of scenario (I) could be entrenched in a (fundamental) four-place *M*-relation, which strongly globally supervenes on $\{R\}$. I also think that Sider's proposal is ingenious: admitting only (fundamental) modal relations rebuts the supervenience argument against coincidentalism. What I deny, rather, is that the *M*-pattern *must be* entrenched in a four-place *M*-relation. There are also (possible) cases in which the *M*-pattern is entrenched in the two-place *M*-relations. My counter-example refers to the latter case, not to the former.

Second, SGS has a distinctive role to play even if the *M*-pattern must be entrenched in a four-place *M*-relation. SGS nicely distinguishes between the (metaphysical) dependence of the four-place *M*-relation and the (ordinary-language product of) non-dependence of the two-place *M*-relation. For the four-place *M*-relation strongly globally supervenes on $\{R\}$, but the two-place *M*-relation does not. SIS, however, holds in both cases. Lastly, it seems to me that if scenario (I) commits us to a four-place *M*-relation, then the same reasoning will show that coincidentalism *entails* (basic) modal relations, namely, that the modal-pattern of coincident entities is entrenched in modal relations and not modal properties. This will be an even more interesting philosophical result.

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