

Supervenience and co-location.

by Michael C. Rea

Co-location is compatible with the doctrine of microphysical supervenience. Microphysical supervenience involves intrinsic qualitative properties that supervene on microphysical structures. Two different objects, such as Socrates and the lump of tissue of which he is constituted, can be co-located objects that supervene on different sets of properties. Some of the properties are shared, but others, such as the human-determining properties or the lump-determining properties, supervene only on one object or the other. Therefore, properties at the same location can be arranged so as to constitute more than one object at the same time.

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There was a time, not so long ago, when philosophers might truthfully claim that "it is a truism frequently called in evidence and confidently relied upon in philosophy that two things cannot be in the same place at the same time." (1) David Wiggins, famously, called this "truism" into question, and in the decades following his work the view that co-location is possible became one of the most popular solutions to the problem of material constitution. (2) More recently, however, the tides have again turned against the co-locationists. One important reason for this is that the possibility of co-location seems absurd in light of what we might call the "doctrine of microphysical supervenience." (3) My aim in this paper is to briefly describe this doctrine and the problems it is supposed to raise for the co-locationist and then show how one might avoid these problems without rejecting the possibility of co-location.

I

It is widely believed that many (if not all) of the intrinsic qualitative properties of macrophysical objects supervene on the intrinsic properties and relations exemplified by their microphysical parts. For example, an object's mass and shape seem to supervene in this way; its mental properties (if it has any) and its sortal properties seem to as well. (4) This is the doctrine of microphysical supervenience. For convenience, I will abbreviate the doctrine as the view that intrinsic qualitative properties supervene on microphysical structure. The microphysical structure of an object is just the total set of intrinsic properties and relations exemplified by the parts of that object.

If the doctrine of microphysical supervenience is true, then the possibility of co-location raises a host of puzzles. Consider Socrates and the lump of tissue that constitutes him (call it "[Lump.sub.s]"). Obviously, Socrates cannot be identical with [Lump.sub.s], for [Lump.sub.s] but not Socrates is destroyed when, say, Socrates's left index finger is annihilated. Thus (assuming we want to say that both Socrates and [Lump.sub.s] exist) it looks like we are committed to the conclusion that, filling the region occupied by Socrates, there are at least two material

objects with different persistence conditions: one a human being and one a lump of tissue. These objects share all of the same parts, and it seems that their parts stand in all of the same relations with one another. Thus, it seems, they have the same microphysical structure. But now the following problems arise.

(1) Suppose Socrates has a mass of 100 kilograms. If mass supervenes on microphysical structure, then anything having the same microphysical structure as Socrates ought to have the same mass as well. So [Lump.sub.s] must have a mass of 100 kilograms. But if [Lump.sub.s] and Socrates are distinct from one another, and if each has a mass of 100 kilograms, then they should have a combined mass of 200 kilograms. But obviously they do not. (5)

(2) If mental properties supervene on microphysical properties and relations, then anything having the same microphysical structure as Socrates ought to have the same thoughts and beliefs that Socrates has. Thus there are always at least two thinkers located where Socrates is located: Socrates and the lump of tissue that constitutes him. But this is absurd. Suppose Socrates now believes that he kissed Xanthippe on their wedding day ten years prior, and suppose he believes that he was not a scattered cloud of atoms on that day (though, let us suppose, [Lump.sub.s] was a scattered cloud of atoms). Then [Lump.sub.s] believes these things as well. But whereas Socrates believes correctly, [Lump.sub.s] believes incorrectly. (6)

(3) Socrates is a human being. But if sortal properties supervene on microphysical properties and relations, then it seems that anything having the same microphysical structure as Socrates must be a human being as well. But this has extremely bizarre implications. It turns out that either [Lump.sub.s] is a human being with radically different persistence conditions than Socrates, or else [Lump.sub.s] is not destroyed whenever Socrates's left index finger is destroyed. But neither of these possibilities is acceptable. If the first is right, then annihilating Socrates's finger destroys a human being. This means that one can commit murder much more easily than one ordinarily would have thought, and by performing actions

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that one would ordinarily think harm only oneself.(7) On the other hand, if the second is right, then we effectively pay a double price for our solution to the problem of material constitution. Not only do we commit ourselves to co-location; we also commit ourselves to the view that there is nothing co-located with Socrates which has the persistence conditions of a mere lump of tissue.(8)

In each case, of course, the problem can be overcome by denying that the relevant properties are supervenient; but that seems to be a heavy price to pay for co-location.(9) Perhaps one may have independent reasons for denying that some of these properties supervene on microphysical structure and arrangement. But it would be unfortunate to find oneself committed to denying that all of these properties supervene simply by virtue of one's views about the possibility of co-location.

II

What, then, should the co-locationist say about these "supervenience objections"? Let us begin by considering the "mass objection." Intuitively, the co-locationist's reply should go something like this: Socrates and [Lump.sub.s] do not have a combined mass of 200 kilograms because they share their mass of 100 kilograms. There are only 100 kilograms of stuff in the region occupied by the two objects, and so it stands to reason that if both objects are composed of the same stuff, if they share all of their material parts, then they will share their height, mass, shape, and so on as well.

Dean Zimmerman (1995) gives a nice formal statement of this reply.(10) He begins with the following definition:

S is a complete decomposition of x = [sub.df]

Every member of S is a part of x , no members of S have any parts in common, and every part of x not in S has a part in common with some member of S.

With this term in hand, he then expresses the co-locationist's reply as follows:

x has mass n iff there is a complete decomposition S of x such that the sum of the masses of the members of S is n .

Thus if Socrates has a mass of 100 kilograms, then so

does [Lump.sub.s] and so does the sum, Socrates + [Lump.sub.s]. There are (at least) two objects in the region filled by Socrates and [Lump.sub.s], but the object that is their sum still has a mass of only 100 kilograms since every complete decomposition of that object will be such that the sum of the masses of its members is 100 kilograms.

Is this reply any good? It had better be, for otherwise something like the mass objection arises not only for the co-locationist but for anyone who thinks that (i) parthood is transitive and (ii) there are composite objects which have composite objects as parts.(11) Suppose, for example, that among Socrates's parts are the members of a certain set (C) of cells and that among the parts of the cells are the members of a certain set (M) of microparticles. Since parthood is transitive, the members of M are among Socrates's parts; and, for the sake of simplicity, let us suppose that Socrates has no parts other than the members of C and M. Moreover, let us suppose that C is a complete decomposition of Socrates and that M is a complete decomposition of Socrates. Thus the sum of the masses of the members of C equals the sum of the masses of the members of M, which equals 100 kilograms. Now, initially one might think that the mass of Socrates just is the sum of the masses of all of his parts. But if that were right then it would turn out that Socrates has a mass of 200 kilograms rather than 100. The moral, obviously, is that the mass of whatever fills a particular region of space is not to be determined by simply adding together the masses of all of the objects that are in the region. How, then, do we determine the mass of a macrophysical object? It seems that the answer must be something like the co-locationist's answer, that the mass of an object is equal to the sum of the masses of the members of one complete decomposition of that object.

So it seems that the co-locationist has an adequate reply to the mass objection.(12) But what of the remaining two? One would expect that if there is a satisfactory reply to one of the supervenience objections, something like that reply should suffice for the remaining ones as well. But here is the problem. The co-locationist can reply easily to the mass objection because it makes good sense to say that Socrates and [Lump.sub.s], if they both exist, share the same mass. It does not, however, make good sense to say that Socrates and [Lump.sub.s] share the same mental properties or the same sortal properties. If we say they share the same mental properties, then we again have [Lump.sub.s] believing (albeit wrongly) that it (?) was a living human being who kissed Xanthippe on its wedding day ten years prior. But we don't want to say that [Lump.sub.s] has such beliefs; those are Socrates's beliefs and his alone. Likewise, we can't say that [Lump.sub.s] and Socrates share their sortal properties because (i) that

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contradicts the initial hypothesis that [Lump.sub.s] is essentially a lump and not essentially a human being, and (ii) even if we were willing to give up the initial hypothesis, we would find ourselves saddled with the conclusion that annihilating Socrates's index finger is an act of murder.

The co-locationist, then, must deny that Socrates and [Lump.sub.s] share all of the properties that supervene on the properties of their microphysical parts. But the only way to do this without abandoning co-location is to find some principled reason for attributing different intrinsic qualitative properties to Socrates and [Lump.sub.s].

III

A first step in this direction is to endorse a coincidence-friendly definition of supervenience. As Zimmerman notes (1995, p. 90), some definitions of supervenience are more amenable to the possibility of colocation than others. For example, the following is coincidence-hostile:

((S.sub.1))B-properties supervene on A-properties =_[sub.DF] for any worlds [w.sub.1] and [w.sub.2], and for any objects x and y, if x has in [w.sub.1] exactly the same A-properties that y has in [w.sub.2] then y has in [w.sub.2] exactly the same B-properties that x has in [w.sub.1].(13)

Given this definition, the doctrine of microphysical supervenience entails that objects having the same microphysical structure must share all of the same intrinsic qualitative properties.(14) Thus, if we accept both [S.sub.1] and the doctrine of microphysical supervenience, there is no avoiding the conclusion that Socrates and [Lump.sub.s] share all of the same mental and sortal properties.(15)

However, the co-locationist need not accept [S.sub.1]. She might instead accept a definition that is more friendly to her view. For example, she might accept the following:

((S.sub.2)) B-properties supervene on A-properties =_[sub.DF] for any worlds [w.sub.2] and [w.sub.2] and objects x and y, if the parts of x compose something in [w.sub.2] that has exactly the same

A-properties as something that the parts of y compose in [w.sub.2], then the parts of y compose something that has in [w.sub.2] exactly the same B-properties as something that the parts of x compose in [w.sub.2].

On this understanding of supervenience, the doctrine of microphysical supervenience does not entail that objects having the same microphysical structure have all of the same intrinsic qualitative properties. Rather, it entails only that if x and y share the same microphysical structure, and if properties P and Q supervene on that microphysical structure, then something that the parts of x (and y) compose has P and something that those parts compose has Q. Thus it leaves open the question whether the thing that has P is the same as or different from the thing that has Q.

Strictly speaking, this is enough to overcome the remaining two supervenience objections. Each objection infers from the doctrine of microphysical supervenience that, because one of the two objects in the region occupied by Socrates has a particular qualitative property, the other must have that property as well. However, as we have seen, these inferences are valid only given certain definitions of supervenience; and there is no reason to think that the colocationist need accept those definitions when there are definitions such as [S.sub.2] readily available.

Still, the co-locationist is not completely out of the woods. Thus far, I have mainly been developing in detail replies on behalf of the co-locationist that have already been suggested in one way or another by Dean Zimmerman and others. But Zimmerman, at any rate, is unsatisfied with those replies. His objection, in short, is that if we accept a definition of supervenience like [S.sub.2], we have the resources to deny that objects like [Lump.sub.s] and Socrates are qualitatively identical, but we still seem to lack the resources to explain their qualitative differences. We want to say, for example, that it is Socrates who thinks and not [Lump.sub.s]. But what could possibly explain this fact? One might say that the explanation lies simply in the fact that Socrates is the human being of the pair, and only human beings are capable of thought; but this just raises the further question of what explains the sortal difference. The co-locationist can stipulate that the supervenient properties exemplified in the region occupied by Socrates are distributed in a certain way (i.e., Socrates gets one set of properties, [Lump.sub.s] gets another); but she seems to lack principled reasons for supposing that they are

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distributed one way rather than the other. Thus Zimmerman concludes that co-location remains unacceptable.

IV

Clearly our most ordinary explanations for qualitative differences will be unavailable to the co-locationist. For example, one would ordinarily explain the fact that Socrates and his horse differ in their sortal properties by appeal to the fact that Socrates's parts are arranged in one way whereas the parts of Socrates's horse are arranged in a completely different way. But obviously the co-locationist can't invoke this sort of explanation to account for the qualitative discernibility of Socrates and [Lump.sub.s]. Nevertheless, the co-locationist is not entirely bereft of resources.

One way to explain the qualitative discernibility of Socrates and [Lump.sub.s] is to endorse a view of material objects according to which an object of kind K exists just in case there is some matter arranged Kwise.⁽¹⁶⁾ This is a roughly Aristotelian view, for it implies that material objects supervene on events: a bronze statue supervenes on the statuewise arrangement of some bronze molecules; a tree supervenes on the treewise arrangement of certain cells; a lump of clay supervenes on the lumpishness of some clay. In each case we have an event consisting of some matter exemplifying a certain property, and the object in question supervenes on that event. This is a very reasonable view of material objects, and it affords the co-locationist a principled explanation for the qualitative differences she wants to attribute to co-located objects.

Consider Socrates. No one will deny that the stuff filling the region occupied by Socrates is arranged both humanwise and lumpwise. Moreover, it seems clear that the fact that it is so arranged is determined by (or supervenient upon) the intrinsic properties and relations exemplified by the microparticles in that region. Some of those properties and relations make it the case that the stuff in that region is arranged lumpwise; others make it the case that the stuff in that region is arranged humanwise. Thus, it is quite reasonable to suppose that the properties that supervene on these properties and relations are distributed accordingly. Since the human being in the region supervenes on the humanwise arrangement of the microparticles, it is reasonable to say that his properties are just those that supervene on the human-determining properties and relations exemplified by those particles; and since the lump in the region supervenes on the lumpwise arrangement of the microparticles, it is reasonable to say that its properties are those that supervene on the lump-determining properties and relations exemplified by those particles. On this view,

the human being and the lump will share some of their intrinsic qualitative properties (namely, those that supervene on both sets of micro-properties) but there will be others that they won't share (namely, those that supervene on one of the two sets but not the other). The explanation for the differences lies simply in the fact that the two objects supervene on different events.

To put this a bit more formally, let the ps be the microphysical particles that compose both [Lump.sub.s] and Socrates, let L be the set of lump-determining properties and relations that the ps exemplify at time t, and let H be the set of human-determining properties and relations that the ps exemplify at time t. Then: [Lump.sub.s] at t supervenes on the ps exemplifying the members of L; Socrates at t supervenes on the ps exemplifying the members of H. [Lump.sub.s] and Socrates are co-located because the ps compose both objects at the same time; but they are nonetheless different objects because the properties and relations that constitute them as what they are remain different.⁽¹⁷⁾ (In Aristotle's terms, [Lump.sub.s] and Socrates share the same matter but not the same form.) Socrates's intrinsic qualitative properties will be those that supervene on the members of H; [Lump.sub.s]'s intrinsic qualitative properties will be those that supervene on the members of L. Socrates and [Lump.sub.s] will share those properties that supervene on both H and L. (I take it that the members of L will be a proper subset, or close to it, of the members of H, since part of what makes it the case that there is a human being in the region occupied by Socrates is the fact that there is a lump in that region. Thus, I take it that most of [Lump.sub.s]'s properties -- such as weight, size, and so on -- will be shared by Socrates.) But they will not share those properties that supervene on the members of one set but not on the members of the other.

If this is right, then the co-locationist has a ready reply to each of the supervenience objections:

- 1) The mass objection infers from the doctrine of microphysical supervenience that the mass of Socrates will be duplicated by [Lump.sub.s]. However, the co-locationist may plausibly reply that mass is one of the many properties that supervenes on just those properties and relations that L and H have in common; thus, the mass that supervenes on Socrates's microphysical structure is shared by Socrates and [Lump.sub.s].
- 2) The "two thinkers" objection infers from the doctrine of microphysical supervenience that Socrates's mental properties will be duplicated by [Lump.sub.s]. Endorsing [S.sub.2] enables the co-locationist to deny that both Socrates and [Lump.sub.s] must have the relevant mental properties; thus there is no need to believe that those

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properties are either duplicated or shared. And endorsing the view that the objects in question supervene on different events enables the co-locationist to explain why Socrates has those mental properties whereas [Lump.sub.s] does not. The mental properties supervene on the members of H and not on the members of L (otherwise, it would be possible for a mere lump--something whose parts exemplified just the members of L and not the members of H -- to have those mental properties). Thus, the mental properties should be attributed to the object that supervenes on the ps exemplifying the members of H; and that object is Socrates.

3) The sortal objection infers from the doctrine of microphysical supervenience that the sortal properties of both Socrates and [Lump.sub.s] would have to be duplicated. Again, however, endorsing 52 helps the colocationist to avoid the conclusion that those properties are either duplicated or shared, and endorsing the view that objects supervene on events enables her to explain how those sortal properties are distributed. What it is for there to be a lump in a region is just for some matter to be arranged lumpwise; thus, being a lump supervenes on the members of L and it is reasonable to think that the object that supervenes on the ps exemplifying the members of L -- namely, [Lump.sub.s] -- is the one that has the property of being a lump. But (though most, if not all, of the members of L are also members of H) being a lump does not supervene on the members of H. The reason is that being a human being supervenes on the members of H, and (the colocationist assumes) it is impossible for an object to be both a lump and a human being. Thus, it is reasonable to deny that [Lump.sub.s] has the property of being a human being, and it is reasonable to attribute that property to the object that supervenes on the ps exemplifying the members of H -- namely, Socrates.

On this view, then, multiple objects fill a given region just in case there is matter in that region which is arranged in more than one object-constituting way at once. The doctrine of microphysical supervenience implies (given S.sub.2) that all of the intrinsic qualitative properties exemplified in that region supervene on the intrinsic properties and relations exemplified by the microphysical parts of the objects in that region, but nothing will follow from that doctrine regarding which objects have which which intrinsic qualitative properties. The distribution of supervenient qualities will depend upon which objects supervene on which events. And if this is right, then it will turn out on that the intrinsic qualitative properties of each object supervene on its microphysical structure, all of the properties exemplified in the region are accounted for, and the properties we think the co-located objects share (e.g., mass and extension) will be shared and the non-sharable properties (e.g., sortal and mental properties) will be

relegated to the object to which we think they ought to be relegated.(18)

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NOTES

(1.) Wiggins 1968, p. 90.

(2.) See, for example, Doepke 1982, Johnston 1992, Robinson 1985, Simons 1990, Thomson 1983, and, of course, Wiggins 1968 and 1980.

(3.) Among the articles and books that raise supervenience objections to co-location are Burke 1992 and 1994, Heller 1990 (Chapter 2), van Inwagen 1990 (esp. pp. 126-7), van Inwagen (forthcoming), and Zimmerman 1995.

(4.) I am assuming here that mental properties and sortal properties are intrinsic properties. This assumption is not crucial, however. The relevant intuition is not so much that these properties are intrinsic (though it is hard to see why they wouldn't be) as it is that these properties, whether intrinsic or not, are among the properties that supervene on the intrinsic properties and relations exemplified by an object's microphysical parts.

(5.) This problem is mentioned in Lewis 1986 (p. 252) and discussed in some detail in Zimmerman 1995.

(6.) This problem is raised in van Inwagen 1990 (p. 127, esp. footnote 45), van Inwagen (forthcoming), and Zimmerman 1995.

(7.) E.g., it turns out that if you destroy your own finger, you not only harm yourself, but you destroy a human being co-located with you.

(8.) This problem is raised in various ways in Heller 1990 (Chapter 2), Burke 1992, and Zimmerman 1995.

(9.) But see Trenton Merricks (unpublished).

(10.) The formulation is Zimmerman's, but, he says, it is inspired by van Inwagen. (Zimmerman 1995, p. 89, note 57.)

(11.) I owe this point to Trenton Merricks.

(12.) It is instructive to note that a similar reply can be made to what we might call the "extension objection". Suppose one claims that two roads, each with an extension of twenty kilometers, wholly overlap one another. Extension supervenes on microphysical structure

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just as mass does; but it would be absurd to object to the possibility of co-located roads by claiming that such a possibility implies that where two twenty-kilometer roads overlap, we should find forty kilometers of asphalt since forty kilometers is what the combined extension of the two roads would amount to. The roads obviously share their extension; that's just what it is for them to completely overlap one another.

(13.) This is a slightly modified version of a definition offered by Brian McLaughlin (quoted from an unpublished manuscript in Kim 1987, p. 81.)

(14.) To see why, let B-properties be intrinsic qualitative properties and let A-properties be properties like 'the property of having a part (or parts) that exemplify P', where P is some intrinsic property or relation.

(15.) One might deny that (say) mental properties and sortal properties are intrinsic properties. If one did so, one could accept the doctrine of microphysical supervenience as I stated it at the beginning of Section I without accepting the claim that microphysically indiscernible objects must also be indiscernible with respect to these properties. But I am inclined to doubt that such a move would ultimately be helpful. As I said in note 4, I take it that the relevant intuition is that these properties, whether intrinsic or not, supervene. Thus denying that they are intrinsic would seem to show only that the present formulation of the doctrine of microphysical supervenience is defective, not that co-location is compatible with that doctrine.

(16.) This is perhaps controversial. It implies, for example, that (assuming 'statue' is a genuine object-kind) something counts as a statue even if it came about as a result of cosmic accident. I have addressed this and other objections to this thesis in Rea (forthcoming).

(17.) This is not to say that, e.g., [Lump.sub.s] necessarily has parts that exemplify the members of L, for I take it that the members of L determine both essential and non-essential properties of [Lump.sub.s].

(18.) I would like to thank Trenton Merricks for many helpful discussions about the issues addressed in this paper. A version of this paper was read at the 1996 Central Division Meeting of the APA in Chicago. I would like to thank Michael Burke, my commentator on that occasion, for his comments. I am also grateful to William Lycan, Michael Loux, Trenton Merricks, Dean Zimmerman, and an anonymous referee for this journal for comments on earlier drafts.

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