

MEREOLOGY WITHOUT WEAK SUPPLEMENTATION

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I. Introduction

According to the Weak Supplementation Principle (WSP)--a widely received principle of mereology--an object with a proper part, p , has another distinct proper part that doesn't overlap p .¹ A guiding thought behind WSP is that there must be some mereological difference between a composite and any one of its proper parts and there would be no such difference if something were composed by a single proper part [Simons 1987: 26 fn. 17; Casati and Varzi 1999: 38]. I think that WSP is false. Indeed, in my view, the main argument of Nikk Effingham's and Jon Robson's recent article in this journal, 'A Mereological Challenge to Endurantism' [2007: 633-640], should be taken to show that WSP is false. Effingham and Robson, hereafter 'E&R', see matters differently; they take themselves to have provided a compelling objection to endurantism. My reply to E&R's objection serves not only to defend endurantism but also bears on mereology in general. First, I argue that denying WSP can be motivated apart from the truth of endurantism. I then go on to offer an explanation of WSP's initial appeal, argue that denying WSP fails to have untoward consequences for the rest of mereology, and show that the falsity of WSP turns out to be consistent with the above cited thought behind it.

II. E&R's Challenge and the Possibility of Multiple-Location

Let me begin with a brief statement of E&R's objection to endurantism. Suppose it's possible for there to be a wall, Wall, at some time, t , built from a single time-travelling brick, Brick. Given endurantism, this possibility entails that at t , Brick is multiply-located throughout the region Wall exactly occupies, that is, Brick is wholly present at multiple disjoint regions the union of which is the region that Wall exactly occupies. According to E&R, an endurantist can say one of three things about this supposed possibility: (a) Wall is composed by Brick; (b) Wall is identical with Brick; (c) the supposed possibility is in fact impossible--perhaps mereological nihilism is true and there cannot be composite walls or perhaps necessarily, any attempt to build a wall from a single enduring time-travelling brick will be frustrated.

I agree with E&R [2007: 636-639] about the dim prospects of (b) and (c). We part ways, however, in our assessment of (a). According to E&R, option (a) is to be rejected because it entails the falsity of WSP, the denial of which they find to be incredible [2007: 635]. The primary burden of this paper is to argue that such incredulity is misplaced. Before shouldering that burden, though, I argue briefly that even if endurantism is false, there remains motivation for denying WSP. Accordingly, accepting option (a) shouldn't be viewed as a desperate *ad hoc* maneuver to save endurantism.

¹ For a comprehensive survey and assessments of formal mereological systems, see [Simons 1987; Casati and Varzi 1999]; my mereological nomenclature follows that found therein.

To see this, note that perdurantism *per se* doesn't preclude the possibility of an object being multiply-located at a single time. Perdurantism *per se* doesn't, for instance, preclude the possibility of a perduring brick having a stage, Brick-Stage, that's multiply-located throughout a region in a way qualitatively similar to the way in which, in E&R's time-travel case, Brick is multiply-located. As E&R rightly point out [2007: 636], it's exceedingly difficult to see how there could fail to be a wall present at the region throughout which Brick is multiply-located. Similarly, it's exceedingly difficult to see how there could fail to be a temporal stage of a perduring wall, Wall-Stage, present at the region throughout which Brick-Stage is multiply located. Something, however, would have to make up Wall-Stage--it wouldn't be a metaphysical simple²--and the only candidate for that would be Brick-Stage.

Upshot: The main source of conflict with WSP isn't endurantism, but rather, the possibility of an object's being multiply-located at a single time. Since multiple-location at a single time strikes me as a genuine possibility whether or not endurantism is true, denying WSP strikes me as well-motivated whether or not endurantism is true. Of course, E&R and others might insist that WSP is true and conclude that multiple-location at a single time is impossible. Might we have reached an unbreakable standoff in fundamental intuitions? I think not. For WSP doesn't deserve the wide acceptance it enjoys. Or so the balance of this paper is devoted to establishing.

III. The Reasonability of Denying WSP

To begin to see why it's entirely reasonable to deny WSP, it will be useful to consider what E&R say on its behalf:

WSP is not only eminently plausible and in accord with our intuitions, but it is also an axiom of just about every mereology available. Indeed, Casati and Varzi write that '[s]ome authors (most notably Peter Simons) regard [WSP] as constitutive of the meaning of 'part' and would accordingly list it along with the lexical postulates of mereology' [Casati and Varzi 1999:39]. So denying WSP is not a credible option. [2007: 635]

How plausible is it that WSP is constitutive of the meaning of 'part'? Not very. It's easy to imagine someone--for instance, someone admitting the possibility of an object's being multiply-located at a single time--understanding the meaning of 'part' as well as anyone else and yet denying WSP. This, in turn, shows that WSP isn't an analytic or conceptual truth.

How much weight should we place on WSP being selected as an axiom in most formal systems of mereology? Very little, for at least two reasons. First, as I just noted, WSP isn't analytic. Second, there's a plausible explanation, consistent with the falsity of

² You may be tempted to think otherwise. Resist. However, if you cannot, then you still have--provided you want one--a reply to E&R's challenge. For if Wall-Stage should be treated as a simple, then so should Wall. But in that case, the earlier options offered to the endurantist aren't exhaustive. For Wall would be a wall that is neither identical with Brick nor composed by Brick since by hypothesis Wall is a simple. There would no doubt still be some interesting relation between Brick and Wall--perhaps Wall would be said to emerge from Brick.

WSP, for why it is chosen as an axiom in most formal systems of mereology. One may simply fail to attend to the consequences of admittedly unusual but genuine metaphysical possibilities--such as the possibility of a brick being multiply-located at a single time--when selecting the axioms of a formal mereological system. A failure to attend to such possibilities is understandable. When casting about for axioms of mereology, it's very likely for one to attend to *typical* cases of composition involving composites with disjoint proper parts. Of course, WSP would apply in those typical cases of composition and so, it's no wonder that WSP strikes many as quite plausible. However, E&R's case of an enduring time-travelling brick and the parallel case of a multiply-located brick-stage aren't typical. Indeed, those are paradigmatically *atypical* cases of composition. It's no wonder, then, that something surprising such as the falsity of WSP follows from them.

Someone might worry about whether denying WSP has objectionable ripple effects throughout the rest of mereology.³ Might not the falsity of WSP entail the falsity of some obvious and uncontroversial principle of mereology? Though denying WSP has some interesting consequences--as we'll see shortly--as far as I can tell, none of them requires denying anything obvious and uncontroversial. For starters, denying WSP is compatible with taking parthood to be a partial ordering--a reflexive, antisymmetric and transitive relation.⁴ The principles that capture these features of parthood are typically taken to be the fundamental or core axioms of mereology from which different mereological systems are derived by way of adding further axioms.⁵ In addition, denying WSP is consistent with other principles included as axioms in progressively stronger formal systems, principles such as that any two objects that underlap have a smallest common part, that any two objects that overlap have a largest common part, and that any two objects have a mereological sum.⁶

However, WSP is entailed by the Strong Supplementation Principle (SSP), which says that if an object, x , fails to have another object, y , as a part, then there is an object, z , that is a part of x and doesn't overlap y . Consequently, denying WSP commits one to denying SSP. An alleged benefit of SSP is that it precludes the possibility of distinct objects having the very same proper parts. As anyone familiar with work on the metaphysics of material objects can attest, however, it's highly contentious whether distinct objects can have the same proper parts.⁷ In particular, those who maintain that composites (such as statues) are constituted by numerically distinct composites (such as lumps of clay) happily deny SSP. SSP isn't, then, an obvious and uncontroversial principle of mereology.

³ I am very grateful to an anonymous referee for suggesting that I consider and explore this point.

⁴ A relation R is antisymmetric iff for all x, y , if Rxy and Ryx , then $x = y$. An antisymmetric relation need not be asymmetric, and may be symmetric (e.g. identity, equality).

⁵ As Casati and Varzi note [1999: 33-35], even the antisymmetry and transitivity of parthood have been challenged. Like Casati and Varzi [1999: 33-35], I find those challenges lacking. However, even if you deny either that parthood is antisymmetric or that it is transitive, you can still consistently deny WSP. Accordingly, my main point that denying WSP doesn't require denying an obvious and uncontroversial axiom isn't threatened by challenges to the antisymmetry and transitivity of parthood.

⁶ Adding the first two so-called closure principles to the core axioms of parthood yields Closure Mereology and adding the third so-called Unrestricted Fusion principle yields Classical Mereology. See [Casati and Varzi 1999: 43-47] for detailed discussion.

⁷ The literature surrounding material objects and constitution is voluminous. Michael Rea's edited collection *Material Constitution* [1997] is a very nice starting point.

What's more, if you so desire, you can consistently deny WSP and maintain that statues aren't constituted by distinct lumps of clay, that desks aren't constituted by distinct chunks of wood, that human persons aren't constituted by distinct human bodies, and so on. To see this, suppose we have an atypical statue, S, composed by a multiply-located proper part, p . This would, of course, imply that WSP and SSP are false. But does our supposition, on pain of inconsistency, require us to say that S is constituted by a distinct lump of clay that's also composed by p ? As far as I can tell the answer is, 'No'; whether there is such a lump is not settled by the falsity of WSP. So, you can deny WSP without jettisoning the view that composites such as statues aren't constituted by numerically distinct lumps of clay.

I should also point out that anyone denying WSP because of the possibility of something being composed by a multiply-located proper part faces significant pressure to deny the Proper Parts Principle (PPP).⁸ PPP says that if an object, x , has a proper part z and every proper part of x is also a proper part of another object y , then either x is a proper part of y or $x = y$ [Simons 1987: 28]. Suppose I'm right that it's possible for a wall such as Wall to be composed at t by a single brick such as Brick that's multiply-located at t throughout a region R. (For simplicity suppose that Brick is a simple and Wall's only proper part.) Given this, it's hard to see why it would not be possible for Brick also to be multiply-located at t throughout a region, R^* , disjoint from R, in such a way that at R^* , Brick composes a numerically distinct wall, Wall*. (Again, retain the simplifying assumption that Brick is a simple and Wall*'s only proper part.) If this is possible, then PPP is false.⁹ For in such a case, there is an object, Wall, with a proper part, Brick, and every proper part of Wall is also a proper part of Wall* but Wall is not a proper part of Wall* and Wall is not identical with Wall*.

However, the cost of denying PPP is as minimal as denying SSP. By precluding the possibility of distinct composites with the same proper parts, PPP is likewise highly controversial. Moreover, anyone denying WSP can still consistently deny that statues are constituted by distinct lumps of clay. For even though the above possibility involving Brick composing Wall and Wall* entails that distinct objects can have the same proper parts, it doesn't entail that there can be composites with the same proper parts *where one composite constitutes the other*. This reveals an interesting feature of multiple-location: The possibility of multiple-location opens up an alternative way for distinct composites to have the same proper parts, an alternative that can be consistently combined with rejecting constitution. I conclude that denying WSP fails to require denying some obvious and uncontroversial principle of mereology.

Even so, at this point, you might recall the aforementioned guiding thought behind WSP--that there must be a mereological difference between a composite and any one of its proper parts--and find yourself wondering: *How* exactly could a single thing come to compose, come to add up to, something else? Fortunately, that question has an answer, one that squares nicely with the guiding thought allegedly backing WSP. A single thing comes to compose, comes to add up to, something else in much the same

⁸ This point deserves consideration apart from SSP because, though SSP entails PPP, the converse doesn't hold. Accordingly, one might be tempted to think that someone denying WSP because of the possibility of something being composed by a multiply-located part could simply take PPP to be an axiom in order to preclude the possibility of distinct objects having the same proper parts.

⁹ I am assuming here and throughout that mereological principles are necessarily true if true at all.

way as *multiple* things come to compose, come to add up to, something else. Multiple things come to compose a wall, for instance, by bearing certain relations one to another. In the more exotic, atypical case of a single thing composing a wall (or a wall-stage as the case may be), that single thing comes to bear those same relations not to other things but to itself, where this involves that single thing's coming to be multiply-located. So, even in the exotic case of composition by a multiply-located part, there is a kind of supplementation that occurs and there is sense to be made of mereological difference between part and whole.¹⁰ It turns out that a proper part can be supplemented to make a whole in one of at least two ways, by being related in the right sorts of ways to another disjoint part--as captured by WSP--or by being related to itself in the right sorts of ways via multiple-location.

IV. The Parts-Just-Once Principle

E&R raise another objection to option (a)--that Wall is composed by Brick--an objection that doesn't explicitly appeal to WSP. Without addressing this other objection, I won't have completely defended endurantism against E&R's challenge. Moreover, considering the objection is instructive since it too--at least on one understanding--rests on a formal principle the initial appeal of which can be similarly explained away. According to E&R, option (a) is incompatible with what they call the 'Parts Just Once' principle, which says that a composite object cannot have the same object as a proper part many times over [2007: 635]. Whether this alleged incompatibility is genuine depends on how we understand 'a proper part many times over'. To see how E&R seem to understand the expression, consider the following passage:

For the Parts Just Once principle to be false there could exist an x that has n proper parts, the y s, (where $n > 1$) such that the y s are not the same proper part, but are the same object. If there is a whole which has two or more different proper parts, the whole has those proper parts by being part-related to two or more different (i.e. distinct) objects. So for each of the y s, that y is not identical to any of the other y s. Yet it is stipulated that the same object (call it z) is a part n times over. So z is identical to each of the y s--and so by the transitivity of identity each of the y s are identical to one another. A clear contradiction. [2007: 635]

The so-called clear contradiction follows from denying Parts Just Once only if denying it commits one to the claim that *one thing* could be *two distinct* proper parts of a composite (at a single time), which is, I agree, impossible. But this claim follows from denying Parts Just Once only if we read 'a proper part many times over' as 'many *distinct* proper parts of a composite (at a single time)'. Understood this way, however, (a) is compatible with Parts Just Once. For instance, Wall being composed by Brick doesn't

¹⁰ According to Simons [1987: 26 fn.] Franz Brentano [1981] thought that a man could be a proper part of a sitting man without there being any extra part added to the man to compose the sitting man. In the above referenced footnote, Simons says, 'If there is a difference between a man and the same man sitting, it is not a mereological difference.' Notice, though, that in Brentano's example there is no kind of supplementation to account for the alleged difference whereas in a case of a multiply-located part composing a whole there is, the multiply-located part supplements itself. This underscores an important difference between the ways in which Brentano and I reject WSP.

involve *a single object* also being *many distinct* proper parts of Wall (at a single time). Rather, Wall being composed by Brick involves a single object, Brick, serving as the lone proper part of another object, Wall. It's true that Brick may very well have different properties at the different regions it multiply occupies, but that isn't to say nor does it entail that Brick is a distinct proper part of Wall at those regions.

One might suggest reading 'a proper part many times over' along the lines of 'a proper part multiply-located in many distinct regions'. Understood this way, Parts Just Once is obviously incompatible with (a). Fortunately, however, denying this second interpretation of Parts Just Once doesn't lead to E&R's target contradiction. Again, that Brick is multiply-located in distinct regions doesn't entail that *it* is *two distinct* proper parts. This second interpretation of Parts Just Once is nothing more than a disguised denial of the possibility of an object's being multiply-located at a single time. Accordingly, Parts Just Once so understood is only as plausible as a principle about location that baldly denies the possibility of multiple-location at a single time. I propose that, like WSP, the plausibility of such a principle about location derives from intuitions about typical cases of objects occupying regions. But again, cases involving multiply-located objects are atypical. Moral: The objection to (a) based upon Parts Just Once fares no better than the one founded upon WSP.

So, endurantists can successfully meet E&R's challenge. Moreover, we've seen an instance of how metaphysics can shape formal mereology. In particular, we've seen that the extent to which one is inclined to admit or dismiss the possibility of an object's being multiply-located at a single time dictates the extent to which one is inclined to deny or accept principles such as WSP and the second interpretation of Parts Just Once.¹¹

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¹¹ I am indebted to two anonymous referees for this journal for their invaluable comments on this paper.