

THE LARGEST PROPER PARTS OF A WHOLE: A MEREOLOGICAL REASON WHY THE THESIS OF COMPOSITION AS IDENTITY IS FALSE

Patrick Monaghan
Doane College

I. INTRODUCTION

Roughly speaking, according to the thesis of composition as identity, a mereological whole is nothing over and above the parts that compose it. In recent years, the thesis has generated quite a lot of controversy. However, while a variety of arguments have been introduced to refute it, since they have all been based on various assumptions concerning general metaphysics that the proponent of the thesis will simply reject out of hand, they must all be deemed to be inadequate. Consequently, if the thesis is to be refuted, what is needed is an argument that is based on an assumption pertaining to the metaphysics of mereology that the proponents of the thesis cannot reject quite so easily. The purpose of this paper is to defend one such argument, which is based on the notion of the largest proper parts of a mereological whole. The plan of the paper is as follows: First, I will reconstruct the thesis of composition as identity, after making a few brief introductory remarks about mereology itself. Second, I will argue that the thesis of composition as identity is false.

II. THE THESIS OF COMPOSITION AS IDENTITY

The thesis of composition as identity is one in the metaphysics of mereology. So, prior to reconstructing that thesis, I will make a few brief introductory remarks about mereology itself. Mereology is the logic of parts and their wholes. It is usually formulated by taking the transitive and reflexive but non-symmetrical relation of parthood as a primitive and by defining other mereological relations on the basis of it.¹ To account for the non-symmetrical nature of the relation of parthood, it is standard to draw a distinction between the relations of proper and non-proper parthood. Roughly speaking, for x to be a proper part

of y is for x to be a smaller sized part of y . More formally, x is a proper part of y just in case x is a part of y but y is not a part of x . Unlike parthood, the relation of proper parthood is transitive but anti-reflexive and anti-symmetrical. On the other hand, roughly speaking, for x to be a non-proper part of y is for x to be a same-sized part of y . More formally, x is a non-proper part of y just in case x is a part of y and y is a part of x . Unlike parthood and proper parthood, the relation of non-proper parthood is transitive, symmetrical, and reflexive. Next, x and y are said to overlap each other just in case they share a part in common. And they are said to be disjoint just in case they do not overlap. Unlike parthood, proper and non-proper parthood, the relation of overlap is reflexive and symmetrical but non-transitive. Finally, whereas the relation of proper parthood is the one-one relation that the proper parts of a whole individually bear to that whole, composition is the many-one relation that the proper parts of a whole collectively bear to that whole. It is especially important for our purposes to note that there is this distinction to be drawn between the relations of proper parthood and composition; for the thesis of composition as identity is one that pertains only to the latter relation, not to the former one.²

As I said above, the thesis of composition as identity is one in the metaphysics of mereology. The chief proponent of that thesis is David Lewis. In his *Parts of Classes*, he writes:

To be sure, if we accept mereology, we are committed to the existence of all manner of mereological fusions. But given a prior commitment to cats, say, a commitment to cat-fusions is not a *further* commitment. The fusion is nothing over and above the cats that compose it. It just *is* them. They just *are* it... For the most part, if you are committed to the existence of a certain thing or things, and then you become committed to the existence of something that bears a certain relation to it or them, that is indeed a further commitment. If you incur a commitment to the lover of, or the next-door neighbor of, or the weight in grams of, or the shadow of, or the singleton of, something you were committed to already, you have made a further commitment. It is not redundant. But the relation of identity is different. If you are already committed to the existence of cat Possum, and then affirm that there exists something that is identical to Possum, that is not a further commitment. I say that composition—the relation of part to whole, or, better, the many-one relation of many parts to their fusion—is like identity. The “are” of composition is, so to speak, the plural form of the ‘is’ of identity. Call this the Thesis of *Composition as Identity*. (Lewis 81-82)

Given this statement of the thesis of composition as identity, it is important to note what the thesis does and does not imply. It does not imply that the many-one relation of composition is reducible to the one-one relation of identity, or that the former is somehow just the latter in disguise. Instead, given the distinction that Lewis draws between the singular and plural forms of the “is”

of identity, it seems to imply that that there are at least two different varieties of what I call identity-relations. On the one hand, there is the familiar one-one relation of identity. This is the transitive, symmetrical and reflexive relation that, necessarily, any given entity bears to itself and nothing else. This is also sometimes referred to as strict, numerical identity, so as to distinguish it from qualitative identity, or indiscernibility. On the other hand, there is also what I will call the many-one relation of compositional identity. This is the relation that the proper parts of a whole collectively bear to a whole in virtue of which, as Lewis puts it, they are it and it is them. According to the thesis of composition as identity, then, the one-one relation of identity and the many-one relation of composition are both identity-relations in the sense that, just as to claim that x bears the former relation to y is to claim that x and y are one and the same thing, to claim that the proper parts of a whole bear the latter relation to that whole is to claim, as Lewis elsewhere puts it, they amount to the same portion of reality simply taken in two different ways (81).

If there is more than one identity-relation according to the thesis of composition as identity, exactly how many of them are there? There are two answers that the proponent of the thesis can consistently give to this question. First of all, one might claim that there are just two such relations. There is the one-one relation of strict, numerical identity and the many-one relation of compositional identity. On the other hand, one might claim that there are actually an infinite number of them. There is the one-one relation of identity; there is the two-one relation of compositional identity; there is the three-one relation of compositional identity; and so on and so forth. Of course, at this point one might object that there is nothing in Lewis' statement of the thesis of composition as identity that implies that there are more than two identity-relations. But while the objection makes a fair point as far as it goes, I still insist that the claim that there are an infinite number of identity-relations is perfectly compatible with Lewis's statement of that thesis. When he speaks of the many-one relation of composition as an identity-relation, we can (by adopting the standard set-theoretic understanding of the nature of relations) regard that relation as the set that contains as elements the two-one relation of compositional identity, the three-one relation of compositional identity, and so forth. In other words, we can regard the many-one relation of composition as the set containing all of the other, more specific relations of compositional identity as elements. Seen in this light, the claim that there are an infinite number of identity-relations is a way simultaneously to flesh out and make systematic the thesis of composition as identity. In any case, it is important to note that nothing in my argument of the next section turns on the issue of whether or not this interpretation of Lewis is correct. So for that reason, I will simply set that interpretive issue to the side at this time.

On the other hand, one might also object that there is nothing in Lewis' statement of the thesis of composition as identity that implies that there is even more than one identity-relation. But this objection is implausible. To be sure, Lewis is not as explicit on this point in the passage quoted above as one might

like him to be. After all, while he does claim that one-one identity and many-one composition correspond respectively to the singular and plural forms of the “is” of identity, to claim that composition is like identity is not necessarily to claim that the former is an identity-relation, as others have noted.³ But even so, he is more explicit on the point elsewhere, when he writes:

[M]ereological relations ... are something special. They are unlike the same-mother relation or the average-of relation. Rather, they are strikingly analogous to ordinary identity, the one-one relation that each thing bears to itself and to nothing else. So striking is this analogy that it is appropriate to mark it by speaking of mereological relations—the many-one relation of composition, the one-one relation of overlap—as kinds of identity. Ordinary identity is the special, limiting case of identity in the broadened sense. (Lewis 84-85)

Not only does this passage make clear that, according to Lewis, the relation between many-one composition and one-one identity goes beyond mere analogy or similarity; given its reference to one-one identity as a limiting case, it also seems to suggest that there are a variety, if not an infinite number, of identity-relations.

At this juncture, there are two points concerning the logic of the interaction between the one-one relation of identity and the many-one relation of composition that should be noted, which will become important in the following section. The *first* is that if x , y , and z collectively bear the many-one relation of composition to W , and if x , y , and z also bear that relation to W' , then if the thesis of composition as identity is true, W and W' will bear the one-one relation of identity to each other. After all, if that thesis is true, and if x , y , and z bear the relation of composition to W , then it is them, as Lewis puts it. And if that thesis is true, then if x , y , and z bear that relation to W' , they are it, as he puts it. But if W is x , y , and z , and if x , y , and z are W' , this seems to imply that W and W' are one and the same thing. In other words, it seems to imply that W and W' bear the one-one relation of identity to each other.

The *second*, which is a direct implication of the first, is that if x , y , and z collectively bear the many-one relation of composition to W , and if x , y , and z also bear that relation to W' , then if W and W' do not bear the one-one relation of identity to each other, the thesis of composition as identity will be false. Certainly one might wonder how W and W' could fail to bear the one-one relation of identity to each other, if x , y , and z are proper parts of them both. But as I will explain in the following section, x , y , and z can still bear the many-one relation of composition to both W and W' , even though W and W' do not bear the one-one relation of identity to each other, provided that x , y , and z are the largest proper parts of W but not W' .

Finally, there are two additional claims in the metaphysics of mereology accepted by the proponents of the thesis of composition as identity that should be noted prior to proceeding.⁴ The first is the principle of unrestricted composi-

tion. According to this principle, given any non-empty set of entities, all of the elements of this set are proper parts of some mereological whole, regardless of how scattered the elements of that set are with respect to each other. And the second is the principle of mereological extensionalism. According to this principle, if x and y have proper parts in the first place, then x and y are identical to each other just in case they share all such parts. It is important to note that the principle of mereological extensionalism is to be distinguished from the more general principle according to which, given any x and y , regardless of whether they have proper parts or not, they will be identical to each other just in case they share all such parts. For even if there are just two numerically distinct atoms (i.e. entities with no proper parts), then whereas the existence of these atoms will trivially constitute a counter-example to the former principle, their existence will not constitute a counter-example to the former one. It should also be noted that the principle of mereological extensionalism is to be distinguished from the principle according to which, given any x and y , they are identical to each other just in case they share all of the same *parts*. For if x and y are two numerically distinct atoms that are nevertheless parts of each other, then whereas the existence of these atoms will constitute a counter-example to the latter principle, their existence will not constitute a counter-example to the former one. Of course, if one insists that x is a non-proper part of y just in case x and y are identical to each other, then one will insist that x and y cannot be atoms that are proper parts of each other without being identical to one another. But in that case, whereas the latter principle will be trivially true, the principle of mereological extensionalism will be substantively true, if true at all.

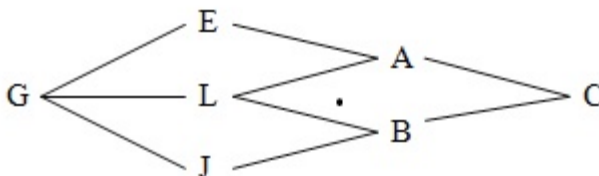
III. THE THESIS OF COMPOSITION AS IDENTITY IS FALSE

Central to my argument is the notion of the largest proper parts of a mereological whole. As I define that notion, x is among the largest proper parts of W just in case 1) x is a proper part of W and 2) x is not a proper part of any of the proper parts of W . Given this definition, I claim that there is at least one mereological whole that has at least one proper part that is among the largest proper parts of that whole. Consider the federal government of the United States of America, for example. It seems natural to regard the Executive, Legislative, and Judicial branches of that government as its largest proper parts. After all, since the U.S. Constitution confers powers only upon those branches and their parts, it seems natural to regard each one of those branches as a proper part of that government that is not a proper part of any proper part of it. To be sure, to claim that those branches are the largest proper parts of that government is not to claim that those parts are all of equal size; for it is a well-known fact that the Executive Branch dwarfs the other two by comparison. Nor is it to claim that these branches are the *biggest* proper parts of that government in all senses of the term; for by some measurements, the Department of Defense (itself a proper part of the Executive) is even larger than the Legislative Branch. Nev-

ertheless, despite these caveats, it still seems correct to regard the Executive, Legislative, and Judicial branches as the largest proper parts of the government in the sense defined above. I will have something more to say in defense of this point below.

In the meantime, it should be noted that the claim that there are some mereological wholes with at least some proper parts that are among the largest proper parts of those wholes fits into a long-standing tradition of thought regarding the metaphysics of mereology; for there is a long-standing tradition of thinking that there is at least one mereological whole, *W*, that has certain proper parts, *p*₁, *p*₂, ..., *p*_{*n*}, that are *exhaustive* in the sense that for any *x*, if *x* is a proper part of *W*, then *x* is a *part* of *p*₁, *p*₂, ..., or *p*_{*n*}.⁵ For example, Plato famously divided the soul into three principle components, i.e. the rational, spirited, and appetitive components. He regarded those components as being exhaustive in the sense that any proper part of the soul is itself a part of one of those components. Now, the phenomenon of exhaustive proper parts seems to be fairly widespread. For example, consider a living organism, such as a human being. It is exhausted by its organs, bones, joints, sinews, and various other tissues. Or, consider an artifact such as a bicycle. It is exhausted by its frame, wheels, handlebar, various braking & gear components, seat, and chain. Or consider a geological object such as the Earth. It is exhausted by its crust, mantle, and core. But note that if a mereological whole is exhausted by *p*₁, *p*₂, ..., *p*_{*n*} in the sense that any proper part of *W* is a part of *p*₁, *p*₂, ..., or *p*_{*n*}, it will follow that *p*₁, *p*₂, ..., and *p*_{*n*} are the largest proper parts of *W* in the sense specified above. So even if one does not like the example of the U.S. Federal Government, since the phenomenon of exhaustive proper parts is fairly widespread, one has lots of other choices to choose from as we proceed.

Given that there is at least one mereological whole that has at least one proper part that is among the largest proper parts of that whole, it should be easy at this point to see that the thesis of composition as identity is false. To see this clearly, let us consider once again the case of the United States Government. Let *G* be that government as a whole; and let *E* be the Executive Branch, *L* be the Legislative Branch, and *J* be the Judicial Branch. Clearly *E*, *L* and *J* bear the many-one relation of composition to *G*. Now by the principle of unrestricted composition, *E* and *L* compose something (call it *A*), *L* and *J* compose something (call it *B*), and *A* and *B* compose something (call it *C*). Clearly *E*, *L* and *J* also bear the many-one relation of composition to *C*. (See figure below.)



Now let us assume that the thesis of composition as identity is true. If that thesis is true, then since E, L, and J bear the many-one relation of composition to G, and since E, L, and J also bear that relation to C, G, and C should bear the one-one relation of identity to each other. But E, L, and J are the largest proper parts of G. And if E, L, and J are the largest proper parts of G, then since E and L are proper parts of A, and since L and J are proper parts of B, A and B will not be proper parts of G, even though they clearly are proper parts of C. Yet if A and B are proper parts of C but not G, then by the principle of mereological extensionalism, G and C are not identical to each other after all. Thus, the thesis of composition as identity is false.

In the remainder of the section, I will reply to a possible objection to my argument, which is based on what is called the proper parts principle. According to this principle, given any x and y, if x and y have proper parts in the first place, and if all of the proper parts of x are proper parts of y, then x itself is a part of y. Now, according to the objection, since the proper parts principle is true, and since all of the proper parts of A are proper parts of G, A itself is a part of G.⁶ But according to the objection, if A is a part of G, then my argument is unsound. Thus, according to the objection, that argument is unsound.

To reply to this objection, I reject the proper parts principle as false. On the one hand, I grant that if x and y have proper parts, and if x is a part of y in the first place, then of course all of the proper parts of x are proper parts of y. But, on the other hand, I deny that if x and y have proper parts, and if all of the proper parts of x are proper parts of y, then x itself automatically counts as a part of y. Consider G once again. G is a social institution. That is to say, we created it. And since we created it, it is up to us to decide what counts as a part of it and what does not. Now I submit that when we created G, we did so in such a way that E, L, and J are its largest proper parts. This seems to be suggested by the fact that, as I said above, when we created G, we divvied up its causal powers among its branches and their parts. But if E, L, and J are its largest proper parts, then even though all of the proper parts of A are proper parts of G, A itself is not a part of G at all. Again, this is not to claim that A fails to exist or that it fails to be a part of C. Rather, it is just to claim that it fails to be a part of G.

This last point warrants further emphasis. On the one hand, I do not find it all that strange to be told that we cannot create a government with E, L, and J as its branches without thereby creating something that has E and L as parts. In any case, the claim that E and L exist only if they compose something is a straightforward implication of the principle of unrestricted composition. But, on the other hand, I do find it very strange indeed to be told that no matter how hard we try, we cannot create a government with E, L, and J as its branches without creating something with E and L as its parts that not only exists, but does so as yet another, even larger, part of G. That is to say, I find it strange to be told that no matter how hard we try, we simply cannot create a government that has E, L, and J as its largest proper parts. But this is precisely what the proper parts principle insists upon, given its insistence that since all of the

proper parts of A are proper parts of G, A itself is a part of G. And for this reason, it should be clear that the proper parts principle is false.

NOTES

1. As I understand the notions, relation R is symmetrical just in case for all x and y, if x bears R to y, then y bears R to x. Being as tall as is a symmetrical relation. R is anti-symmetrical just in case for all x and y, if x bears R to y, then y does not bear R to x. Being taller than is an anti-symmetrical relation. And R is non-symmetrical just in case for some but not all x and y, x bears R to y and x bears R to y. Love is a non-symmetrical relation, given that sometimes it is requited and sometimes it is not. Similar remarks apply with the appropriate changes made to reflexive and transitive relations.

2. For more on mereology, see Simons's *Parts: An Essay on Ontology*.

3. See Yi's "Is Mereology Ontologically Innocent?"

4. For Lewis's commitment to these principles, see his *Parts of Classes* (74).

5. In the limiting case, x will be a non-proper part of p1, p2, ... or pn. Otherwise x will be a proper part of one of them.

6. This objection could also be made in terms of the relation between B and G. My reply to this objection will mirror my reply to the one now under consideration.

WORKS CITED

Lewis, David. *Parts of Classes*. Oxford: Basil Blackwell Press, 1991.

Simons, Peter. *Parts: An Essay in Ontology*. Oxford: Oxford University Press, 1987.

Yi, Byeong-Uk. "Is Mereology Ontologically Innocent?" in *Philosophical Studies*, 93.2 (1999): 141-60.