

PART III

Metaphysical Commitments
of CAI



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Composition as Identity, Modal Parts, and Mereological Essentialism

Meg Wallace

1 Introduction

There are many arguments against composition as identity.¹ One of the more prominent of these maintains that composition as identity (CAI) entails mereological essentialism (ME).

Composition as Identity (CAI): for any composite object, O , O is (collectively) identical to its parts, O_1, O_2, \dots, O_n .²

Mereological Essentialism (ME): for any composite object, O , O is composed of (all and only) its parts O_1, \dots, O_n , in every possible world in which O exists.³

But ME is *prima facie* outrageous. You do not, after all, think that you would have ceased to exist if you had lost one skin cell. Or that cutting your hair or growing a mustache or taking a shower would result in the destruction of one person—you!—or the (*ex nihilo*) creation of another. What goes for you goes for any ordinary object whatsoever—they can all survive the loss (or replacement or addition) of parts. But if so, then ME is false. And so is any view that entails ME. So much the worse for CAI, then, if CAI entails ME.⁴

¹ See Merricks (1999), van Inwagen (1990), and Sider (2007) for variations of this argument.

² O is not identical to each of O_1, O_2, \dots, O_n , but is collectively identical to them in the way that some students collectively surround a building. Also, the identity here is strict identity, not merely analogical, or one that disobeys the Indiscernibility of Identicals, contra Lewis (1991) and Baxter (1999), respectively.

³ Definition borrowed from Merricks (1999).

⁴ This argument is given by Merricks (1999).

Appeal to the entailment of CAI to ME, and to the purported falsity of ME, abounds in the metaphysical literature. Van Inwagen (1981, 1990), for example, thinks that the choice is between mereological essentialism and denying the existence of composite objects. Famously, he embraces the latter, but he does so by disjunctive syllogism, relying on the supposed falsity of ME.⁵ Cameron (this volume) relies on the supposed absurdity of ME as one reason to reject CAI. Van Cleve (1985), while not concerned with composition, argues that trouble abounds for (a certain kind of) bundle theory of properties because it entails mereological essentialism, and ME is clearly false. And so on.

My aim in the following chapter is not to deny the claim that CAI entails ME; indeed, as I will explain in the next section, I think this claim is true.⁶ Rather, I aim to show how mereological essentialism—contrary to popular intuition—may in fact be true. I will do this by outlining a view of ordinary objects that embraces *modal* parts, the possible world analog of temporal parts. This view maintains that individuals are stretched out across possible worlds in the way that a temporal parts theorist maintains we are stretched out over time.⁷ Such a view of objects, I argue, renders mereological essentialism both intuitive and compelling. If I am right about this, then any arguments which have heretofore relied on the falsity of mereological essentialism must now be reconsidered. Moreover, embracing rather than rejecting mereological essentialism undermines the argument that has been given against CAI, as well as others that are similar in spirit. While I think that adopting modal parts is advantageous in its own right,⁸ a coupling of this view with CAI fortifies CAI against (certain) opponents. I will conclude by considering (briefly) some objections.

⁵ To be a bit more careful: van Inwagen thinks that a commitment to universal composition (universality) carries with it a commitment to something like mereological essentialism; he doesn't specifically talk about CAI. But since a commitment to universal composition is assumed by my account of CAI (defended in Wallace 2011), his argument will apply to CAI. The important point is that mereological essentialism is often seen as a reason to reject certain other views, including CAI.

⁶ If this claim is understood in the way Merricks intends. See discussion, end of §3.

⁷ See Weatherson (n.d.). A view that accepts modal parts is what Weatherson calls a "lump theory." To my knowledge, Weatherson is one of the more recent contributors to discussions of modal parts, although his interest in the view is primarily an exploration of logical space. Weatherson attributes modal parts (or lumps) to Kaplan (1979), which is a paper that was first presented in 1967. McDaniel (2004) discusses a kind of modal parts theory, but it is different than the one I propose here, and he does not defend the view as plausible. So while the idea of modal parts is not novel, using it as a way to make mereological essentialism plausible, and its application to puzzles of constitution and composition, is. As far as I am aware, no one has proposed modal parts (so understood in this chapter) as a competitive view, as I suggest here.

⁸ Defense of this claim will be left for another time. But see Wallace (n.d.) for an independent argument for modal parts.

2 CAI and ME

Here are two quick arguments for why we should think CAI is true (these are not intended to be decisive; I am simply providing some initial motivation for the view):

CO-LOCATION: Co-location of a composite whole and its parts is just as problematic as co-location of e.g. a statue and the clay that constitutes it, unless CAI is true. So, CAI must be true.⁹

ODD THINGS: Suppose for *reductio* that CAI is false. And suppose that universalism¹⁰ is true. Then it follows that if there is a finite number of things in the universe, then there is—a priori—an odd number of things in the universe. This is absurd. So CAI must be true.¹¹

However, there are several arguments against CAI, all similar in spirit, each of which seemingly renders moot arguments like those just given. Trenton Merricks (1999), for example, argues against CAI as follows:¹²

- (1) CAI entails ME.
- (2) ME is absurd (hence false).
- (3) So CAI is false.

I mentioned at the outset why (2) is seemingly true—we think that many ordinary objects *could* lose (and gain) parts and still survive, which violates ME. But let us focus on (1). Merricks argues:

... suppose that O, the object composed of $O_1 \dots O_n$, is identical with $O_1 \dots O_n$. From this, the fact that $O_1 \dots O_n$ are identical with $O_1 \dots O_n$ in every possible world, and the indiscernibility of identicals it follows that O is identical with $O_1 \dots O_n$ in every possible world. Therefore, if composition as identity is true, there is no world in which O exists but is not composed of $O_1 \dots O_n$. So composition as identity implies that O—and, of course, every other composite object—must, in every world in which it exists, be composed of the parts that actually compose it. Composition as identity entails mereological essentialism. (1999, 191–2)

⁹ Argument given in Wallace (2011).

¹⁰ Universalism claims that any two objects whatsoever compose a mereological sum.

¹¹ If there are not finitely many things in the universe, then if CAI is false and universalism is true, there are uncountably many things in the universe. This (some may argue) is absurd, or (at the very least) unnecessarily unparsimonious. Thanks to Aaron Cotnoir and Donald Baxter for bringing this qualification to my attention. Some philosophers may wish to pin the *reductio* on universalism, not CAI. Fair enough. But my aim is just to give some motivation for CAI, not a conclusive argument. So more carefully, if one accepts universalism, then there is motivation to accept CAI, on pain of the absurd consequence that there is *a priori* an odd number of things in the universe.

¹² Where CAI and ME are defined as they are at the start of this chapter.

So if CAI is true, then any composite object is (collectively) identical to its parts. But then by the Indiscernibility of Identicals, there is no world where the composite object exists and its (actual) parts do not. This is pretty convincing. If you disagree, and think (1) is false,¹³ then CAI is safe.¹⁴ So I will assume (1) in what follows.

One way to put Merricks's argument in connection with these arguments for CAI is with a Moorean spin: we are more assured of ME's falsehood than we are that CO-LOCATION or ODD THINGS are good (enough) reasons for CAI. So CAI is false.

A slightly different line of reasoning is the following: CAI is a thesis (that can be) motivated by thinking about the relation that a mereological sum has to its parts (as evidenced by ODD THINGS). But mereological sums have their parts essentially, while ordinary objects do not. So it cannot be that the relation a mereological sum holds to its parts is the same relation that I hold to my parts, since I can lose my parts but a mereological sum cannot. Assuming that the CAI theorist is endorsing a single relation (viz., identity) that is had by both mereological sums and ordinary objects, this is doomed from the start since these are clearly different relations.

Finally, another argument against CAI: ordinary objects might have a very special relationship with their parts, but they aren't identical to them. For *arrangement* matters. I cannot be identical to my parts because if all of my parts were arranged haphazardly, I could not survive. So CAI must be false.¹⁵

All of these arguments are similar in spirit, for they all rely on modal intuitions: I *could* lose some parts and survive, I *could not* have my parts haphazardly rearranged and survive, etc. Our intuitions about the modal profiles of ordinary objects (seemingly) direct us to conclude that CAI is false, regardless of any arguments (such as CO-LOCATION and ODD THINGS) to the contrary.

In the next section, I aim to show how these modal intuitions can be respected and yet this is no threat to CAI. I propose that this can be accomplished if we accept a particular view of ordinary objects—one that maintains that they are *modally* extended.

¹³ One way would be to deny the Indiscernibility of Identicals, as Donald Baxter (1999) does. Also, if one maintains a weaker form of composition as identity, *à la* Lewis (1991), then one could maintain that one of the (few) differences between composition and identity would be that the latter obeys the Indiscernibility of Identicals while the former does not. But these options do not assume the version of CAI I am defending here, so let us leave them aside for now.

¹⁴ From Merricks's argument, at least. ¹⁵ See e.g. Cameron (Ch. 5 of this volume).

3 Modal Parts and CAI

Most of us think that ordinary objects have *spatial* parts.¹⁶ You have your hand and head as parts, for example. This page has a top half and a bottom half, etc. Some of us think that, in addition to these spatial parts, objects also have *temporal* parts—instantaneous time slices of a temporally extended whole.¹⁷ Yet it is theoretically available to think that you have more than just spatial and temporal parts; you may also think that you have *modal* or *world* parts.¹⁸ Let me take the following section to describe (at least one kind of) modal parts view, and to explain how such a view makes good sense of mereological essentialism. Then I will explain how such a view can be beneficial to CAI.

For expository purposes, let us allow the modal parts theorist two assumptions for now (which we may later choose to drop): let us be realists about times and realists about possible worlds. We will assume that there are times other than the present, and we will assume that there are possible worlds other than the actual world. Following Weatherson (n.d.), let us also characterize the modal parts theorist as someone who thinks that “objects which exist at more than one time (world) do so by having different parts at different times (worlds).” So we will be committed to spatial, temporal, and modal parts; we will be committed to the idea that objects are spatially, temporally, and modally *extended*.

Most philosophers (and people in general) think that objects are spatially extended.¹⁹ Fewer (but still some) think that objects are temporally extended. A temporal parts theorist defends the view that individuals are trans-time fusions—stretched out in time (and space) the way that ordinary folk believe a road is stretched out (only) in space.²⁰ Ordinary objects—such as cars and cats and running shoes—are spatio-temporal worms, or mereological sums of time slices of three-dimensional objects.²¹

¹⁶ Some don't. See e.g. van Inwagen (1990) and Unger (1979).

¹⁷ See Sider (2001), Lewis (1986), Heller (1993), etc.

¹⁸ It is possible to commit to modal parts without committing to spatial or temporal parts. For this reason, and following Weatherson (n.d.), I will refrain from calling a modal parts theory “five-dimensionalism.” However, since the view is the modal analog of spatial and temporal extension, and it is (to my mind) conceptually easier to consider a position that maintains symmetry with respect to its view on space, time, and worlds, I will focus on a modal parts theory that embraces spatial, temporal, and modal parts.

¹⁹ Again, some do not. van Inwagen (1990), Unger (1979), and Merricks (2003) e.g. deny that there are (at least certain kinds of) spatially extended objects.

²⁰ I am admittedly being a bit sloppy. There are various kinds of temporal parts theories, and not all of them agree on the picture I am painting here. Yet since I am only using temporal parts as a springboard to make a modal parts view coherent, broad strokes should be fine for now.

²¹ Sider (1997, 2001), Heller (1993), Lewis (1986), etc.

One of the benefits touted for temporal parts is that we can wriggle out of notorious metaphysical puzzles.²² Consider change over time: When you were 5 years old you were 3' tall, not 5'3"; now you are 5'3" tall, not 3'. We'd like to think that you remain the same object over time despite minor changes (a growth spurt, say). But you at 5 years old had the property being 3' (and not 5'3"). You at 36 have the property being 5'3" (and not 3'). But then by the Indiscernibility of Identicals, you at 5 are not identical to you at 36. So, contrary to our intuitions, you do not survive over time or over change.

But temporal parts to the rescue. The idea of "you at 5" and "you at 36," a temporal parts theorist might argue, is strictly speaking a misdescription of the facts. Objects aren't wholly present *at* a time. Rather, they are extended *across* time (and space). So one temporal part of you is 3' and another temporal part of you is 5'3". But this is no more of a contradiction than the fact that a spatial part of you is on the ground right now (your foot, for example) and another spatial part of you is not (your head, let's hope). The temporal parts theorist insists that what it is for an object to change over time is analogous to change over space. A spatially extended object changes over space iff there is one spatial part of that object that is qualitatively distinct from another spatial part. A temporally extended object changes over time iff there is one temporal part of that object that is qualitatively distinct from another temporal part of that object. Change over time, then, "is the difference between successive temporal parts."²³

One may object that on a temporal parts picture, ordinary objects do not *strictly speaking* gain and lose parts. Since objects on this view are trans-temporal fusions, the object itself—the *fusion*—has all of its parts all of the time; it doesn't gain and lose parts at all. So it seems that all of our ordinary statements about change will turn out false.²⁴

But the temporal parts theorist insists that the metaphysical facts are different than we may have initially supposed. Let's take my desk as an example. According to a temporal parts theorist, my desk is a trans-temporal object that has a temporal part, tp_1 , that is composed of molecules m_1, \dots, m_n . My desk has another temporal part, tp_2 , however, that is composed of molecules m_1, \dots, m_n, m_{n+1} . To say that my desk *gained a part*, then, is just to say that my desk has two temporal parts, tp_1 and tp_2 , which differ in their m_i s, such that tp_2 has all of the parts tp_1 has, plus one. So, the temporal parts theorist will insist, it is not the case that our statements about ordinary objects concerning change are flat-out false. Rather, what makes these statements true is different than we may have

²² In fact, this is one of the leading reasons Sider is convinced that the view is true.

²³ Sider (1997, 2001, 2007).

²⁴ See e.g. Hinchliff (1996).

pre-theoretically thought. In this way, we have a view of objects that captures our intuitions about my desk: my desk *does* gain and lose parts over time and still remains the same object. It's just that the metaphysical facts grounding what it is for something to *change*, or gain and lose parts, are slightly different than we may have first supposed.

I intend for a modal parts view to be very similar, with the difference being that the relevant parts under consideration are modal (or world-al), as well as temporal. According to this view, individuals are not only trans-time, but also trans-world.²⁵ What makes it the case that my desk *could* have had one more (spatial) part than it actually does is that in some other possible world, a (world) part of my desk (the part that is in another possible world) has one more (spatial) part than another (world) part (the part of it that is in the actual world) does.²⁶

The definition of modal parts may be given as an analog of the definition of temporal parts. Sider (2001) gives the following mereological definition of a temporal part: *x* is an instantaneous temporal part of *y* at an instant *t* =_{df} (i) *x* exists at, but only at, *t*; (ii) *x* is part of *y* at *t*; and (iii) *x* overlaps at *t* everything that is part of *y* at *t*.²⁷ A parallel (initial) definition of a modal part is: *x* is a world-bound modal part of *y* at a world *w* =_{df} (i) *x* exists at, but only at, *w*; (ii) *x* is part of *y* at *w*; and (iii) *x* overlaps at *w* everything that is part of *y* at *w*.²⁸ This definition may ultimately need some tweaking, but let us begin with it.

One initial worry for the temporal parts theorist was that she would not be able to account for the fact that we think that objects gain and lose parts over time. For if an ordinary object just *is* a trans-time fusion, then it has all of its parts all of the time, and so—in a certain sense—*it* (the fusion) doesn't lose parts at all. But the strategy invoked was to recast our talk of temporal change into differences between successive temporal parts. Similarly, the modal parts theorist faces an initial, parallel worry: we think that objects *can* gain and lose parts. We think that, even if my desk is composed of parts p_1, \dots, p_n , in the actual world, it *could have been* composed of parts p_1, \dots, p_n, p_{n+1} instead; we

²⁵ I mean by "trans-world" in "trans-world individual" something similar to "trans-continental" in "trans-continental railroad"—I am talking about an individual (railroad) that is stretched out across worlds (continents). I do not mean it (as it is sometimes used) to indicate an individual that is wholly located in more than one world.

²⁶ Lewis himself countenances such trans-world individuals (because he accepts universalism), but he denies that they are metaphysically relevant. See Lewis (1986).

²⁷ Sider (2001, 59). Sider gives an atemporal mereological definition of "temporal part" for the benefit of the three-dimensionalist a page later. Similarly, one may give an a-world-al mereological definition of "modal part" for the benefit of the modal equivalent of the three-dimensionalist—i.e. those who think that objects can exist in more than one world and are wholly located wherever they exist.

²⁸ I'm assuming that the modal equivalent of *instantaneous* is *world-bound*.

think that it is made out of parts p_1, \dots, p_n, p_{n+1} in some other possible world. According to the modal parts theorist, talk about differences of individuals (or counterparts) in distinct possible worlds will be cashed out in terms of differences between modal parts of trans-world (and trans-spatio-temporal) individuals. An individual, then, has (at least) one (world) part in one world and another (world) part in another world.²⁹ Any differences between these parts will ground the modal facts about these individuals.

Let's take my desk as an example again. My desk (a trans-world object) has a world part, wp_1 , let's say, that is in the actual world, and which is composed of molecules m_1, \dots, m_n . My desk has another world part, wp_2 , however, that is in another possible world, where it is composed of molecules m_1, \dots, m_n, m_{n+1} . To say that my desk *could have* gained a (spatial) part, then, is just to say that my desk—the lumpy, trans-world object—has (at least) two world parts, wp_1 and wp_2 , which differ in their m_i s, such that wp_2 has all of the (spatial) parts wp_1 has, plus one. So, analogous to the move the temporal parts theorist makes to account for change, the modal parts theorist maintains that it is not that our statements about the persistence conditions of ordinary objects are flat-out false. Rather, what makes these statements true is different than we might have (pre-theoretically) thought. In this way, the modal parts theorist endorses a view of objects that captures our intuitions about my desk: my desk *could* gain and lose parts and still remain the same object. It's just that the metaphysical facts grounding what it is for something to *possibly gain parts* are slightly different than we may have first supposed.

But wait. At the start of this chapter I said that a commitment to modal parts would make mereological essentialism plausible. Yet I have just said that a modal parts theorist will gloss our talk of what is possible and impossible for ordinary objects by talk of differences in world parts—analogueous to how a temporal parts theorist glosses our talk of change over time by talk of differences in temporal parts—thereby *honoring* our ordinary intuitions that ordinary objects possibly gain and lose parts—i.e. honoring our intuition that objects do *not* have their parts essentially. If a modal parts theorist can capture the intuition that ordinary objects possibly gain and lose parts, then how is it that a commitment to modal parts is not only consistent with mereological essentialism but, in addition, makes ME intuitive?

²⁹ I suppose there could be strange individuals that have only one modal part, just like there may be strange individuals that have just one (instantaneous) temporal part, just like there may be strange non-extended objects that have only one spatial part, etc. But let's leave these weird objects aside for now; objects with no modal parts would be extremely fragile beings!

Just because a modal parts theorist grants that it's possible for ordinary objects to gain and lose (spatial and temporal) parts, this does not contradict her commitment to mereological essentialism *as it was defined earlier in the chapter*. ME maintains that any composite object *O* is composed of (all and only) its parts O_1, \dots, O_n , in every possible world in which *O* exists. But this is trivially true on a modal parts picture, since she maintains that ordinary objects are trans-world fusions—not world-bound objects that exist in only one world. And this, she will insist, is going to make all of the difference in our understanding of what mereological essentialism is.

Suppose *O* is any ordinary object you please: a car, a cat, a running shoe, etc. According to a modal parts theory, *O* is a lumpy, trans-world object, with parts O_1, \dots, O_n in different possible worlds. Some of *O*'s world parts will have qualitatively different spatial and temporal parts. But *O* itself is the mereological fusion of all of these world (and spatial and temporal) parts. But then *O* doesn't (wholly) exist in any one world—by hypothesis, *O*'s parts O_1, \dots, O_n are scattered across different possible worlds. If mereological essentialism was false, then *O* would (wholly) exist in a world without O_1, \dots, O_n . Yet in every world in which *O* (wholly) exists (none of them!), *O* is composed of all and only its parts O_1, \dots, O_n . So mereological essentialism is never false; so it is true.

Now suppose *O* is a world-bound object—a strange object that has no modal properties because it is *not* modally (or world-ally) extended; it is just a world-*chunk*. It exists in only one possible world, and no other.³⁰ And suppose *O* is composed of (world-bound) parts O_1, \dots, O_n . If mereological essentialism was false, then *O* would exist in a world without O_1, \dots, O_n . Yet in every world in which *O* exists (just the one!), *O* is composed of all and only its parts O_1, \dots, O_n . So, again, mereological essentialism is never false; so it is true.

So either way—whether we are considering trans-world fusions, or world-bound fusions—ME is true if a modal parts theory is.

It may help to think of the temporal analog. Instead of mereological essentialism, let us consider *mereological eternalism*—the view that, for any composite object, *O*, *O* is composed of (all and only) its parts O_1, \dots, O_n , at every time *O* exists. The endurantist typically rejects this view because while they accept that ordinary objects are wholly located at particular times, they (typically) disagree that an object has all of its (spatial) parts at every time it exists. That is, the endurantist thinks that objects in fact gain and lose parts over time, thus mereological eternalism is false. But the temporal parts theorist would technically accept

³⁰ This is analogous to an object that has no temporal properties because it is not temporally extended; it is just a time *slice*, which is analogous to an object that has no spatial properties because it is not spatially extended; it is just a *space-point*. See n. 28.

mereological eternalism (so defined) for reasons similar to why the modal parts theorist accepts mereological essentialism. According to temporal parts theory, an ordinary object, *O*, is a trans-temporal object, with parts O_1, \dots, O_n at different times. Some of *O*'s *temporal* parts will qualitatively differ in some of their respective (spatial) parts. But *O itself* is the mereological fusion of all of its temporal parts. But then *O* doesn't (wholly) exist *at any one time*—by hypothesis, *O*'s temporal parts are scattered across different times. If mereological eternalism was false, then *O* would (wholly) exist at a time without O_1, \dots, O_n . Yet at every time in which *O* (wholly) exists (none!), *O* is composed of all and only its parts O_1, \dots, O_n . So mereological eternalism is never false; so it is true. Now suppose *O* is a temporally bound object—a strange object that has no temporal properties because it is not temporally extended; it is just an instantaneous time *slice*. It exists at only one time, and no other. And suppose *O* is composed of (temporally bound) parts O_1, \dots, O_n . If mereological eternalism was false, then *O* would exist at a time without O_1, \dots, O_n . Yet at every time in which *O* exists (just the one!), *O* is composed of all and only its parts O_1, \dots, O_n . So, again, mereological eternalism is never false; so it is true.

The difference in the underlying metaphysics of ordinary objects between the modal parts theorist and (a certain kind of) non-modal parts theorist is analogous to the difference in the metaphysics of ordinary objects as understood by the perdurantist and endurantist, respectively. An endurantist believes that ordinary objects are wholly present wherever and whenever they are located. A perdurantist (or temporal parts theorist) believes that ordinary objects are never *wholly* located at (in) a particular time (assuming that no ordinary object is instantaneous). What the endurantist considers the whole object, the perdurantist will argue, is really just a time *slice* of a much larger object composed of various temporal parts. Similarly, an ordinary object is not *wholly* located in one world, according to the modal parts theorist. What many of us consider to be the whole object, the modal parts theorist will insist, is really just a world-*chunk* of a much larger object composed of various world parts. So the modal parts theorist and the non-modal parts theorist differ greatly as to what they think ordinary objects are, and this difference will factor into our understanding of the connection between mereological essentialism and modal parts theory.

A modal parts theorist will assent to “my cat has all of his parts in every possible world in which he exists.” For this is vacuously true on a modal parts view since *cats*—having a rich modal profile—don't exist in any one world. Yet it is still the case that my cat *can* lose (spatial and temporal) parts, since all that *this* means (on the modal parts view) is that my cat (a trans-world object) has world parts that qualitatively differ (in their spatial and temporal parts).

So according to modal parts theory, ME is true and yet ordinary objects possibly gain and lose parts. How is this even coherent? It seems flat-out contradictory.

On the one hand we have the statement “a trans-world object has all of its parts in every possible world in which it exists.” On the other hand we have the statement “a trans-world object possibly gains and loses some of its parts.” I have been arguing that a modal parts theorist will assent to both of these. The key to avoiding contradiction is to pay close attention to what is exactly meant by “parts” in each statement. In the first case, a modal parts theorist will insist that we are specifically attending to a trans-world object’s *world* parts. But if so, then she can easily grant that a trans-world object has all of these necessarily (for there is no world where it lacks them). In the second case, however, what is generally meant is that an object possibly gains or loses its *spatial* and *temporal* parts (but not world parts). Given what the modal parts theorist says that it *is* for an object to possibly gain and lose (spatial or temporal!) parts—i.e. that the object has world parts that qualitatively differ (in their spatial or temporal parts)—this is no problem. Disambiguating what is meant by “parts” in each case, the modal parts theorist will insist, shows how she can consistently grant that objects possibly gain and lose (spatial and temporal) parts, but also how objects have their (world) parts in every world in which that object exists (none).

One might quickly object, however, that the *way* in which modal parts theory embraces ME is a cheat, and furthermore belies the seeming boldness of my claim that modal parts makes mereological essentialism intuitive. For ME simply follows *trivially* from modal parts, and trivial truths are rarely metaphysically significant. Moreover, if ME as originally defined is circumvented in this tricky manner by modal parts, then perhaps it is implausible to think that a modal parts theorist would accept the definition of ME given at the outset of this chapter. Indeed, shouldn’t she rather define mereological essentialism as follows?

Mereological Essentialism_{mp} (ME_{mp}): For any composite object, O, O is composed of modal parts $O_{m1}, O_{m2}, \dots, O_{mn}$, each of which is composed of (all and only) spatio-temporal parts $O_{st1}, O_{st2}, \dots, O_{stn}$.

Since the modal parts theorist cashes out modal differences by qualitative differences in modal parts, these qualitative differences are seemingly generated by differences in spatio-temporal parts. Conversely, the modal parts theorist cashes out modal sameness by qualitative identity of modal parts, which is seemingly generated by sameness of spatio-temporal parts. So ME_{mp} accurately captures how the modal parts theorist should think of mereological essentialism, not ME.

It's true that interpreting "mereological essentialism" as ME_{mp} rather than ME falsifies my earlier claim that modal parts "makes good sense of mereological essentialism." For a modal parts theorist will reject ME_{mp} , making no good sense of it at all. But this is why we must remind ourselves of why we are concerned with mereological essentialism in the first place. I proposed modal parts as a way for the composition as identity theorist to circumvent arguments (*à la* Merricks) that rely on modal intuitions. If we reinterpret what it is that grounds the modal truths—if it is the fact that we have qualitatively distinct modal parts that makes it the case that certain things are possible or impossible for us—then the modal arguments against CAI fail to gain traction. This is because a modal parts theory accounts for what it is for an object to gain and lose parts. What matters is that they can account for our modal profiles, not how they understand "mereological essentialism." Put another way, the sense of "mereological essentialism" that is seemingly so devastating for CAI is whatever sense it is that entails that *ordinary objects* cannot gain and lose parts—that is, that ordinary objects are composed of modal parts, each of which is composed of (all and only) the same spatio-temporal parts. But a CAI theorist who accepts modal parts is not committed to this.

Let's suppose a CAI theorist adopts modal parts (CAI + MP). Then she will claim that ordinary objects are mereological sums of spatio-, temporal-, and world parts. Moreover, this sum is identical to (all and only) these parts. Any difference in any of these parts will result in a distinct object. Suppose you have a lump of clay that comes into existence at the same time as a statue, such that the lump constitutes the statue. So we have a lump and a statue that have completely overlapping spatial and temporal parts. Are the lump and the statue nonetheless distinct objects? According to CAI + MP, yes if they differ in their modal parts; no if they don't. So if you have the intuition that most of us have, the lump of clay can be squished and still survive, but the statue cannot. But, according to modal parts theory, this just means that the (trans-world) lump has modal parts that the (trans-world) statue does not. Some of their world parts overlap, but their distinctness is determined by the world parts that don't. Does this mean that CAI is false? No. Because CAI claims that any object—in this case the trans-world lump or trans-world statue—is identical to all of its respective parts. This is still the case; given CAI + MP, the relevant trans-world objects *are* identical to all of their respective parts, which include the modal ones.

Let's change the case to one of composition, not constitution:³¹ suppose we have some Lego blocks that compose a Lego house. If CAI is true, does that

³¹ Traditionally, the difference between composition and constitution is that the former is a many-one relation whereas the latter is one-one. I don't think that there is an important difference here, and I certainly don't think a CAI theorist should think so, but I'll leave this discussion for another time.

mean the blocks are identical to the house? Not if they differ in any of their spatial, temporal, or world parts. Does this mean that CAI is false? No, because again, according to CAI, a whole is identical to all of its parts, and according to CAI + MP, this includes modal parts (assuming the object in question is modally extended).

So how, exactly, does CAI + MP get us out of the modal objections presented in section 2? As already explained, ME is true if CAI + MP is. If it is protested that once CAI + MP is on the table, we mean by “mereological essentialism” ME_{mp} , then premise (2) will have to be changed to: ME_{mp} is false. But if so, then premise (1) must claim that CAI entails ME_{mp} , on pain of invalidity. But CAI + MP does not entail ME_{mp} , so CAI does not either. In this way, a CAI + MP theorist can reject ME_{mp} , accept ME, and yet avoid the modal objections given at the outset of this chapter.

4 Objections, Replies

Let me take a moment to address a few objections, beginning with modal parts. One of the more controversial assumptions I began with in order to get the modal parts view going was a commitment to modal realism—i.e. that there are concrete possible worlds. Indeed, I have talked of counterparts and possible worlds and world parts as if these were uncontroversial entities. But very few of us are modal realists. So why should anyone take modal parts seriously?

It is true that many of us are not modal realists. But this isn't because we refuse to countenance possible worlds. Typically, the objection to modal realism is the *concreteness* of the worlds, not their existence. Notoriously, if one denies that there are possible worlds, then one is left with the theoretical burden of accounting for our modal truths. One *could* take modal facts as brute, but it is not clear that having brute modal truths is any more theoretically elegant than positing possible worlds.³² So while many philosophers will not commit to *concrete* possible worlds (e.g. Lewis's hard-core modal realism), most *are* inclined towards some kind of ersatzism—the thesis that possible worlds are abstract sorts of things, sets or classes, or some kind of linguistic entities, etc.³³ But then the question isn't whether you think a commitment to possible worlds is outrageous (or objectionable or ontologically excessive), but whether you take a stand on the metaphysical nature of these worlds once you've already invited them into your

³² One could also be a fictionalist about possible worlds, in which case one would get to use possible worlds talk without committing to them. But Modal Fictionalism has its fair share of burdens, which arguably outweigh the benefits of getting rid of worlds to begin with. See Brock (1993), Divers (1995), Hale (1995a, 1995b), Rosen (1990, 1993, 1995), etc. for discussion.

³³ The temporal parallel would be those who commit to times, but think that times (except for the present, perhaps) are abstract.

ontology—and this is a different point (which I’ll get to in a second). So denying that there are possible worlds is not going to be an easy position to maintain in light of the wealth of theoretical benefits possible worlds afford.

But if we do quantify over possible worlds, then (assuming a Quinean criterion of ontological commitment) we are committed to having them in our ontology. Whether possible worlds are abstract or concrete is neither here nor there. And if we already have abstract possible worlds in our ontology—if they are already *here*, so to speak—then they can surely be *parts* of things. Indeed, they are admittedly *part of what there is!*

Perhaps one thinks that composition only concerns or applies to concrete objects. But we do, in fact, use parthood talk when we discuss traditionally abstract objects. Lewis talks about trigonometry being part of mathematics, omniscience being part of God; the number three is part of the real numbers, etc.³⁴ And we do not just talk about abstract entities (e.g. mathematics) having abstract parts (e.g. trigonometry). We think that concrete objects can have abstract parts—or at least, we talk as if they do. We talk about bowling balls having an axis of symmetry, the earth having an equator; Plato talks about the mathematical axis and circumference of a spinning top;³⁵ Peter van Inwagen talks about the mathematical point of a knife;³⁶ etc. Perhaps one may think that these particular examples of parthood are metaphorical, not literal. But it is sometimes accepted (in the literature) that our notions of parthood are topic-neutral, and that we use the word “part” ecumenically.³⁷ Rather than trying to discern metaphorical parthood talk from literal parthood talk, I suggest—following Lewis (1991)—taking all of our parthood talk as instructive, and letting all of our parthood talk define the primitive notion of parthood. In which case, we should allow abstract entities as parts. But if so, then all of the considerations in favor of modal parts remain as they are. While I assumed modal realism for exegetical purposes, at no point did my definition of a modal part, my understanding of a modal part, or its connections to mereological essentialism rely on the assumption that possible worlds are concrete rather than abstract.³⁸

But perhaps this isn’t why you think that abstract worlds are problematic for a modal parts view. Perhaps, you think, the definition of *world-bound modal part*—unlike the definition of *instantaneous temporal part*—is unacceptable. And this

³⁴ Lewis (1991). ³⁵ Plato, *Republic*, book 4. ³⁶ van Inwagen (1981).

³⁷ See Lewis (1991), Simons (1987), McDaniel (2004, 2010), etc.

³⁸ Moreover, if one is a certain kind of ersatz, then one may not even need to make use of abstract objects as parts. One may think that possible worlds are abstract sets of propositions, but that concrete objects are (often) part of these propositions. A proposition about Humphrey e.g. may include Humphrey himself. Sets, while abstract, can have concrete members, and it may be these concrete members that ultimately count as the relevant world parts.

is indeed due to the metaphysics of possible worlds. If worlds are abstract, you might argue, then the notion of “existing at a world” is mysterious. How can an (abstract or concrete) thing *exist at* an abstract thing?

Put a bit more carefully, crucial to the definition of instantaneous temporal part is the idea of *existence at a time*. Likewise, crucial to the definition of world-bound modal part is the idea of *existence at a world*.

x is an *instantaneous temporal part* of y at an instant $t =_{df}$ (i) x exists at, but only at, t , (ii) x is part of y at t , and (iii) x overlaps at t everything that is part of y at t .

x is a *world-bound modal part* of y at a world $w =_{df}$ (i) x exists at, but only at, w , (ii) x is part of y at w , and (iii) x overlaps at w everything that is part of y at w .

Sider explains that the *exists-at* predicate in the definition of instantaneous temporal part is “analogous to the spatial predicate ‘is located at’ . . .” Similarly, then, we should understand the *exists-at* predicate in the definition of world-bound modal part as analogous to the spatial predicate “is located at.” But if this is right, one may argue, then if we think that possible worlds are abstract rather than concrete, then the definition of a modal part becomes mysterious at best and incoherent at worst.³⁹

But notice that the same can be said in the temporal case. If one thinks that times (other than the present) are abstract rather than concrete, then the definition of temporal part—and in particular, the *existing-at* relation—becomes mysterious at best and incoherent at worst. Yet rarely (and to my knowledge: never) does anyone object to temporal parts on the grounds that if one takes times (other than the present) as abstract then the notion of a temporal part is incoherent. I suspect this is either because very few are committed to abstract times and so it is not often considered as a response, or else because it is assumed that anyone who endorses abstract times has a relation that fills in and does the theoretical duty that the *exists-at* (a time) relation is supposed to do for the temporal parts theorist. So either there is a problem with temporal parts because the definition of temporal part does not accommodate those who believe in abstract times, or else in the modal case we can assume (as is done in the temporal case) that anyone who endorses abstract possible worlds has a relation that fills in and does the duty of the *exists-at* (a world) relation. Either way, if this worry is a legitimate one, it is not a problem for the modal parts alone: the coherence of temporal parts and modal parts seems to stand or fall together here.

One may object that, even if the coherence of the *exists-at* relation is a problem for temporal and modal parts alike, it is only a *pressing* problem for modal parts

³⁹ Thanks to an anonymous referee for raising this point.

since very few (if any) embrace abstract times, but many more accept abstract possible worlds.⁴⁰ This may be true but it is ultimately irrelevant. For the view I am proposing here can easily deflate the original worry. As already suggested, a modal parts theorist would have a liberal notion of “part,” allowing that abstract things are parts of concrete things (and the other way around). If one is a (certain kind of) ersatz, then one already grants that possible worlds are abstract sets with abstract (and maybe concrete⁴¹) members. Thus, the *exists-at* predicate could be cashed out in terms of being part of (or being a member of) a particular (abstract) world. This may not be as analogous to the spatial *is-located-at* predicate as Sider originally intended, but it is difficult to see how this affects coherence for the notion when *part of* and *member of* are presumably well understood by the modal parts theorist and ersatz, respectively.⁴²

Perhaps you object to modal parts not because of the metaphysical burdens it seemingly incurs (which I hope I have at least minimally convinced you it doesn't), but because it is just too unintuitive. It is simply not the case, you might argue, that when we think of ordinary objects, we are thinking about these strange modally extended, trans-world mereological sums.

It is true that we may not seem to explicitly think about cross-world objects; indeed, thinking about possible worlds in general is a highly theoretical philosopher's notion that is far outside the realm of common sense. But common sense *does* think a lot about—and has strong intuitions about—the persistence conditions of ordinary objects. I can admit that we don't think of ourselves as trans-world objects, but we do think an awful lot about what is possible and impossible for us, and we do think that such modal attributes are *part of* what makes us who we are. We think that our modal facts are a large part of what makes us who we are; other modal facts are a large part of what makes other things what they are, etc. I do not mean to be leaning too heavily on our metaphorical talk about what is *part of* us and other things. But it is the case that we all have strong intuitions about various objects and their persistence conditions or modal facts, and there are various philosophical puzzles that rely on them (e.g. Gibbard's Goliath and Lump⁴³). And if it is the case—as many of us assume—that our modal facts and properties are made true by various things going on in various possible worlds (whether these worlds are concrete or abstract), then the theory of modal parts is a position that deserves serious attention.

Even if we accept modal parts, however, you might worry that we have now strayed too far from our original motivations for composition as identity.

⁴⁰ Thanks to Aaron Cotnoir for pushing this point.

⁴¹ See n. 39.

⁴² Thanks to Don Baxter for input here.

⁴³ Gibbard (1975).

CO-LOCATION and ODD THINGS, recall, purportedly show that CAI (i) makes mereological universalism more ontologically parsimonious and (ii) solves co-location puzzles. But by pairing CAI with MP, one might argue, we have now undermined these particular advantages for CAI. Take (i). Even if CAI makes universalism more ontologically innocent, one might argue, by accepting modal parts, we have now amplified our commitments to all of these trans-world individuals, thereby dwarfing any ontological savings by adopting CAI in the first place. But I am assuming that all of us are already committed to possible worlds (in light of the objections that have been addressed). And whether these worlds are abstract or concrete, the modal parts theorist accepts mereological sums of these very things that we already accept. I will admit that just accepting modal parts *without* CAI would be ontologically excessive—for every new mereological sum would be a new object in our ontology. But embracing CAI means that we get all of these trans-world mereological sums for free. And *genuinely* free; for the sums are simply *identical* to the things that all of us already accept. So modal parts does not undermine this particular motivation for CAI; that motivation is still very much in play—indeed, it makes (to my mind) modal parts even more attractive.

Take (ii). Even if CAI solves puzzles of co-locations, by accepting modal parts, we are now giving a decidedly different answer to co-locations puzzles (much like the temporal parts theorist does with seemingly co-located objects that have distinct temporal careers). That is, co-location is explained away as a case of mere (world) overlap. So an appeal to CAI is not even needed. It is true that, for the usual puzzles in the literature, it is the modal parts theory that will seemingly be doing most of the work. But this is an illusion. For one thing, there is still the question as to what the relation is between the (trans-world) table and its (spatio-temporal-world) parts. CAI has an answer: identity. A modal parts theory on its own is silent on this matter. So CAI is doing some work here, even if the work is done further back than one had hoped.

Second—and more importantly—everyone in the literature seems to accept cases of (partial) overlap as acceptable and unproblematic.⁴⁴ But this seems as metaphysically irresponsible as blithely accepting total overlap with no explanation. If complete overlap is a problem (as the puzzles of co-location illustrate), then partial overlap should be, too. Isolate the overlapping parts. What is their relation? CAI has an answer: identity. Other views (including modal parts) do not. So even if it seems that CAI paired with modal parts is relying too much on

⁴⁴ Everyone who accepts overlapping parts to begin with, that is.

the latter to solve metaphysical problems, this is too quick an assessment; CAI is doing work at all cases of mereological overlaps, even the partial ones.

There is much more to say here, of course. We still need some independent arguments in favor of modal parts,⁴⁵ and there are surely other objections against it that need to be addressed. But I hope I have at least put modal parts on the table, and shown how it dovetails nicely with CAI. Moreover, if modal parts are worthy of serious attention, then we must also reconsider mereological essentialism. For if I am right that modal parts make (at least some understanding of) mereological essentialism plausible, then any views and arguments which have heretofore relied on the falsity of mereological essentialism must now be reconsidered. At the very least, a class of modal objections against CAI—ones that rely on the supposed falsity of mereological essentialism—are in need of reassessment.⁴⁶

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⁴⁵ Although see Wallace (n.d.).

⁴⁶ I should also add that a modal parts view is not the only answer available to a CAI theorist against the modal objections. But it is certainly the one I prefer.

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