New arguments for composition as identity

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Abstract

Almost all philosophers interested in parthood and composition think that a composite object is a further thing, numerically distinct from the objects that compose it. Call this the *orthodox view*. I argue that the orthodox view is false, and that a composite object is identical to the objects that compose it (collectively). This view is known as *composition as identity*.

I argue that, despite its unpopularity, there are many reasons to favour composition as identity over the orthodox view. First, defenders of the orthodox view have not offered complete theories of composition. For instance, they have not given adequate accounts of heterogeneous properties like *being black and white* in composite objects. Nor have they given satisfactory explanations for the necessary connections that hold between composite objects and their proper parts.

Second, there appears to be no good way for defenders of the orthodox view to remedy this. Any account of the heterogeneous properties of composite objects which is compatible with the orthodox view faces serious problems, as does any account of the necessary connections between an object and its proper parts. Composition as identity, on the other hand, is compatible with intuitive responses to both of these challenges.

Third, there are a number of strong arguments in favour of composition as identity. For example, composition as identity fits our evidence about the way the world is better than the orthodox view does. It also allows us to easily maintain that composition sometimes occurs and sometimes does not—i.e., it allows us to easily maintain that composition is *restricted*. The orthodox view does not.

The theories of composition put forward by most philosophers are at best incomplete or in need of improvement. At worst, they are false and composition as identity is true.

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INTRODUCTION

This thesis is about composition and parthood as they apply to concrete objects.[1] Most of us think that the world contains a great variety of material objects: chairs, tables, cats, dogs, people, trees, planes, planets, molecules, atoms, electrons, and so on.[2] We also tend to think that some of these things are *made up of*, or *composed by*, others. A person, for instance, is composed of large body parts like arms and legs. These body parts are themselves composed of cells of various kinds. These cells are composed of molecules. The molecules are composed of atoms. And the atoms are composed of electrons, protons, and neutrons.

Among the cells that compose a person are individual cells. Each of these individual cells is a *proper part*[3] of the person. Among the atoms are individual atoms. Each of these is also a proper part of the person. Each is also a proper part of one of the individual cells.

My goal is to say what this relation of proper parthood is, and to say what it means for some material objects to compose something.

[1] Although discussion here will be limited to material objects, this should not be taken to mean that these are the only things which have parts. If there are abstract objects then it seems likely that they have parts as well.

[2] There are also "things" which seem to be material but which do not fit clearly into the category of material objects. (Water, gold, electromagnetic fields, and so on.) I will mostly ignore these. Arguably, they can also be treated as objects. Whenever there is some water, for instance, we can say that there is a *body* of water which is composed of water molecules. I assume here that this approach is viable, though that is debatable (e.g., Steen, 2012).

[3] "Proper part" is the philosopher's term for a part (see Chapter 1).

This bears upon the question of what exists. Whether chairs and tables exist, for instance, plausibly depends upon whether there are any things that compose chairs and tables. And this depends upon what exactly composition is.

There are, broadly speaking, two views: one popular, one unpopular. I shall argue that if the popular view of composition is true we have good reason to believe that composition does not occur at all, and that there are no composite objects. If there are such things as atoms, for example, then there are no such things as chairs. If there are chairs, then there are no such things as atoms. But this is very hard to believe. It gives us reason to think that the popular view of composition is false. And I shall argue that, even if I am wrong about this, the popular view makes composition mysterious. It raises more questions that it answers. That, too, gives us reason to think it is false, or at least badly incomplete.

For these reasons, and others, I shall be defending the unpopular view of composition. My goal is to provide new arguments in its favour.

I will say what both views are shortly, First, some preliminary remarks.

I. PRELIMINARIES

In what follows I will be assuming four important points. It is worth making my commitment to them explicit, especially because they play a role in the arguments to come, directly or indirectly. The points are:

1. There is a mind-independent "external" world.

2. Our knowledge of the world comes ultimately through the senses and only through the senses.[4]

3. There is at least one material object.

[4]My approach here is inspired by Maudlin (2007, p. 104). It seems to me that empirical considerations are often not given enough weight in metaphysics. I stress the importance of this in Chapter 4.

4. The philosophical debate about the existence of composite objects is substantive.

All four claims require elaboration. The first is difficult to defend, or even to state precisely. I will not try to do either of those things here. The idea of a mind-independent world is intuitive enough. There is some way the world is, and this may be different to how we think it is. I do not know how to defend this claim, but it is widely enough held that I should not have to.

The second claim follows naturally from the first, with at least one qualification. If facts about the world are mind-independent, then some way of accessing them is needed. The only legitimate source of knowledge about the world seems to be the senses. As far as we can tell there is no way to know what exists in the world without looking, touching, smelling, hearing, tasting, or otherwise interacting with it causally. One cannot simply intuit that the world is a certain way.

Of course, one may be able to deduce, or otherwise infer, facts about the world based on other knowledge; but this other knowledge must ultimately be grounded in empirical data. *That* is the claim.

Here is the qualification. It seems that one can know certain things about the world on the basis of logic alone. For instance, it seems that one can know that the world is not both one way and some other way at the same time. Still, this does not amount to positive knowledge about the way the world is. We can at best rule out incoherent possibilities using logic alone, but we cannot say which of the possibilities is actual on that basis.

The third claim is essential. This is a thesis about material objects. It seeks in part to answer the question of whether some material objects have proper parts, or are proper parts of others. If there are no material objects then the question does not even arise. Luckily, it is relatively uncontroversial that there is at least

one material object. That could, of course, be false; however, even those who deny that it is (e.g., Sidelle, 2000) usually admit that our talk of objects at least *loosely* matches the way the world is. This suggests that, even if there are no material objects, what is said here may be useful regardless.

The fourth point is different from the first three. There is a philosophical debate about whether composite objects like chairs and tables exist (as strange as this sounds). In fact, this thesis speaks to that debate. I will not be assuming that one particular side of the debate is right. But I will be assuming that one side or the other is right. That is, I will be assuming that (a) there is a correct answer to the question, "Are there chairs and tables?" and (b) the players on either side of the debate genuinely disagree about what the right answer to this question is. Some deny this (e.g., Hirsch, 2005; Chalmers, 2009). I cannot argue against such philosophers here. Nevertheless, I think it is reasonable to assume that the debate about composition is substantive. Those involved in the debate take themselves to be genuinely disagreeing, even after hearing the arguments put forward by those who claim otherwise (*cf.* Sider, 2009). And, as we shall see shortly, we can apparently make good sense of the disagreement in question.

Those, then, are the four key assumption I will be making. No doubt there are others; but it would be impossible to make explicit every assumption that lies behind the arguments that follow.

Plural Quantification

In what follows we will be making extensive use of plural referring expressions and plural quantification in general. A *singular referring expression* such as a name or a definite description is an expression that refers to a single object. "Sophia" and "the red thing on the table over there" are both singular referring expressions. A *plural referring expression* is an expression that refers to more

than one thing at once.[5] Examples include "the people outside", "the atoms", and (arguably) "The Beatles".

I will be assuming that it is possible to refer to some things in this way without committing oneself to a further thing. For instance, I think that it is possible to refer to the atoms that compose you without having to refer to any other thing such as the set of those atoms.

This, I think, is reasonable enough.[6] Why shouldn't we be able to refer to just the atoms? When I say that some atoms compose you I am saying something about the atoms and their relation to the you. I do not mean that the *set* of the atoms composes you (*cf.* Boolos, 1984). That is absurd. First, composition is a relation between many things and one. A set is not many things. Second, material objects are composed of material objects. A set is not a material object.

I will also take it for granted that things can have properties *collectively*. This is also very plausible (and perhaps impossible to deny if one accepts the previous assumption). The property of *composing something* is a good example. The atoms that compose you do so collectively. It is not true that *each* of the atoms composes you. Composing you is something that the atoms do together, collectively. There are many other cases of collective properties. For instance, some objects can be arranged such that they *surround* another object. It is false of any one of the objects that it surrounds something, but true of the objects together. We will see many more examples in what follows.

Notice that in the cases just mentioned the property had by the "plurality"[7] is not had by the individual members of the plurality. This may not be true of all collective properties. Some individually red objects will presumably also be red

[5] Or to one or more things at once, depending on one's views. (See e.g., Yi, 1999b, 2014.)

[6] It is also widely accepted. Not everyone agrees, however. See Linnebo (2014) for discussion.

[7] I use this term loosely. "A plurality" should not be taken to refer to a single thing, but rather to some things. It is often easier to talk as if some things were one thing. Still, I will avoid doing so as much as possible.

collectively, for example. In that case some objects can be both collectively and individually red.

Of course, it is possible that sometimes when we appear to be attributing a property to some objects collectively we are in fact attributing the property to each of the individuals. Perhaps some individually red objects are not collectively red. Perhaps what we really mean when we say that *they* are red is that *each* of them is red. This is, of course, still a collective property of the objects—*being such that each of them is red*—but it is not the collective property of *being red*. I will leave it open as to which view is correct. I am inclined to say that some individually red objects are also collectively red, but nothing I say will hang on this.

Just as singular variables are used to stand for single objects in first-order predicate logic, we can use plural variables to stand for pluralities of objects. Sentences of the form "There is a red thing" are represented in predicate logic as follows:

(1) $\exists x(Fx)$

("There exists an x such that x is F.") "x" here is a singular variable and "F" is a predicate (in this case "is red"). If we wish to say "There are some red things" we can introduce plural variables: "xx", "yy", "zz" and so on (Linnebo, 2014). This gives us:

(2) $\exists xx(Fxx)$

("There exist some Xs such that the Xs are F.") "Fxx" should be read as attributing a collective property to the values of the variable "xx". In this case, (2) should be read as saying that there exist some objects which are collectively red. (We will use the terms "the Xs", "the Ys", and so on as plural variables outside of formal

contexts. Furthermore, we will stipulate that the referents of plural referring terms and variables are to be restricted to non-overlapping objects—that is, objects that do not share any parts. Where important, however, I will stress this point. Note also that we will let these terms refer to one or more objects. Thus, we will take it to be true that there are some Xs even if there exists only one thing. This is perhaps a somewhat odd usage,[8] but it will prove useful later.)

Of course, "there are some red things" is naturally read as attributing redness to *each* of the objects. To capture this difference we need to make use of the predicate "is one of". Following Linnebo (2014), let us use the symbol "$\prec$" for this purpose. We can then say:

(3) $\exists xx \forall y(y \prec xx \rightarrow Fy)$

("There exist some Xs such that every one of the Xs is F.") Unlike (2), (3) attributes a property to each of the objects. In this case, it says that there are some objects such that every one of them is red. In what follows I will indicate whether a property is had collectively or individually by saying either that some objects instantiate it "collectively" (or "together"), or by saying that "each of" the objects instantiates the property. It is important to do this because many sentences are ambiguous in this regard. (Many sentences are true regardless of which way they are read so the ambiguity is often harmless in everyday contexts. That, however, is not a reason to ignore the distinction.)

We will also want to be able to make plural identity statements. Just as one thing is identical to itself, some things are identical to themselves. For this reason, "$xx = yy$" is a well-formed formula in plural logic.

Finally, in addition to plural referring expressions, it is also plausible that natural languages contain *super-plural* referring expressions. That is, it is plausible

[8] Though see Yi (2014) for a defence.

that sometimes we quantify plurally over "pluralities", rather than individuals. Expressions like "the fishes" and "the fruits" appear to have this feature. "The are some fishes" means that there are some fish of one kind and some fish of another kind (and so on). (Apparently there are also good examples of super-plural referring expressions in Icelandic.[9])

That there are super-plural referring expressions is somewhat contentious. It shouldn't be. Even if one doesn't think that "the fishes" or "the fruits" are super-plural referring terms, it is quite clear that we can refer to more than one plurality at once. For example, when two sports teams compete against each other it is true that there are some people competing against some other people. If we call the people on one team "the As" and the people on the other "the Bs", then the sentence "the As and the Bs are competing against each other" is true (*cf.* Linnebo and Nicolas, 2008). It is not true, however, that all of the players together are competing against each other. Nor is it true that the As are competing against each other, or that the Bs are competing against each other. Thus, "the As and the Bs" appears to be a super-plural referring expression.

Even setting this aside we seem to at least be able to make sense of super-plural quantification. Thus, even if there are no super-plural referring expressions in natural languages, there is no reason we can't simply introduce them (if only in formal contexts). To do this, we can use expressions like "the Xses" and "the Yses". For logical formulae I will use the variables "xxx", "yyy", and so on. As with the predicate "is one of" we will need something to capture the relation between some Xs and some Yses. I will use the (admittedly unsatisfying) term "is one plurality of" for this and represent it formally as "$\prec_p$".[10]

The necessity of these plural resources for our purposes should be quite clear. If we want to talk about some objects composing something, or of some object

[9] See Linnebo (2014), section 2.4.

[10] See Rayo (2006) for discussion of the formal features of super-plural quantification.

being composed of some things, we need to refer to objects both individually and collectively, and appeal to collective properties in doing so. It will not do to talk of the set of some objects composing something; for a set is not the sort of thing that can compose a material object. Of course, we could say that the *elements* of the set compose something, but now we are referring to the objects collectively once again. Mentioning the set is unnecessary, and so we will avoid it.

With these preliminary points out of the way we can now say more about the two views of composition mentioned earlier.

II. Two Views About Composition

It is common to think that the world can usefully be represented using a "levels" structure, with objects at the higher levels being composed out of the objects at the levels below them (*cf.* Oppenheim and Putnam, 1958). At lowest level (if there is one) are perhaps the elementary particles of physics: bosons, leptons, and quarks. If these objects are indeed at the lowest level then they have no proper parts. That is, they are *mereological simples* or *mereological atoms*.[11] Higher up are atoms. Above these are molecules. Somewhere higher are ordinary objects like chairs and tables.

This seems to fit nicely with how we think about the different sciences. For instance, fundamental physics deals with lower-most levels (or at least the lowest known levels): the atomic and subatomic levels. Chemistry deals with the levels immediately above those: the molecular levels. And biology deals with the levels above those, where they apply to living things: the cellular level and above.

Levels talk, then, is appealing and apparently useful. It is not, however, without its complications. Consider an atom. It is composed of protons, neutrons,

[11] Note that a mereological atom is not an atom in the ordinary sense of the word. It is a literal atom: an object which is indivisible into proper parts.

and electrons. Thus, we might think that the level below the atomic level contains these kinds of object. But, apparently, protons and neutrons are composite objects and electrons are not. If this is right, then surely electrons belong on the same level as the particles that compose protons and neutrons instead. This raises questions. Should electrons be seen as occupying *both* of these levels? Or are there no electrons on the same level as protons and neutrons? Note that if we go with the latter option we will have to say that objects can combine with others at different levels to compose things.

Similarly, it is difficult to say how objects which are made up of quite different kinds of objects fit together. Living things, for instance, are composed of cells, whereas most non-living things are not. Does this mean that living things should be placed on their own level? Or do they share a level with certain non-living things.

Finally, there may be no neat hierarchical structure at all. A square, for example, can apparently be decomposed into halves in two different ways, as Figure 1 below shows.

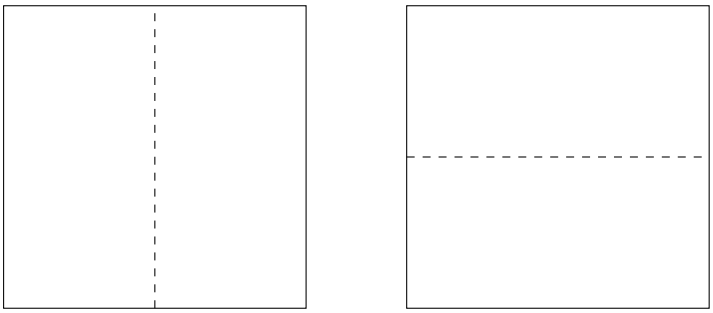


Figure 1: Two different decompositions of a square into halves.

The vertical rectangles in subfigure (a) and the horizontal rectangle in subfigure (b) do not seem to be capable of composing anything with one another, even in principle. Intuitively, then, they should not be placed on the same level; but nor

should one be placed higher than the other. Thus, if there are composite objects that can be decomposed in more than one way, it seems that the world does not have a strict levels structure at all.

Luckily, these problems are not too important for our purposes. The important thing is that it seems useful to appeal to some sort of structure: a structure which is levels-like in many cases. And this structure is mereological. No object is on the same "level" as any object that is a proper part of it, or any object which it is a proper part of.

Let us examine on a simple case. Imagine a brick wall located at a spatial region R. The wall, let us suppose, is composed of bricks, located at subregions of R, and nothing else. And the bricks are composed of atoms located at the subregions of the subregions of R. Ignore all other parts of the wall which may or may not exist. Intuitively, I have just described things at three different *levels of description*. More precisely, something like the following three descriptions all seem to be true:

(i) There exists a brick wall at region R.

(ii) There exists a brick at region S_1, and there exists a different brick at region S_2, and there exists a different brick at region S_3, and ...

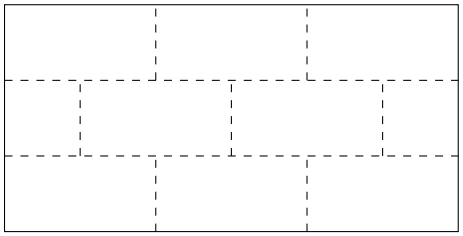
(iii) There exists an atom at region P_1, and there exists a different atom at region P_2, and there exists a different atom at region P_3, and ...

Note that if the bricks compose a wall, the locations S_1, ..., S_n compose the region R, which is wall-shaped.[12] This means that the bricks are arranged in the

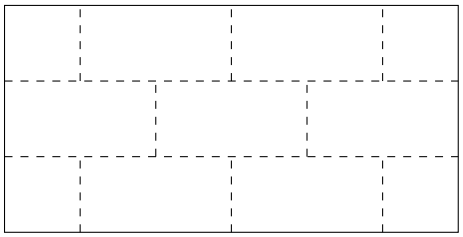
[12]One might think that this is incorrect if the bricks have gaps between them; for then R would include regions not occupied by the bricks. This, however, is a mistake. If the bricks have gaps between them, then the region occupied by the wall has gaps too, and R does not include those gaps. (If you think that the gaps are proper parts of the wall too, then you must reject the case. After all, in the case I have given, the wall is composed of the bricks and the bricks alone.)

shape of a wall. Similarly, the atoms are arranged both in the shapes of some bricks, and in the shape of a wall.

This case brings out another important property of levels talk. Call the description of the wall a *high level* description, the description of the bricks a *mid level* description, and the description of the atoms a *low level* description. The higher and lower level descriptions clearly differ in terms of detail.[13] Suppose that (ii) is a complete description of the bricks. (Ignore the fact that each individual brick will have its own properties.) Even then (i) cannot be a complete description of the wall. For it is compatible with at least two different ways the wall could be. Both of images shown in Figure 2 could be the illustrations of wall in question.



(a)



(b)

Figure 2: Two different brick walls of the same dimensions.

I will argue in Chapter 2 that this feature of higher level descriptions is ineliminable, but for now let us assume it is not. It is not unreasonable to suppose

[13] This seems to be a general feature of higher level descriptions. That is, it seems true that, for the most part, disciplines which focus on higher level entities abstract away from the finer details. For instance, a scientist who is interested in studying organic cells is unlikely to be interested in the exact details of the atoms that make them up. In fact, one can probably study cells without knowing anything about atoms at all.

that we can make each level of description complete by adding a complete description of the wall's properties, being careful not to do so with reference to any of the bricks. After all, it is clear that the walls depicted in (a) and (b) have different properties, even if it is difficult to say what they are without mentioning the bricks that compose them. Thus, let us assume for now that each level of description is complete in this way.

The Orthodox View and Composition as Identity

We are now faced with an interesting question: What is the relationship between these descriptions and the world? There are two types of answer. The first is that each description is a description of a different feature of the world. On this view, the high, mid, and low level descriptions are descriptions of distinct things. If they are all true, then a complete low level description, for instance, is not a complete description of reality. In the example above, the low level description is not a complete description for it does not say anything about the bricks or the wall. It says only that some atoms exist, and are located at certain spatial regions.

This is the "popular view" mentioned earlier. It is widely accepted by metaphysicians (although it is not usually put in terms of levels of description). At its heart is the view that a composite object is *numerically distinct* from the objects that compose it. The wall is something over and above the bricks: it is a further thing, a different constituent of reality. Let us call this the *orthodox view*.[14] We can express it more carefully as follows.

The Orthodox View For any Xs and any y, if the Xs compose y then y is numer-

[14]Einar Bøhn has pointed out the me that this name is somewhat misleading. The accepted view (at one time at least) was that it makes no sense to ask if a composite object is identical to its proper parts. Thus, most philosophers simply made no claims about the relation between a composite object and its proper parts. This, I think, is true, and the reader should bear it in mind; however, those philosophers were still committed to what I call the "orthodox view" since, to them, that view was true by default.

ically distinct from the Xs, individually and collectively.

The second view about the relation between descriptions at different levels and the world is that each description is a description of the *same* features of reality. That is, high, mid, and low level descriptions all describe the same thing/things, but in different ways (and perhaps at different levels of detail). To say that a brick wall exists is just to say that there exist some bricks arranged in the shape of a wall, and vice versa. At the heart of this view is the claim that a composite object is *identical* to its proper parts taken collectively. The wall is not something over and above the bricks: it just *is* the bricks. (Or take a square composed of two rectangles, as in Figure 1 above. On this view a "square" is what we call two rectangles of those proportions, in that relation to one another. Two rectangles of those proportions, seamlessly attached in that way, are a square, and vice versa.)

This view is known as *composition as identity*. More formally, composition as identity is the following thesis.

Composition as Identity For any Xs and any y, if the Xs compose y then y is numerically identical to the Xs collectively.

Composition as identity is the "unpopular view" I alluded to at the beginning of the Introduction. It has few (vocal) supporters: Wallace (2009, 2011a, 2011b), and Bøhn (2009, 2014b), and perhaps Cotnoir (2013).[15]

There are a variety of views which have been called "composition as identity", but which I will not defend. David Lewis (1991) who first coined the term, for example, vacillates between the view stated above and the view that composition is (merely) *analogous* to identity. We will not discuss the latter kind of view.[16]

[15] Cotnoir provides support for composition as identity, but it is not clear whether he endorses it.

[16] The view that composition is analogous to identity also seems to feature in the writing of David Armstrong (e.g., Armstrong, 1978). See Wallace (2009), Yi (1999b) and Bøhn (2009) for discussion.

Our interest here is in the stronger thesis that a thing is literally identical to its proper parts.

Even that view has variants. First, there is the view, held by Donald Baxter (1988a, 1988b) that a composite is identical to its proper parts, but that our understanding of identity needs revision. Specifically, Baxter thinks that the following widely accepted principle does not hold:

The Indiscernibility of Identicals For all x and y, if x is identical to y then x and y share all of their properties.

The view defended in this thesis does not reject the indiscernibility of identicals. Rather, identity is to be understood in the usual way.[17][18]

Second, there is the (very strange) view that a composite object is identical to *each* of its proper parts. This is not the view defender here either. Again, the view defended here is that a composite object is identical to its proper parts *collectively*, just as it is composed of them collectively.

This view is often called *strong composition as identity* to distinguish it from the view that composition is analogous to identity (*cf.* Yi, 1999a; Wallace, 2009; Sider, 2007).

I also endorse the view that Sider (2007) calls *superstrong composition as identity*:

Superstrong Composition as Identity For any Xs and any y, the Xs compose y if and only if y is identical to the Xs collectively.

[17]By "usual way" I mean in such a way that the indiscernibility of identicals holds. More specifically, I take it that if x = y, then "x" and "y" refer to the same thing. Similarly, if xx = y, then "xx" and "y" are coreferential, and xx and y share all of their properties. I will say more about what this entails, ontologically speaking, in Chapter 3, section IV.

[18]For discussion of Baxter's view see Wallace (2009) and Turner (2014). Note that it is not clear that Baxter *must* be taken to be holding an extreme view of identity. Cotnoir (2013), for example, gives an account inspired by Baxter's view, on which the indiscernibility of identicals is maintained. If Baxter's view can be understood in this way then it does count as composition as identity as I will use the term.

(As the name suggests, superstrong composition as identity is a stronger view than strong composition as identity. Strong composition as identity says that the Xs are identical to y if the Xs compose y. *Superstrong* composition as identity says this and also that the Xs compose y if the Xs are identical to y.)

Nevertheless, our discussion will largely be focused on the standard version of the thesis (i.e., strong composition as identity). For the most part the difference between the two views will not matter for our purposes.

There is a small difficulty in expressing either thesis in first order logic. The difficulty is that the standard identity predicate "=" only takes singular terms as argument places, and the plural identity predicate we introduced only takes plural terms. We therefore need to introduce a "hybrid" identity predicate "$=_h$" which can take either singular terms or plural terms (Wallace, 2011a). Thus, we can state the thesis of composition as identity in logical notation as:

Composition as Identity $\forall xx \forall y(xxCy \rightarrow xx =_h y)$

I will continue to use the symbol "=". I do not think any confusion can arise from this. If the reader prefers she or he may (mentally) replace this with the symbol above. My reason for retaining the usual symbol is that claims made by ordinary speakers seem to me to conform perfectly well to the hybrid identity predicate, and "=" is supposed to capture the ordinary meaning of "numerically identical". For instance, competent English speakers appear to have no problem with expressions like "The deck just is the cards" which, on the face of it at least, seem to be identity statements. Of course, one might argue that the "is" here is not the "is" of identity, but it is unlikely that a case for this can be made without first refuting composition as identity. All I can say is that when *I* say such a thing I am making an identity claim. Thus, I prefer to expand the use of "=" rather than

introduce a new predicate. If composition as identity is true then "=" should have been a hybrid predicate all along.

Composition as identity is widely held to be false. My goal in this thesis is to argue that it is true. I leave a more detailed exposition of composition as identity for Chapter 3, where I will also deal with common objections to the view. (Seeing how the objections fail and understanding the view go hand in hand.) I leave it until then to say more about what it *means* to say that one thing is many—that is, about what kind of ontological picture composition as identity suggests.

Structuralism and Non-structuralism

It is natural to think that ontological and mereological questions go together. For instance, it seems that the question "Do chairs and tables exist?" is closely related to the question "Do atoms compose anything?" Those who think that there are true descriptions of reality at multiple levels, and that these descriptions describe different features of reality, are committed to saying that certain objects exist and that the world has genuine mereological structure (whatever that means exactly). The result is a world-view which includes composite objects, their proper parts, and the mereological relations between them. I call this world-view, illustrated in Figure 3 below, *structuralism*.

The figure shows three levels. Each level contains objects which are numerically distinct from those at other levels. The bottom level contains eight small squares and nothing else. The middle level contains two larger squares. And the top level contains a single rectangle. The arrows represent mereological relations. The rectangle at the top level is composed of the squares at the middle level. These squares are then composed of the smaller squares at the bottom level.

Note that the structuralist need not claim that *all* levels of description are accurate. For instance, the structuralist is free to claim that people are composed

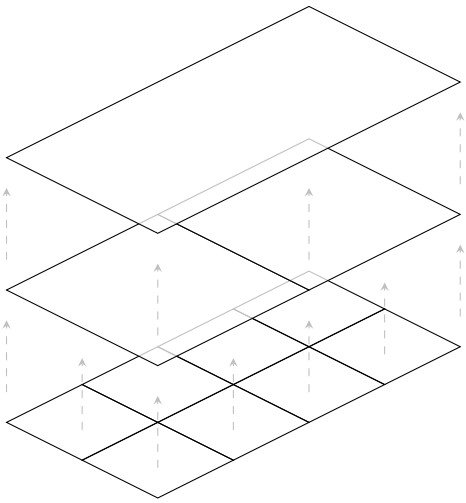


Figure 3: A representation of the structuralist world-view. Three levels of distinct objects are shown. Dotted arrows represent mereological relations between objects.

of atoms but not cells. She is also free to claim that people exist, but that chairs and tables do not, for example.[19]

Let us postpone the question of what mereological relations are supposed to be for now. At very least, structuralism implies that composition is a substantive relation between distinct objects. That is, it implies the orthodox view of composition.

The orthodox view, however, does not imply structuralism. The orthodox view says only that *if* there are composite objects, then they are distinct from the objects that compose them. Thus, it is consistent with the orthodox view to deny that there are any composite objects. In other words, it is consistent with the orthodox view to deny that more than one level of description accurately reflects the way the world is. Philosophers who do so are known as *mereological nihilists*. Nihilists believe that composition never occurs (and, usually, that it *cannot* occur.)

Realists, on the other hand, think that composition does occur (at least sometimes). Realism together with the orthodox view *does* entail structuralism. For

[19] In fact, we will see that some philosophers hold both of these views.

if composition occurs, and composite objects are distinct from the objects that compose them, composition is a substantive relation between objects at different levels. And that is what structuralism says. In other words, if composite objects are distinct from their proper parts (collectively) then claims about composite objects and claims about their proper parts are not claims about the same things.

Thus, orthodox realism entails that structuralism is true, and orthodox nihilism entails that it is false.

According to the orthodox nihilist only one of the structuralist's levels exists. This is a view on which the world is, mereologically speaking, "flat". Given this lack of structure, I call the view *non-structuralism*.

There are many possible variants of nihilism. The most familiar is what I will call *atomist nihilism*. This is the view that only fundamental particles exist (Sider, 2013). On the opposite end of the spectrum is *existence monism*. This is the view that only one thing exists. The most natural version has it that the universe is one big object—the "blobject" which and has no proper parts (Horgan & Potrč, 2000).[20] Neither form of nihilist thinks that ordinary objects like chairs and tables exist—at least not strictly speaking. (More on this shortly.) But there are possible nihilist positions which do take such objects to exist (though on these views such objects are not composite objects).

It is worth noting that a nihilist can technically believe in both ordinary objects *and* in elementary particles, if she denies that the former are composed of the latter (*see* Williams, 2006). Nihilism (in this context) is a view about composition, not about which objects exist *per se*. Nobody, to my knowledge, wholeheartedly defends such a view (though see Sider, 2013, p. 47).[21]

Unless stated otherwise, I will be assuming that if the things we take to be

[20] See Schaffer (2007) for an argument that all nihilists should be existence monists.

[21] Sider suggests that the nihilist might identify non-atomic objects with sets of mereological atoms.

composite objects exist (chairs, trees, people, planets etc.), and if fundamental particles exist (and in the same locations), then the former are composed of the latter. This is not a controversial assumption. As we will see, the fact that certain objects compose others is essential for explaining the intimate connections between them. (Just think how closely a chair is related to the particles that compose it.) Given this assumption, nihilism and realism are views about both composition and the existence of composite objects, with realism being the view that composition occurs at least sometimes and that some non-atomic objects exist. This is, in fact, how the views are typically presented.

I said earlier that I think the debate over composition is substantive. The reason for this will hopefully now be clear. Orthodox nihilists and orthodox realists agree about what it would take for composition to occur (at least in a general sense). They agree that composition is a substantive relation obtaining between distinct objects. That is, they agree that composition occurs only if some form of structuralism is true. What they disagree about is whether or not structuralism is, in fact, true. This looks very much like a substantive dispute. Either the world is structured, or it is flat.

Interestingly, although orthodox nihilims entails non-structuralism the reverse is not true. Consider what sort of ontology we arrive at if we assume that higher and lower level descriptions of the world are different ways of describing the same things, and that they are all true. (If they were all false, it is hard to see how we could say that there were any objects at all.) Suppose that we have, on the one hand, true claims about chairs, tables, people, and other ordinary objects, and, on the other, true claims about elementary particles (hereafter just "atoms"). If these claims are about the same thing or things then it must be that the world is "flat", and that it is the different ways of describing the world that are structured. (That is, the different descriptions cannot describe different levels,

otherwise they would not be descriptions of the same facts.) Thus, this view entails non-structuralism too.

Composition as identity appears to be the only way to make sense of the claim that statements like "There exists a chair" and "There exist some atoms arranged chair-wise" are not about different features of reality. So composition as identity appears to be the only way to make sense of the view that levels of descriptions are just that, and nothing more: levels of *description*. Certainly, composition as identity implies non-structuralism. It implies that composition is not a substantive relation, and thus that there are no "levels" out in the world (as we have been putting it). And if chairs and tables exist and are composed of atoms it implies that chairs and tables just are atoms (plural). Thus, if the atoms form a single level, and everything that exists is composed of atoms, then everything that exists occupies a single level. Non-structuralism follows.

The key difference between composition as identity and orthodox nihilism is therefore a difference in what composition is taken to be. The orthodox nihilist believes that composition must be a substantive relation between distinct objects. The defender of composition as identity denies this. In a sense, they disagree about the correct meaning of "composition" and about what suitable referents of terms like "chair", "person", and so on (depending upon the particular version of nihilism in question etc.) are. The orthodox nihilist and the defender of composition as identity agree that the world is flat and they may agree that it contains only atoms. They may even agree exactly which atoms exist and where. But they disagree about whether the world contains composite objects or not.

(It may seem strange to say that there are only atoms *and* that there exist composite objects. Remember, though, that the defender of composition as identity thinks that composite objects *are* atoms. On this view, then, there is nothing contradictory in saying that only atoms exist, and that chairs and tables

exist. We will discuss this point in more detail in Chapter 3.)

It is tempting to conclude from this that the difference between orthodox nihilism and composition as identity is purely semantic. We will see in Chapter 3, however, that things are not that simple. For now, however, it is enough to recognise that both composition and identity and orthodox nihilism have in common a commitment to non-structuralism.

Both orthodox nihilism and composition as identity are unappealing to most philosophers. The orthodox nihilist claims that many of the statements we make about the world are false. The atomist, for instance, believes that claims like "there are people", "there are chairs", and "there are planets" are all false. And this is quite hard to believe.

Composition as identity, on the other hand, does not face this objection. But it faces a number of others, which I call *discernibility arguments*. The strategy of critics is to point to difference between composites and the objects that compose them, concluding that they cannot therefore be identical. The atoms that compose you, for instance, existed long before you did. They can also survive many events that you cannot survive. And they are many things, whereas you are but one. Therefore, it seems, you cannot be identical to the atoms that compose you.

I will argue in Chapter 4 that these arguments against orthodox nihilism and composition as identity are far too quick. If they are sound, they show that non-structuralism is false. Yet surely we do not have good reason to think that non-structuralism is false; and even if we *do* it is not plausible that it is on the basis of such arguments.

Even if I am right, the fact is that the predominant view is that structuralism (and with it, the orthodox view) is true. Supposing that it is, there remains the question of what exactly exists, and where. It is, after all, consistent with structuralism to deny that many composite objects exist. So which objects exist

and which do not? These questions are the focus of much of the debate about composition.

III. The Special Composition Question

One would be justified in thinking that the right way to come to a precise ontological view is to ask which descriptions of the world seem to be true. Thus, we might take the apparent truth of sentences like "there are chairs", "there are people", "there are atoms", "there are planets", "there are molecules" and so on, as reason enough to commit to such objects.

However, there is another way to go about answering the same question. The alternative is to start by assuming that certain objects at the same level exist and ask under what conditions (if any) they compose something. This is the question posed by Peter van Inwagen in his seminal book *Material Beings* (1990). He writes:

> Suppose one had certain (nonoverlapping) objects, the Xs, at one's disposal; what would one have to do—what could one do—to get the Xs to compose something? (Van Inwagen, 1990b, p. 31).

He calls this the *special composition question*:

Special Composition Question For any Xs, there exists a y such that the Xs compose y if and only if _____?

To give a satisfactory answer to the special composition question one must provide the necessary and sufficient conditions under which certain objects, the Xs, compose something; and these must be stated in non-mereological terms (*viz.* without using terms like "part" and "whole"). The answer will be of the logical form:

$$\forall xx \exists y(xxCy \leftrightarrow \_\_\_\_\_)$$

("For any Xs, there exists a y such that the Xs compose y if and only if _____")

On the face of it this looks like a bad way to go about figuring out what exists. Suppose we start with the assumption that some atoms (in the non-philosophical sense) exist. Whatever justifies this assumption would seem to also justify the assumption that chairs, people, and planets exist. However, Van Inwagen's method proves to be very useful. For suppose that we conclude that there is *no* way to get some atoms to compose anything. Then we have reason to doubt our original belief that chairs are composed of atoms. It follows, given our assumption that chairs are composite objects, that it cannot be that both chairs and atoms exist as we thought. (Of course, this does not tell us *which* of these kinds of thing exist. It only tells us that they cannot *both* exist. Still, that is a start.)

In fact, we shall see that there are compelling reasons to think that our everyday beliefs about composite objects are not all true. (At least, if the orthodox view is true there are compelling reasons. If composition as identity is true, there are not.) Thinking about the special composition question thus opens the door to revisionary views about which composite objects—if any—exist.

Answers to the special composition question are usefully sorted according to what they say about the question "How often do some Xs compose something?" The possible answers are "never", "sometimes", and "always". Those who answer "never" are the nihilists (who we have already come across). Nihilism is the view that composition never occurs; that there are no composite objects; that nothing is a proper part of anything or has anything as a proper part.[22]

[22]Note that some define nihilism as the view that *necessarily* there are no composite objects, or that *necessarily* composition does not occur (e.g., Van Inwagen, 1990b, p. 72). The definition I have given, however, is much more common (e.g., Schaffer, 2007; Sider, 2013; Korman, 2014). It is also arguably more useful, because it allows us to easily separate the two questions: "Are there any composite objects?" and "Could there be any composite objects?" This applies to other answers to the special composition question as well.

Nihilism For any Xs, there is nothing which the Xs compose.[23]

Those who answer "sometimes" think that some objects compose things and some don't. They are known as *restrictivists* or *moderates* about composition. (I will use the former term.)

Restrictivism For some but not all Xs, there is something which the Xs compose.

Finally, those who answer "always" are known as *universalists*. They believe in *unrestricted mereological composition*. This is the view that any non-overlapping objects, whatsoever, compose something.

Universalism For all Xs, there is something which the Xs compose.

Typically, philosophers take the answers to these questions to be necessary truths (see e.g., Van Inwagen, 1990b; Sider, 1993). (Though see Cameron, 2007, and Miller, 2009, for arguments against this view.) One reason to think that facts about composition are necessary is the following. Suppose that whenever there are atoms arranged chair-wise in the actual world, there exists a chair, composed of those atoms. It would be very strange if it were possible for the atoms to be arranged in just the same way and not compose a chair. What could account for this difference? One reason to think that facts about composition are contingent is the fact that worlds with and without composite objects seem to be conceivable. (At least, such worlds are conceivable if the orthodox view is true. If composition as identity is true, there is reason to think that such worlds are not genuinely conceivable.)

[23] Recall that we restricting the use of plural referring expressions like "the Xs" such that they refer only to non-overlapping objects. In other words, nihilism is the view that for any *non-overlapping* Xs, there is nothing which the Xs compose. The same applies to the other views discussed below.

Restrictivism is clearly the most intuitive answer to the special composition question. Suppose you have some pieces of wood and some nails. Ordinarily we think that when objects like these are not attached to one another there is nothing which they compose. But nail the pieces of wood together in the right way and they will compose something—a cabinet, perhaps, or a chair or table, depending on how they are arranged. That is, we normally take sentences like "there are chairs", "there are people", and "there are atoms" to be true, but sentences like "there are trout-turkeys" to be false. (A trout-turkey is an object composed of the undetached front half of a trout and the undetached rear of a turkey.)[24]

Note, however, that there are two two types of restrictivism: *commonsense restrictivism* and *revisionary restrictivism* (*cf.* Korman, 2014).[25] Commonsense restrictivists think that the conditions under which composition occurs are more or less what people ordinarily think they are. On their view there are such composite objects as chairs and tables, but no such composites as trout-turkeys, or other things composed of arbitrarily selected objects. The commonsense conception also includes the notion that the term "compose" is vague. When nailing the pieces of wood together, there seems to be no precise point at which a composite object comes into being. Rather, composition appears to occur gradually. More precisely, the ordinary conception of composition is one in which there are *borderline cases* of composition—cases in which it is indeterminate whether the objects in question compose something or not.[26]

Revisionary restrictivists, on the other hand, are not motivated by commonsense. They claim either that (a) there are significantly more or fewer composite

[24]The example is David Lewis' (Lewis, 1991, pp. 7–8).

[25]Korman (2014) does not use these terms, but he does make the distinction between revisionary and commonsense theories of composition. A revisionary conception of composition, according to Korman, is one which allows either that there are *more* composite objects than we ordinarily think (permissive) or fewer objects than we ordinary think (eliminative). I include conceptions which take composition to involve sharp cut-offs to be revisionary as well.

[26]See Sorensen (2013) for a discussion of borderline cases and vagueness.

objects than we normally think; or (b) composition is not vague; or both. Perhaps the most well known defenders of revisionary restrictivism are Peter van Inwagen (1990b) and Trenton Merricks (2001). Van Inwagen's view is that only living things and mereological simples (probably elementary particles) exist. He claims that some Xs compose something if and only if "the activity of the Xs constitutes a life" (Van Inwagen, 1990b, p. 82).[27] On Van Inwagen's view "constitutes a life" is vague and hence so too is "composes" (e.g., van Inwagen, 1990b, p. 154).

Merricks holds a more subtle view. He claims that the only composite objects that exist are those with non-redundant causal powers (Merricks, 2001). On his view this rules out most or all ordinary objects. For instance, he claims that there are no such things as baseballs, statues, tables, and so on. Conscious things such as human beings, on the other hand, do exist on Merricks' view, since he believes they have non-redundant causal powers. He leaves it open whether non-conscious living things exist, whether things like the atoms and molecules of physics exist, and (unlike Van Inwagen) makes no claims about mereological atoms (Merricks, 2001, Chapter 4, section VI).

Merricks' view, as we will see in Chapter 4, is not primarily motivated by commonsense, but by the thought that some objects have causal powers over and above the causal powers of the particles that compose them. This, Merricks thinks, is reason to believe in them. His view is thus different from Van Inwagen's in terms of both motivation, and in terms of what he takes to exist. Merricks, unlike Van Inwagen, is not committed to the existence of non-conscious living composites (unless they have non-redundant causal powers). Merricks also differs from Van Inwagen in thinking that cases in which some objects compose something and cases in which they do not are divided by a sharp cut-off (Merricks,

[27] What this means exactly is not completely clear. (One might also be worried about the use of the term "constitutes" given that constitution is sometimes understood as a mereological notion. See Chapter 1 and later in the Introduction.)

2005). We will see why shortly.

Let us call Van Inwagen and Merricks *quasi-nihilists* due to their belief that ordinary objects such as chairs and tables do not exist. They are, one might say, nihilists with respect to chairs, tables, and the vast majority of other composite objects. Even more extreme are the actual nihilists who deny even the existence of people (insofar as they think that people are material objects at least). This kind of view is defended by Dorr (2005), Horgan and Potrč (2000), and Sider (2013), though with some important qualifications.

Nihilism and quasi-nihilism are not unmotivated. In fact, I will argue in Chapter 4 that there are powerful arguments in favour of nihilism. Suppose you have some objects that do not compose anything. Rearrange them as you like but, intuitively, all you do is move them around. You do not create anything new (*cf.* van Inwagen, 1990b, p. 124). Furthermore, the nihilist ontology—i.e., a non-structuralist ontology—is more parsimonious than any realist ontology. Yet, arguably, the nihilist can explain all of the empirical data just as well as the realist. Or consider a baseball and the atoms that compose it. If the baseball is thrown at a window, the baseball is a sufficient cause of the window breaking (Merricks, 2001). Yet the atoms also seem to be a sufficient cause of the window breaking. How can this be? If the atoms are doing all of the causal work, what work is there left for the baseball to do? These are all reasons to accept nihilism or quasi-nihilism.

It is important to also understand that nihilism (and quasi-nihilism too) is not so at odds with ordinary beliefs as it may seem. Nihilists and quasi-nihilists face what Daniel Korman (2009) calls the *problem of reasonableness*. This is the problem of explaining why it is reasonable for people to believe in ordinary objects given that there are none. Why think that such beliefs *are* reasonable? The thought is that it would be extremely immodest to accuse the general populous

of some sort of "genetically or culturally transmitted idiocy" (Hirsch, 2002), while claiming that you yourself have somehow escaped this fate. The nihilist's response (and the quasi-nihilist's) is to say that while it is *strictly speaking* false that ordinary objects exist, *loosely speaking* claims like "there is a chair over there" and "there exist tables" are true. I will say more about what this means in Chapter 3. The usual idea is that belief in ordinary objects is reasonable because it is useful. For instance, beliefs about tables and chairs track facts about atoms arranged chair- and table-wise. Thus, although there are no chairs and tables, our beliefs about such things are useful approximations of the way the world is.

Importantly, for every sentence about an ordinary object the nihilist (or quasi-nihilist) can give a paraphrase in terms of atoms. For example, the nihilist can paraphrase the (by their lights) false claim "there is a chair over there" into the true claim "there are some atoms arranged chair-wise over there".

However, the nihilist and the quasi-nihilist walk a fine line. As Korman (2009) argues, if the eliminativist denies that some intuitions (i.e., those about ordinary objects) can be trusted, this undermines their reliance on other intuitions in defence of their own view. If some intuitions are unreliable, shouldn't we be wary of them all? The eliminativist may respond that we are justified in relying on intuitions insofar as they are not challenged by strong philosophical arguments (*cf.* Merricks, 2001), but it is often the case that philosophical arguments give us a choice of which intuition to reject. Why choose the ones favoured by the eliminatavist?

Even setting these worries aside, nihilism and quasi-nihilism face a serious problem: it is simply very difficult to believe that there are no ordinary objects, even strictly speaking. Could it really be true that there are no chairs, tables, rocks, planes, and so on? It is fair to say that most philosophers have found nihilism and quasi-nihilism unconvincing, and for this very reason.

In response, some have suggested that (orthodox) nihilism should perhaps be understood as the view that *fundamentally*, all that exist are tiny particles, that the only *natural* objects are mereological atoms (e.g., Dorr, 2005; Sider, 2009, 2011, 2013). Or, put another way: the nihilist's claim that "there are tables" is false, is not to be taken as a claim in English. Instead it should be understood as a claim made in a specialised "language of the ontology room"—*Ontologese*—a language which "carves nature at its joints" (Sider, 2009, 2011).[28] Call such a view *deep nihilism* (Korman, 2013). The deep nihilist can insist that their claim that "there are tables" and similar sentences are false does not contradict ordinary beliefs in tables and other ordinary objects.

We will discuss this response further in Chapter 3. It is my view that it avoids the problems with nihilism only by making nihilism less relevant to our discussion. We started out wanting to know what parthood and composition are, and whether ordinary objects like chairs and tables exist. These are questions in English, not Ontologese. It may be true that there are Ontologese version of the questions: e.g., What are **parthood** and **composition**? Do ordinary **objects** like **chairs** and **tables** exist? (where the terms in bold are the Ontologese counterparts of the unemphasised English words.) However, answering these questions does not absolve us of the burden of answering the corresponding English questions.

My claim is that composition as identity is true *in English*. In fact, I am not sure that it even makes sense as an Ontologese claim. (More on this in Chapter 3 too.) I believe that deep nihilists should accept composition as identity, so understood. If they do not, it is unclear how they can maintain that "there are chairs" is true in English. What does the term "chair" refer to, if not the **atoms** arranged chair-wise which the deep nihilist is committed to? Of course, this

[28]There are two possibilities here. Either the nihilist intended to be speaking Ontologese all along, or the Ontologese version of nihilism is a new view, different from the traditional one (Korman, 2013).

does not mean that the defender of composition as identity is committed to deep nihilism or any other deep ontological view. In fact, I think it is in the spirit of composition as identity to deny that the world has natural "joints" at all. The English word "object" cuts as deep as any word can, so to speak.

The introduction of the conception of deep ontology complicates things significantly. For instance, the commonsense restrictivist may choose to claim that their view is true in both English and Ontologese, or even that English *is* Ontologese when spoken strictly and literally. Furthermore, suppose that a deep nihilist rejects composition as identity (in English). They will also reject orthodox nihilism in English. This means rejecting non-structuralism (understood in English). Presumably, such a view entails structuralism (English). It is thus a combination of structuralism (English) and non-structuralism (Ontologese). But how are we to understand this? Carving nature at its joints yields only atoms, yet the world nevertheless has structure? I have little idea how to go about answering these questions. (I am also sceptical of "joint-carving" talk in the first place, as I said.)

Typically, answers to the special composition question are understood as English claims (or claims in some other natural language) and not Ontologese claims (*cf.* Korman, 2013, section 3). They are taken to have implications for the truth of English sentences about composite objects. I will follow this tradition, although I will indicate where I think a deep version of the theory in question may be relevant.

We have seen that revisionary restrictivism and nihilism face the problem of reasonableness. Universalism also faces this problem, but in the other direction. The universalist can explain the reasonableness of ordinary claims about chairs and tables by appealing to the fact that there *are* chairs and tables. Yet she cannot explain the reasonableness of ordinary *denials* of strange composites like

trout-turkeys. After all, the universalist claims that, for any objects whatsoever, there is something which they compose. Thus, according to universalism there *are* trout-turkeys, and we are wrong to think otherwise.

There are two problems here. First, the universalist is committed to far more objects than we tend to think exist. Second, the universalist is committed to far more *kinds* of objects than we tend to think exist. Not only are there things like chairs and tables, but there are things like trout-turkeys, and toe-tables.

Despite these problems, universalism is a very popular view. Supporters include Lewis (1986), Heller (1990), Rea (1998), Sider (2001), Hudson (2001), Braddon-Mitchell and Miller (2006a) and Van Cleve (2008). Universalists respond to the problems by adopting two strategies (typically both at once). The first is to soften the blow of accepting strange composites. Lewis (1986, p. 213), for instance, argues that we do believe in scattered objects, but exclude them from ordinary discourse because it is not useful to talk about them. According to Lewis, when asked "How many objects are there?" we implicitly restrict our quantifiers in such a way as to rule out strange and scattered composites. As Hudson (2001) puts it, we should "restrict quantifiers and not composition" (p. 112). Critics respond by denying that they are restricting their quantifiers in any way when they deny that things such as trout-turkeys exist (e.g., Markosian, 2005).

The second strategy is to point out that the alternatives—nihilism and restrictivism—are worse. Lewis (1986), Sider (2001), and Hudson (2001) all argue that restrictivism is untenable. Then it is a simple choice between trout-turkeys and other strange composites, and no composites whatsoever. Trout-turkeys no longer seem so bad.

The most well-known argument against restrictivism is the *vagueness argument* or the *argument from vagueness*. The argument originates in Lewis (1986) and is taken up by Sider (1997, 2001). The first step of the argument is to note

that if composition is restricted it must be possible for some objects to go from composing nothing to composing something. Suppose we have some pieces of wood that meet this requirement. Imagine that at one point in time they compose nothing, and at another they compose something. At some point in between it will either be vague whether the pieces of wood compose something, or there will be a definite point at which they come to compose something.

The next step is to show that both possibilities lead to problems. Suppose there are cases such that it is vague whether the pieces of wood compose something. Then it is vague whether there exists a composite object, composed of the pieces of wood. Thus, vague composition seems to entail vague existence. But vague existence seems impossible. How could it be indeterminate whether something exists or not. Either it does or it doesn't. (Imagine an ontological picture with only one level at time *t*, and two levels at time *t**. How could it be indeterminate at some time between *t* and *t** whether there is one level or two?) Thus, it seems composition cannot be a vague matter.

If composition is not a vague matter, however, there must be a precise point at which the pieces of wood come to compose something. Yet this seems extremely implausible. How could the most minute change in the arrangement of the pieces of wood make the difference between a composite object existing and not existing? And even if it could, why would composition occur at just *that* point, rather than another?

These arguments suggest that it can never be vague whether composition occurs, and nor can there be a determinate cut-off at which it occurs. However, there seems to be no other option; either the objects never compose anything, or they always do. Hence, if the argument is sound, either nihilism or universalism is true. Lewis and Sider argue that nihilism is false and conclude that universalism is true.

The argument, then, has the following form:

(V1) If composition is restricted then there is either a sharp cut-off between cases in which composition occurs and cases in which it does not occur, or there are cases where it is vague whether composition occurs or not.

(V2) There is no sharp cut-off between cases in which composition does not occur and cases in which composition occurs.

(V3) There cannot be cases where it is vague whether composition occurs or not.

Therefore, composition is not restricted.

(Note that this is only part of the argument given by Lewis and Sider. They include the premise that nihilism is false. Combined with the conclusion that restrictivism is false this entails that universalism is true. This formulation of the argument is also very rough. There are a number interpretative issues. See Merricks, 2005; Varzi, 2005; Smith, 2006; Korman, 2010 for useful discussion.)

A number of philosophers have challenged premises (V2) and (V3). We have already seen that Trenton Merricks (2005) thinks that there *is* a sharp cut-off at which composition occurs. Ned Markosian (1998a) agrees, though he thinks that facts about composition are *brute*, and do not supervene on the properties of the composing objects. (If composition is brute in this way, the fact that there is only a small change in the pieces of wood before and after composition is no puzzle at all. After all, facts about composition have nothing to do with facts about the arrangement of the pieces of wood if Markosian is right.) Those who attack (V3) do so either by arguing that vague composition does not entail vague existence (e.g., Carmichael, 2011), or that there is nothing problematic about

vague existence (e.g., Van Inwagen, 1990b; Smith, 2005).[29]

We will discuss the vagueness argument in more detail in Chapter 3. My focus will be on premise (V3). The argument can be resisted by denying (V2), but doing so means giving up on the idea that composition is a vague matter. That is a cost since it seems clear that composition *is* vague (*cf.* Korman, 2014 and Smith, 2005). I will argue that we can easily deny (V3) if composition as identity is true. In my view this gives us reason to think composition as identity is true.

That concludes our brief overview of the literature on the special composition question. We can perhaps see now why some philosophers are sceptical about the debate. Putnam (1987), expressing his own scepticism, gives the following example.[30] Consider a world with three objects, x_1, x_2, x_3. How many objects are there? The nihilist answers, "three"; the universalist "seven". What is striking about this case is that the universalist and the nihilist have been given exactly the same information, and yet they disagree so greatly about what exists. I suspect that it is facts like this that lead some to conclude that the debate must be defective.

It is also striking what the universalist claims to know. Consider Figure 3 again. Both the universalist and the nihilist have been given information to the effect that objects at one of the levels in Figure 3 exist. The universalist somehow concludes from this that objects at other levels exist as well. How?

Composition as identity seems to me to be a way to make sense of all this without resorting to the (in my mind) implausible argument that orthodox universalists and orthodox nihilists are not disagreeing, or are talking nonsense. The same applies to debates between restrictivists and the other camps. Given that all parties accept the orthodox view of composition, we can make good sense of

[29] I think that Smith is probably better seen as denying that vague composition entails vague existence, but he presents himself as defending the notion of vague existence.

[30] I borrow this example from Van Inwagen (2002).

the disagreement. Realists think that structuralism is true; nihilists do not. But the sceptic is right to think that there is no way to tell one way or the other based solely on the information that there exist three objects. In fact, surely all that we can conclude from this is that there exist three objects. I will argue in Chapter 4 that this gives us good reason to accept composition as identity. The debate is defective not because all sides are talking past one another, or because what they say is meaningless, but because all sides assume that the orthodox view is true. All sides assume that unless there are more than three objects (in our example) there cannot be any composite objects. But that is a mistake.

IV. The Inverse Special Composition Question

In addition to the special composition question, Van Inwagen (1990b) also raises the *inverse special composition question*:

Inverse Special Composition Question For any x, there exist some Ys such that the Ys compose x if and only if _____?

(Or, informally: "Under what conditions is an object composite?") This question has received less attention that the special composition question, although there is a lively debate about the closely related *simple question*, proposed by Markosian (1998b):

Simple Question For any x, it is not the case that there exist any Ys such that the Ys compose x if and only if _____?

The simple question asks under what conditions an object has no proper parts. There are many possible answers, but we cannot discuss them here.[31] These bear upon the issue of whether or not it is possible for an object to be extended in space

[31] See Markosian (1998b) for an overview and discussion of some of these.

without having any proper parts. Such objects are known as *extended simples*. For discussion see e.g., Zimmerman, 1996; Markosian, 1998b; Simons, 2004; Parsons, 2004; Markosian, 2004; McDaniel, 2003, 2007, 2009; Braddon-Mitchell and Miller, 2006b; Spencer, 2010 and Jaeger (2014).[32]

The main threat to the possibility of extended simples is probably the fact that it seems difficult to make sense of various properties extended simples might have. For instance, it seems that an object cannot be black and white, polka-dotted, striped, etc. without having proper parts (*cf*. Parsons, 2004; McDaniel, 2009; Spencer, 2010). But surely, if extended simples were possible there would be nothing stopping them from having such properties. In Chapter 2 I will argue that extended composites face the same problems if the orthodox view is correct.

V. The General Composition Question

Finally, Van Inwagen (1990b) raises a third question: the *general composition question*. The special and inverse special composition questions ask under what conditions composition and decomposition occur. The general composition question asks what composition *is*.

General Composition Question For any Xs and any y, the Xs compose y if and only if _____?

This is the question that has received the least attention among the three. That may be due to the fact that Van Inwagen argues that it cannot be answered (Van Inwagen, 1990b, chapter 4). Presumably, others agree.

Notably, if superstrong composition as identity is true (see Chapter 3) the general composition question does have an answer, and an easy one:

[32] Hudson (2007) offers a short overview of the debate.

> For any Xs and any y, the Xs compose y if and only if the Xs are identical to y.

If Van Inwagen is right, the best defenders of the orthodox view can do is offer *necessary* conditions for y to be composed of the Xs. We will discuss some of these conditions at the end of Chapter 3 and in Chapter 6. I will argue in the latter chapter that only composition as identity can explain *why* these conditions hold. This, I think, is another point in its favour.

VI. GROUNDING

If structuralism is true we face the task of explaining what the relation of composition is. We just saw that many appear convinced that no useful complete answer to this question can be given, but this does not mean we cannot say *anything* about it.

Recently, a number of philosophers have argued that composition and other relations are instances of a metaphysical analogue of causation known as *grounding*. (For overviews see Correia and Schnieder, 2012; Trogdon, 2013; Raven, 2015.) These philosophers argue that such a relation is needed to explain various "in virtue of" claims that philosophers make. For instance, it is tempting to say that a composite object exists and has the properties it does *in virtue of* the fact that its proper parts exist and have the properties they do. And the same does not seem to be true in the opposite direction: the existence and properties of the proper parts cannot be explained by the existence and properties of the composite.[33] Thus, there seems to be an asymmetrical dependence relation between composites and their proper parts (and between all sorts of other entities). This relation appears to be synchronic, distinguishing it from causation most take to be diachronic.

[33] Though see Schaffer (2010) for arguments that the parts in fact do depend on the whole.

Once we have posited such a relation we can begin to sort objects according to what explains what (*cf.* Schaffer, 2010). This will result in something like a levels structure, though, again, talk of "levels" may only be a rough approximation. (Proponents of grounding disagree about the formal properties of the grounding relation, so what the correct structure is, is up for debate.)

I believe that structuralists will have to say something like this if they wish to say that there are necessary connections between composites and their proper parts, and that these are not unexplainable. For instance, most believe that, necessarily, a chair exists whenever there exist atoms arranged chair-wise. If this is not a brute fact, it seems there must be some *relation* between them which explains it.

I will argue in Chapter 5, however, that grounding cannot account for the intimacy of the relation between composites and their proper parts. The properties of composites and their proper parts are closely related—so closely related, it turns out, that no account on which they are taken to be distinct will do.

VII. Constitution

A final issue worth mentioning is the relation between composition and constitution. Composition is a relation between many things and one thing. Constitution, on the other hand, is a relation between one thing and another thing (or, according to some, a relation between a thing and some stuff).[34]

The classic example of constitution is a statue and the lump of clay, metal, (or whatever) that makes it up. Just as there is a debate about whether a composite object is identical to the objects that compose it, there is a debate about whether the statue is identical to the lump of clay that constitutes it. In fact, the latter debate is the better known of the two. It arises for much the same reasons.

[34] See, for example, Markosian (2004).

The statue and the lump which constitutes it appear to have different properties. For instance, the lump may exist before the statue does, and the statue may be destroyed without destroying the lump. However, there are also reasons to think that the statue and the lump are identical. For instance, they exist at exactly the same location, are apparently composed of exactly the same proper parts, and so on.

Thus philosophers often claim either that *constitution is not identity* or that *constitution is identity*. Those who think that constitution is not identity think that the statue and the lump are numerically distinct. Defenders of this view include Johnston (1992), Baker (1997), Thomson (1998), Fine (2003), Markosian (2004), and Lowe (2013). Those who think that constitution is identity, on the other hand, think that the statue and the lump are identical. Defenders of this view include Lewis (1971), Gibbard (1975), Noonan (1993) , and Sider (2001).[35] Of course, these are not the only views available. One can also deny that either the statue or the lump exists (e.g., Unger, 1979), or claim that when the lump comes to constitute a statue it is destroyed (e.g., Burke, 1994), for example.[36]

It is not clear exactly how constitution and composition are related. It is often thought that a statue and the lump that constitutes it share proper parts.[37][38] Thus, they are mereologically related. That, of course, does not mean that constitution is a mereological relation; but it does suggest a link between the two. Certainly, it implies that two distinct objects may be composed of the same proper parts. And this implies that composition as identity is false.

It also turns out that many of the arguments for and against the view that

[35]Note that Gibbard only thinks that a statue and the lump that constitutes it are identical if they exist at exactly the same times. Thus, he thinks that it is contingent whether such objects are identical.

[36]See Wasserman (2015) for an overview of the possible responses.

[37]See Wasserman (2002) for an argument that this is what we should think.

[38]The problem can also be reformulated in terms of proper parts. The statue cannot survive having its proper parts rearranged in certain ways but the lump can. Thus, they cannot be identical.

constitution is identity carry over to the debate about composition. For instance, the argument I give for composition as identity in Chapter 4 can be modified to (directly) support the conclusion that constitution is identity. I will not discuss these connections in what follows but the reader familiar with the debate about constitution will likely be able to spot them. I will, however, discuss constitution briefly in Chapter 1, where it bears upon issues of parthood.

VIII. Thesis Plan

The thesis is divided into eight chapters. In Chapter 1 we will look at the basic features of parthood and composition. This is important background for the rest of the thesis. I will also give an overview of some of the relevant controversies and the chapter will include a demonstration that if composition as identity is true, we can derive all of the mereological principles that we need.[39] Normally, some of these must be added in by hand. Thus, I take this to be an attractive feature of composition as identity, though obviously those who deny any of the principles in question will not.

Chapter 2 will consist of a discussion of the properties had by composite objects. In particular, I will examine various potential accounts of heterogeneous properties (such as *being black and white*) as they apply to composite objects. This is a topic which has not been widely discussed by philosophers. I will show that the same worries that apply to heterogeneous extended simples also apply to heterogeneous composites if the orthodox view is true. I will argue that these problems have no easy solution.

Having seen the problems facing the orthodox view we will go on to discuss composition as identity in more detail. This is the topic of Chapter 3. In that chapter I will argue that composition as identity is best seen as part of a package

[39] Sider (2007) and Bøhn (2009) do this too, but in a different way.

of views about persistence, modality, and number/ontology. In fact, composition as identity is inconsistent with certain views on these topics. This means that it is a particularly powerful theory. If we can give good arguments for composition as identity then we can make progress in these other debates (and vice versa). Of course, the price of such power is that there are more ways to show that composition as identity is false. Thus, I will give a brief defence of each of the views in the package. I will argue that there are no good reasons to reject any of them and that, in fact, they may well be the best options available.

Chapter 3 also serves several other purposes. Once we see composition as identity as part of a package of views, the main objections to it fall flat. Thus, this chapter will also serve as a defence of composition as identity against the central objections. In addition to this, I will briefly discuss some existing arguments for composition as identity. I will finish the chapter by giving a new one. Composition as identity avoids the vagueness argument against restrictivism. This means that advocates of composition as identity can happily accept that composition is both restricted and vague as it seems to be.

In Chapter 4 I will go on the offensive, giving an argument for composition as identity which I call the *empirical argument*. The empirical argument can be summarised as follows. Given that we can explain all of the empirical data by appeal to only elementary particles, the best ontological theory appears to be non-structuralism. If the orthodox view is true, however, non-structuralism entails mereological nihilism. That is, if the orthodox view is true, then non-structuralism entails that there are no chairs, tables, planets, cells, or even people. However, there are chairs, tables, planets, cells, and people. So the orthodox view must be false.

In Chapters 5 and 6 I will provide more reasons to think that composition as identity is true. In Chapter 5 I will argue that there are at least three important

connections between composites and their properties which can only be accounted for if composition as identity is true. (1) Given that a composite has certain intrinsic properties it is necessarily the case that its proper parts have certain collective properties. (2) For many intrinsic properties that a composite has it is contradictory to say that the proper parts of the composite do not collectively instantiate those properties. (3) If one has knowledge of a composite's properties, one thereby has knowledge of many of the properties of the composite's proper parts.

I will then continue this line in Chapter 6, arguing that composition as identity provides the best explanation of various other relations between composites and their proper parts. For instance, I will show that composition as identity explains why your arm goes where you go, why your volume is the same as the sum of the volumes of your proper parts (and why it is not *additional* volume), and why intrinsic properties had by your proper parts are intrinsic properties had by *you*.

Chapter 7 will be devoted to objections to composition as identity. I will outline and respond to those that are found in the literature.

Finally, I will present some miscellaneous arguments for composition as identity in Chapter 8. Some of these will only be convincing to philosophers who hold certain other views. Nevertheless, I think they are worth presenting even if I cannot defend every premise on which they rely.

The overall goal of the thesis is to provide new arguments for composition as identity.[40] This means that I will not discuss some existing arguments, given by e.g., Wallace (2009) and Bøhn (2009, 2014b). I encourage the reader to consult those texts for further arguments in favour of composition as identity.

[40]The argument in Chapter 5 is quite similar to one given by Bøhn (2014a), however it was developed independently. I also think that my argument is sufficiently different to Bøhn's to be of independent interest, and that it is more powerful (if sound).

1

PARTHOOD AND COMPOSITION

The purpose of this chapter is to examine the central features of *parthood*, *composition* and their relatives. We should begin with the basic formal features of these relations.

I. BASIC MEREOLOGY

Parthood is a good (and standard) place to start. On the most basic level, parthood has at least two features:

1. Everything is a part of itself.
   $\forall x(Pxx)$ (*Reflexivity*)

2. If x is part of y and y is part of z then x is part of z.
   $\forall x \forall y \forall z((Pxy \wedge Pyz) \rightarrow Pxz)$ (*Transitivity*)

It is important to note that "part" here is being used in a technical sense. Ordinarily, people would not say that everything is part of itself. This suggests that what people ordinarily mean by "part" is what philosophers mean by "proper part". We will discuss the latter notion shortly.

Mereology is the study of the formal features of parthood and related notions.[1] A mereological system typically begins with one notion (parthood, proper parthood, or overlap) taken as primitive and builds upwards from there. For instance, if we add a third feature,

3. If x is part of y and y is part of x then x and y are identical.
   $\forall x \forall y((Pxy \wedge Pyx) \rightarrow x = y)$ (*Anti-symmetry*)

to our list, we can define proper parthood and prove that it has certain formal features. Proper parthood is typically defined in terms of parthood in one of two ways:

Proper Parthood (1) $\forall x \forall y(PPxy =_{df} Pxy \wedge x \neq y)$

or

Proper Parthood (2) $\forall x \forall y(PPxy =_{df} Pxy \wedge \neg Pyx)$

(Respectively: "x is a proper part of y if and only if x is a part of y and x and y are not identical," and "x is a proper part of y if and only if x is a part of y but y is not a part of x.") These definitions are equivalent if *Anti-symmetry* holds.[2] It follows that proper parthood has the following features:

1. Nothing is a proper part of itself.
   $\forall x(\neg PPxx)$ (*Irreflexivity*)

2. If x is a proper part of y and y is a proper part of z then x is a proper part of z.
   $\forall x \forall y \forall z(PPxy \wedge PPyz \rightarrow PPxz)$ (*Transitivity*)

[1] For more detailed discussion of mereology see Simons (1987) and Varzi (2015). This chapter draws heavily upon those texts.

[2] *Proof:* Take the first definition: if $PPxy$ then $Pxy \wedge x \neq y$. If $x \neq y$ then by *Anti-symmetry* $\neg(Pxy \wedge Pyx)$. We know Pxy so we know $\neg Pyx$, which gives us $Pxy \wedge \neg Pyx$. Thus, if the first definition is satisfied, so too is the second.

3. If x is a proper part of y then y is not a proper part of x.
   $\forall x \forall y(PPxy \rightarrow \neg PPyx)$ (*Asymmetry*)

Irreflexivity. Using the first definition: if x is a proper part of y then x and y are not identical. Thus, nothing is a proper part of itself. Using the second definition: it cannot be that x is part of x and not part of x. Thus, x cannot be a proper part of x.

Transitivity. Suppose that x is a proper part of y, y a proper part of z, but that x is not a proper part of z. Then x is not a part of z despite being a part of y which is a part of z. But parthood is transitive; therefore x must be a proper part of z.

Asymmetry. Using the second definition: If x is a proper part of y then y is not a part of x. If y is not a part of x then y is not a proper part of x.

(Asymmetry cannot be derived using the first definition alone. This is because the first definition does not rule out cases in which two objects are parts of one another and non-identical. Such objects would be proper parts of one another, contra *Asymmetry*. However, if parthood is anti-symmetric then there are no such cases and *Asymmetry* follows.)

We now have a definition of proper parthood. We can also derive other important mereological relations such as *overlap*:

Overlap $\forall x \forall y(Oxy =_{df} \exists z(Pzx \wedge Pzy))$

("Two objects overlap if and only if they share a common part.") Parthood and proper parthood are both varieties of overlap (see Figure 4).

We can then give a definition of *composition*. For example:

Composition The Xs compose y $=_{df}$ every one of the Xs is part of y and every part of y overlaps at least one of the Xs. (Van Inwagen, 1990b, p. 29).[3]

[3]Recall that the Xs here and throughout are non-overlapping objects.

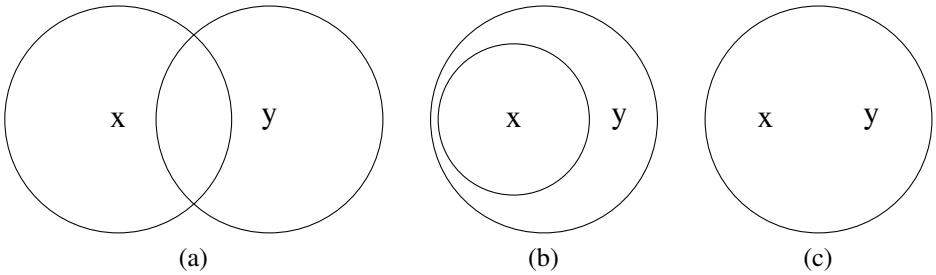


Figure 4: Varieties of overlap: (a) proper overlap; (b) proper parthood (c) perfect overlap (or, equality).

It is typical to add to these definitions and axioms further principles (see Simons (1987) and Varzi (2015) for discussion). For instance, it is common to add some principle that ensures that nothing has just one proper part. The most common of these "supplementation" principles is:

Weak Supplementation $PPxy \rightarrow \exists z(Pzy \wedge \neg Ozx)$

("If x is a proper part of y then there exists some z which is part of y and which does not overlap x.") Supplementation principles come in various strengths and there is some debate over which, if any, is the right one (see Varzi, 2015; Effingham and Robson, 2007; Smith, 2009; and Lowe, 2013). It seems to have gone unnoticed, however, that at least one supplementation principle can be derived from the basic axioms and definitions we have at our disposal. Parthood is related to overlap as follows:

$$\forall x \forall y(Pxy \leftrightarrow \forall z(Ozx \rightarrow Ozy))$$

("x is a part of y if and only if anything that overlaps x overlaps y.") Together with our second definition of proper parthood,

Proper Parthood (2) $\forall x \forall y(PPxy =_{df} Pxy \wedge \neg Pyx)$

this gives us a new biconditional, this time relating proper parthood to overlap

$$\forall x \forall y (PPxy \leftrightarrow \forall z (Ozx \rightarrow Ozy) \wedge \neg \forall v (Ovy \rightarrow Ovx))$$

which reduces to

$$\forall x \forall y (PPxy \leftrightarrow \forall z (Ozx \rightarrow Ozy) \wedge \exists v (Ovy \wedge \neg Ovx))$$

("x is a proper part of y if and only if anything that overlaps x overlaps y and there is some v such that v overlaps y but not x.")

We know from our definition of overlap that if y and v overlap they have a part in common. We also know that v and x do not have a part in common. Thus, y has a part which is not a part of x and is not identical to x. This means that y has at least two parts: x and v. x is a proper part of y; we need to show that v is also a proper part of y. We can do so quite easily. y is not a part of v because not everything that overlaps y overlaps v (e.g., x). Therefore, v is part of y and y is not part of v: i.e., v is a proper part of y. It follows that if x is a proper part of y then y has another proper part which does not overlap x.

The resulting principle is what Varzi (2015) calls *Proper Supplementation*:

Proper Supplementation $\forall x \forall y (PPxy \rightarrow \exists z (PPzy \wedge \neg Ozx))$

("If x is a proper part of y then there exists a proper part of y that does not overlap x.") Varzi (2015), Simons (1987), and others take such a principle to be an extension to the basic mereological system derivable from our initial axioms, but we have just seen that this is not the case.

Note also that *Proper Supplementation* implies *Weak Supplementation*, a principle which has come under attack recently (e.g., Smith, 2009; Lowe, 2013). If our result is correct, those who wish to deny *Weak Supplementation* will need to also deny *Anti-symmetry*, or one of the basic definitions or biconditionals we appealed to.

A principle which *is* an extension of our basic system is *Extensionality*:

Extensionality $\forall x \forall y(\forall z(PPzx \leftrightarrow PPzy) \rightarrow x = y)$

("If x and y have the same proper parts then x and y are identical.") Anti-symmetry gives us a related principle:

> If x and y share all of their parts then x = y.

If x and y share all of their parts then x is part of y and vice versa. *Anti-symmetry* says that if x and y are parts of each other they are identical: hence the above principle. *Extensionality* is the stronger claim that no two objects have exactly the same *proper* parts. (It says that if they do, then they are not two objects but one.)

Finally (for our purposes), mereologists have traditionally added a principle of *Unrestricted Mereological Composition* which says that any non-overlapping objects whatsoever compose something:

Unrestricted Mereological Composition $\forall xx \exists y(xxCy)$

We will see in the next section that these final two additions are particularly controversial.

II. Points of Contention

For our purposes we have probably said enough about standard mereological systems. It is important to recognise, however, that not everyone accepts even the basic axioms we have laid out. We just saw that some philosophers may have reason to reject *Anti-symmetry*. In fact, some philosophers do exactly that. Reasons for doing so are varied, though ultimately they result from philosophers wanting to maintain that objects that are spatially coincident—that is, share the same spatial location—need not be identical. For instance, many philosophers hold that a statue and the lump of clay that makes it up are distinct.

Denying *Anti-symmetry* is, of course, one option. The problem is to say what the relation between a statue and the lump of clay that makes it up (or between objects and that which constitutes them in general) is. These objects clearly spatially coincide; but it is an open question whether they are *mereologically* related. A fairly common view is that the statue and the lump are identical. On this view they share all of their parts, and thus are mereologically related. *Anti-symmetry* and *Extensionality* can be retained as mereological principles on this view. Those who think that the statue and the lump are distinct—i.e., those who think that *constitution is not identity*—must provide a different story.

One option is to view constitution as a form of proper parthood and argue that the lump is a proper part of the statue. Examples of philosophers who advocate such a position are Kathrin Koslicki (2008) and arguably Mark Johnston (2007).[4] Adopting this view has its costs, however. For instance, if the lump is a proper part of the statue we might expect there to be another proper part (*Weak Supplementation*). But what else could be a proper part of the statue besides the lump? Koslicki accepts *Weak Supplementation* and argues that the statue must therefore have a proper part which is not a concrete object. Johnston, on the other hand, denies that an object must always have more than one proper part. We have seen, however, that our second definition of proper parthood (see page 45) (along with some uncontroversial definitions) entails that an object cannot have a single proper part. Thus, Johnston must reject that definition too and go with the first instead. But we also saw that the first definition is equivalent to the second if *Anti-symmetry* holds. So Johnston must reject *Anti-symmetry* too. Whether this is much of a cost is subject to debate. One consequence worth noting is that without

[4]Johnston formulates his view as a view about parthood. However, he thinks that the lump is part of the statue and not identical to it. On our account, then, we should say that his view is that the lump is a *proper part* of the statue. Johnston has complicated reasons for denying this (Johnston, 2007), but it remains true that according to *our* definition of "proper part" he thinks the lump is a proper part of the statue.

the second definition we cannot deduce that proper parthood is asymmetrical. Instead, this needs to be an additional stipulation.

(It is also worth noting that if the statue and the lump have proper parts, but do not share any of them, then the lump cannot be a part of the statue or vice versa unless we reject *Transitivity*. To see this, suppose that the lump were a part of the statue. Then, by *Transitivity*, any part of the lump is part of the statue. Thus, if the lump is part of the statue then the statue must have all of the lump's parts, including its proper parts. The statue may, of course, have *additional* parts, however.)

Another option, defended by Judith Jarvis Thomson (1998), is to take the statue and the lump to be parts of one another. On this view the statue and the lump share all of their parts. This entails that both *Extensionality* and *Anti-symmetry* are false. After all, *Extensionality* says that objects with exactly the same proper parts are identical, and *Anti-symmetry* together with *Reflexivity* entails that objects with the same parts are identical.[5]

As with the last type of view, one's choice of definition of proper parthood matters. If we take the first, which says that x is a proper part of y if x is a part of y and x and y are not identical, it turns out that the statue and the lump (being parts of one another and non-identical) are proper parts of one another. Clearly, this is incompatible with the asymmetry of proper parthood. On the other hand, if we take the second definition, which says that x is a proper part of y only if y is not a part of x, it follows that *neither* the statue nor the lump is a proper part of the other. This is not the place to explore the consequences of these choices, but it is worth noting that neither view captures the intuitive asymmetry of constitution. It is the statue which seems to depend on the lump in various ways, not the other

[5] *Proof:* Everything is a part of itself (*Reflexivity*) so x is a part of x. Thus, if x and y share all of their parts, x is a part of y and y is a part of x. By *Anti-symmetry* it follows that x and y are identical.

way around. Thomson has to wheel in other machinery to do this job. As a result it is not overly clear what reason there is to say that constitution has anything to do with parthood.[6]

One might, then, be tempted by the view that the statue and the lump have no mereological relation to one another whatsoever. That is, one might say that the statue and the lump have no parts in common: they spatially overlap but do not mereologically overlap. This avoids the technical problems of the previous two view, but faces new problems of its own. For instance, if the statue and the lump have no parts in common, how is it that they can be located at the same place at the same time? (Wasserman, 2002, 2015). Objects made of the same kind of matter generally seem to be prevent each other from occupying the same spatial location at the same time. And suppose we want to weigh the statue. If we put it on a scale we necessarily put the lump on the scale too—why doesn't the scale read twice the weight of the statue? One might think we can answer these questions only if the statue and the lump share parts (see Wasserman, 2002). And this brings us back to the first option we discussed.

III. Deficiencies

Even if we could agree about which mereological system is the right one it is clear that none of them say enough about parthood. Mereology does not tell us that material objects are located where their proper parts are located (and necessarily so). It does not tell us that they share mass and volume with their proper parts either. In fact, for all our definition of proper parthood tells us, a composite object could be on the other side of the Earth from its proper parts.

These issues are not the sort to be addressed within a mereological system, although we could perhaps construct a workable joint mereology of objects and

[6]For discussion of these issues see Evnine (2011).

spatial locations. Van Inwagen's (1990) general composition question touches upon the issue.

General Composition Question For any Xs and any y, the Xs compose y if and only if _____?

Or, formally:

$$\forall xx \forall y(xxCy \leftrightarrow \_\_\_\_\_)$$

The idea is to fill in the blank.

While Van Inwagen (1990b) claims that there is probably no informative answer to the general composition question—and many seem to agree—it is clear that we can give partial answers of the form:

$$\forall xx \forall y(xxCy \rightarrow \_\_\_\_\_)$$

That is, we can list necessary conditions for the Xs to compose y. And there seem to be many of them. Van Inwagen (1990b, p. 43) calls these *principles of composition*, and proposes three (p. 44):

1. If each of the Xs has a surface and the Xs compose y, then y has a surface area and the surface area of y is less than or equal to the sum of the surface areas of the Xs.

2. If each of the Xs has a mass and the Xs compose y, then y has a mass and the mass of y is the sum of the masses of the Xs.

3. If each of the Xs occupies a region of space and the Xs compose y, then y occupies the sum of the regions occupied by the Xs.

It is easy to think of many more. Sider (2007, p. 20) suggests the following:[7]

4. If property P is intrinsic, then the property *having a part that has P* is also intrinsic.

5. If x is a part of y, then y is located wherever x is located.

Other plausible candidates include:

6. If each of the Xs has a volume and the Xs compose y, then y has a volume equal to sum of the volumes of the Xs.

7. If the Xs compose y and y is of kind K, then the Xs are arranged K-wise.

8. If the Xs compose y, then y ontologically depends on the Xs, or the Xs ontologically depend on y.

9. If the Xs compose y and y is F, then the Xs are collectively F (for any non-mereological property F).

Note that not only do most or all of these principles seem true but they seem necessarily true. A good theory of composition should arguably be able to account for these facts which Sider (2007) describes as symptoms of the *intimacy of parthood*.

Principle 6 is closely connected to Van Inwagen's Principle 1. Principle 7 is widely accepted. If the Xs compose y and y is a chair then the Xs are arranged chair-wise. (Arguably, this follows from the definition of "arranged chair-wise". See Chapters 4 and 6 for discussion.)

Principles 8 and 9 are probably the most controversial. The idea behind Principle 8 is that the existence of a composite object is explained by the existence

[7] See Cameron (2014) for suggestions which are similar to both Van Inwagen's and Sider's. Sider and Cameron refer to the close relation between an object and its proper parts as the *intimacy of parthood*.

of its parts (or vice versa). ("Why is there a chair over there? Because there are atoms arranged chair-wise over there.")

Principle 9 needs defence, though I think it may well be true. The principle says that if a composite object has a non-mereological property then its proper parts collectively instantiate that property. For instance, if a composite object is red its proper parts will (collectively) also be red. If true, this principle subsumes many of the others. If a composite object has mass *m* and volume *v*, then its proper parts collectively have mass *m* and volume *v*. (The reason for the caveat that F is a non-mereological property is to rule out properties like *having p as a proper part*. The object p may be *one of* the the Xs which compose the composite but the Xs do not have p as a proper part—at least, not unless composition as identity is true.)

Others cases are less clearly subsumed. If a composite object occupies a region of space, R, do its proper parts collectively occupy R? Certainly, they collectively occupy some regions, the Ss, which compose R (Principle 3); but that is not the same thing. I am inclined to think that the proper parts do occupy R, but I have no argument for this besides to say that to occupy a region seems to require nothing more than occupying every one of its subregions. (This may, however, tacitly assume composition as identity at the level of spatial regions.) Some will also argue that the composite and its proper parts have different modal, temporal, and numerical properties.[8] I argue that this is not the case in Chapter 3, though I do not expect everyone to agree. For those who do not, Principle 9 should be modified to exclude those properties too. Once that is done, Principle 9 should seem very plausible.

Any theory of parthood and composition faces the challenge of explaining why such principles hold (or of explaining them away). I will argue in Chapter 6

[8] Assuming that there are any numerical properties.

that composition as identity does this best.

IV. Mereology with Plurals

If composition as identity is true, then mereology is essentially no different to the study of how pluralities of objects relate to one another.[9] After all, if composition as identity is true two objects, x and y, are identical to two pluralities of objects, the Vs and the Ws. (Recall, that "the Vs" and "the Ws" may refer to *one* or more objects. We are not therefore committed to saying that x or y have any proper parts when we say they are each identical to a plurality.) Whatever mereological relations x and y have to one another are also relations between the Vs and the Ws.

Now x and y overlap if and only if they share at least one part. Given that the Vs are parts of x and the Ws parts of y, it follows that x and y overlap if and only if at least one of the Vs is identical to one of the Ws. Similarly, if x is a proper part of y, then each of the Vs is a proper part of y. Given that the Ws are all of y's parts, it follows that each of the Vs is one of the Ws.

We end up with a very neat system which needs only the notions *identical to* and *one of*. (*One of* allows us to define *some of* to mean "at least one of.") Our quasi-mereological relations then correspond to every possible way some Xs and some Ys can be related to one another in terms of identity relations among their members.

Quasi- Parthood The Xs are among the Ys iff$_{df}$ every one of the Xs is identical

[9]Note that I am not claiming in this section that mereological systems are just versions of first-order plural logic. First-order plural logic contains certain rules incompatible with composition as identity. There is, for instance, no hybrid identity predicate in that system.

Nor do I mean to suggest that all composite objects are *really* pluralities of objects. Rather, my claim is that the relation an object bears to one of its proper parts is the same—ontologically speaking—as the relation some objects bear to one of their members. Thus, we can understand what mereological relations are by looking at the relations that hold between pluralities of objects.

to one of the Ys.

Quasi- Proper Parthood The Xs are strictly among the Ys iff$_{df}$ every one of the Xs is identical to one of the Ys and not every one of the Ys is identical to one of the Xs.

Quasi- Overlap The Xs and the Ys share members iff$_{df}$ some of the Xs are identical to some of the Ys.

Quasi- Disjointness The Xs and the Ys are distinct iff$_{df}$ none of the Xs is identical to one of the Ys.

Quasi- Coincidence The Xs and the Ys are identical iff$_{df}$ every one of the Xs is identical to one of the Ys and every one of the Ys is identical to one of the Xs.

The elegance of this system is worth noting. First, we don't need to take any of these notions as primitive—we can define them all using the common notions we started with. Second, we can derive all of the usual principles quite easily. For instance, we can see that the *are among* relation has all of the properties typically associated with parthood. Every one of the Xs is identical to one of the Xs so the relation is *reflexive*. If every one of the Xs is one of the Ys and every one of the Ys is identical to one of some Zs then it follows that every one of the Xs is one of the Zs. Hence, the relation is *transitive*. And if every one of the Xs is identical to one of the Ys and every one of the Ys is identical to one of the Xs then the Xs are identical to the Ys. This tells us the relation is *anti-symmetric*.

Note also that this is also a proof of an analogue of *Extensionality*:

Quasi- Extensionality If each of the Xs is identical to one of the Ys and each of the Ys is identical to one of the Xs then the Xs and the Ys are identical.

As before, a supplementation principle can also be derived. If the Xs are strictly among the Ys then (by definition) not every one of the Ys is identical to one of the Xs. So there are some Zs, such that the Zs are among the Ys but not the Xs. Thus we get:

Quasi- Proper Supplementation If the Xs are strictly among the Ys then there exist some Zs which are strictly among the Ys and which are distinct from the Xs.

The other nice property of our quasi-mereological system is that we can see that mereological relations are all importantly analogous to (plural) identity. A case of perfect overlap, or *coincidence*, is one in which the Xs and the Ys are identical. Imperfect overlap occurs when *some* but not all of the Xs and the Ys are identical. Thus, if composition as identity is true, overlap may be described as "almost identity" or *partial identity* as in Armstrong (1978) and Lewis (1991, 1993). And just as the identity of the Xs and the Ys explains why the Xs occupy the same locations as the Ys, the partial identity of the Xs and the Ys explains why the Xs and the Ys partly occupy the same locations, and why *some* of the Xs occupy the same locations as the Ys.

(Explaining the relations between properties of parts and wholes is trickier. We will take up that task in Chapters 2, 5, and 6. I will argue there that composition as identity does give an explanation of those relations and that the orthodox view probably cannot.)

Those who take the orthodox approach, on the other hand, must say that the term "part" picks out at least two very different relations. There are two kinds of view compatible with the orthodox approach. The first has it that perfect mereological overlap is identity. On this view saying that "x is a part of y" means that x is either (i) identical to y, or (ii) a proper part of y. But although identity

can be characterised as a dependence relation, there is no *substantive* dependence between a thing and itself. On the other hand, there is a substantive dependence between x and y whenever x is a proper part of y on this view.

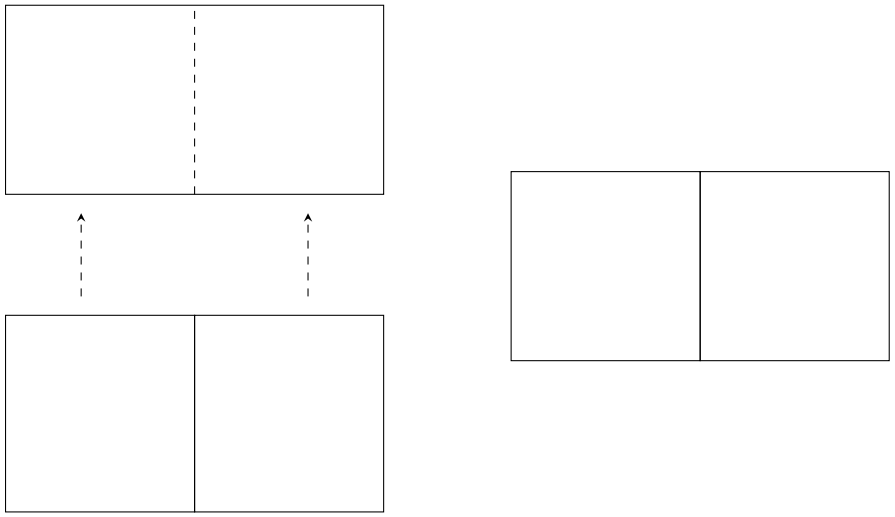
The second view multiplies the problem. On this view "x is a part of y" means that x is either (i) identical to y, (ii) a proper part of y, or (iii) a "symmetrical part" of y. (If x is a *symmetrical part* of y then x is part of y and y is part of x but x and y are not identical.) It is quite clear that all three categories are quite different.

If composition as identity is true, however, "part" essentially picks out the same kind of relation. In the case of identity it picks out a relation between a thing and itself; in the case of proper parthood, it picks out a relation between a thing and a fraction of itself. This latter claim—that something can be *partially* identical to another—is one of the features of composition as identity which some find bizarre. However, once we make the comparison with quasi-mereological relations it becomes clear that the notion is perfectly coherent. For instance, when we say that "the Xs are among the Ys" we say that either (i) all of the Xs are identical to all of the Ys, or (ii) the Xs are identical to some but not all of the Ys. These are essentially the same *kind* of relation—the difference is merely a matter of degree. The former is a case of (plural) identity. The latter is a case of (plural) partial identity.

2

COMPOSITES AND THEIR PROPERTIES

The difference between the orthodox view and composition as identity, in their realist variants, can be illustrated as in Figure 5 below.



(a) The Orthodox View

(b) Composition as Identity

Figure 5: A comparison between realist versions of the orthodox view and composition as identity. In subfigure (a) the top left rectangle represents the composite object, the bottom left squares, its two halves.

The figure shows on the left a rectangle (top) composed of two squares (bottom), according to the view of composition suggested by the orthodox view. There are a total of three objects on this view: the two squares and the rectangle (ignoring any smaller objects). On the right the figure shows the same rectangle (or squares) according to composition as identity. There are either two objects (the squares) or one object (the rectangle), depending on how we count them.[1]

Despite the popularity of the orthodox view, very little has been said about the properties of composite objects and their parts if that view is true. I suspect this is because the answers are taken by most to be entirely straightforward. In this chapter I will argue that the answers are far from straightforward. That these problems have gone largely unnoticed is, I think, a consequence of philosophers failing to take the entailments of the orthodox view seriously enough.

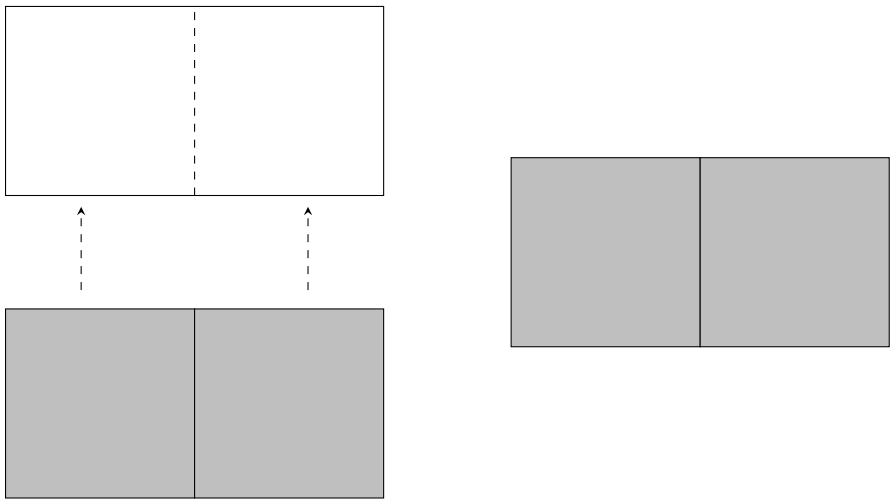
I will defend three points: (1) the obvious view about the properties of composite objects won't work if the orthodox view is true; (2) the alternatives are no better; and (3) composition as identity seems best able to capture intuitions about composites and their properties.

Let us begin by thinking about the rectangle shown in Figure 5. On both views about composition it is a composite object, made up of two squares. What sort of properties does it have and how do these relate to the properties of the two squares? For instance, if the squares are grey what colour is the rectangle?

As Figure 6 illustrates, the answer is straightforward under composition as identity. On that view the question, "What colour is the rectangle?" has the same answer as the question, "What colour are the squares?" Thus, if the squares are grey so too is the rectangle.[2]

[1] Some defenders of composition as identity may wish to claim that one of these ways is correct. This is consistent with the view (see Chapter 3).

[2] Although the defender of composition as identity has a good explanation for why the rectangle has the same colour as the squares *collectively*, one might think that she still has to explain why the rectangle has the same colour as *each* of the squares (or why a rectangle might



(a) The Orthodox View (b) Composition as Identity

Figure 6: A comparison between the orthodox view and composition as identity. In subfigure (a) the top left rectangle represents the composite object, the bottom left squares, its two halves.

But what about under the orthodox view? The figure suggests that there is room for disagreement. Of course, the natural answer is that the rectangle must be grey also; but why couldn't the answer be "red"? The proponent of the orthodox view needs to provide some story. The orthodox view also seems to suggest that it should at least be conceivable—if not possible—that the rectangle be red. But it is not. Again, the proponent of the orthodox view has to tell us why.

I will develop an argument along these lines in Chapter 5. For now, there are more immediate problems facing the orthodox view. If the orthodox view is true we will run into problems in accounting for the properties of composite objects in themselves, and not just the correlations between their properties and those of their proper parts.

We might, for instance, want to ask about the weights of composite objects. Take a chair: suppose that the proper parts of the chair (the legs, seat, back, etc.)

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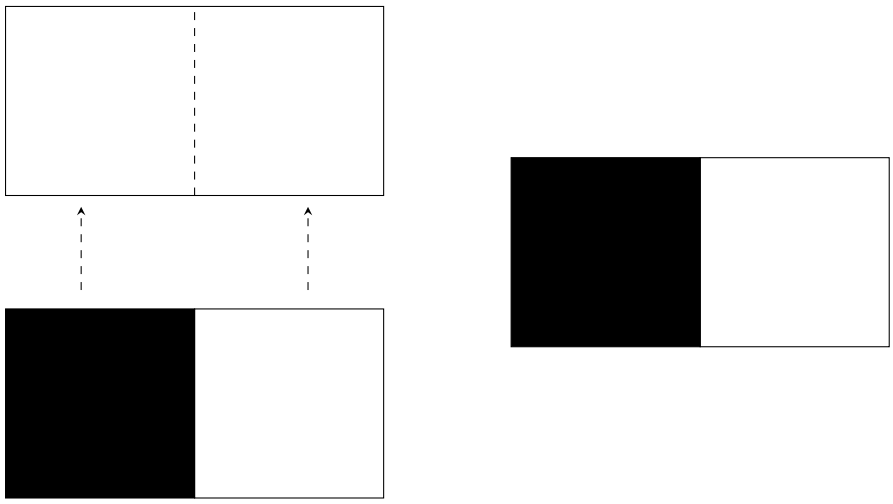
have a *different* colour to each of the squares). I will address this later in the chapter, and also in Chapters 5 and 7.

collectively weigh x kilograms. How much does the chair weigh? The answer again, is obvious—x kilograms—but it is less obvious why. And a further issue arises: if the chair weighs x kilograms, and the proper parts collectively weigh x kilograms, why don't these things, all together, weigh 2x kilograms? A typical answer, even amongst metaphysicians, is, "Because the legs, seat, back, and so on, are all *parts* of the chair." But this is no answer at all. Why does the fact that these objects are parts matter? Without an answer to this second question the original puzzle remains unsolved.

As before, composition as identity can solve it. Since the chair just is the legs, seat, back, etc., taken together, summing together their weights would be to count the weight of the chair twice. I am not aware of any satisfactory response on behalf of the orthodox view. Many these days would be inclined to say that the chair has its weight *in virtue of* the weight of its proper parts. Thus, the weight of the chair is not really anything over and above the collective weight of the chair-parts. Again, however, the question has not really been answered. Why does the fact that the chair has its weight in virtue of some fact about the chair-parts matter? If it has it, it has it, and it doesn't make a difference where it inherited it from.

We will return to this problem shortly (and in more detail in Chapter 8); for now, let us go back to thinking about our rectangle. Suppose that the orthodox view is true and that one of the squares is black and the other white, as in Figure 7.

What colour is the rectangle? A natural answer is "black and white"; but what exactly does this mean? Certainly the rectangle is not black. That would suggest that it is entirely black. Nor is it white, for the same reason. The natural answer is that it means the rectangle has a black proper part and a white proper part. This is the answer that David Lewis (1986, p. 203ff) suggests in his discussion of



(a) The Orthodox View (b) Composition as Identity

Figure 7: A comparison between the orthodox view and composition as identity. In subfigure (a) the top left rectangle represents the composite object, the bottom left squares, its two halves.

temporal parts, and most seem to accept it in that context. I suspect most will want to accept it here too.

The Lewisian answer, however, appears to be inadequate if the orthodox view is true. What we wanted to know was the colour of the rectangle; but what we were told, if the Lewisian view is true, was the colours of the squares. According to the orthodox view these are not the same. Thus, given the Lewisian view, our original response seems to completely fail to answer the question, "What colour is the rectangle?"

There is a way that one could accept both the orthodox view and the Lewisian response without this consequence. For instance, one could say that the sentence, "The rectangle is black and white," does not in fact attribute any colour property to the rectangle at all. Instead, it is a claim about the colour properties of the squares. On this view we may still say that the rectangle has a certain property—*being black and white*—but we may not say that this property is a colour property. For it is not. It is the property of having proper parts with certain colour properties.

This response also opens up a solution to the problem discussed earlier about weight. If, "The chair weighs x kilograms," actually attributes a weight to the chair-parts and not the chair as it seems to, then the chair and the chair-parts together weigh x kilograms as they should. After all, on this view the chair has no weight, strictly speaking. This may seem like a nice result to defenders of the orthodox view.

The view, however, is very problematic. It seems to imply either that (i) no composite object has colour properties, or that (ii) no composite object has heterogeneous colour properties (like *being black and white*), but that there are composite objects with homogeneous colour properties (like *being red*).

Both possibilities are strange. Both wrongly imply that *black and white* is not a colour property. And that seems to imply that the rectangle has no colour properties whatsoever. But what would a composite object without colour properties even be like? The view seems to imply that we do not—and cannot—see many objects that we seem to see. My chair (or what I think is my chair) does not have a perfectly uniform colour. Thus, on this view, it has no colour properties. And therefore—presumably—I cannot see it. Worse still, properties like *black and white* are not the only heterogeneous properties. Most shapes appear to be heterogeneous. Density, pliability, roughness all appear to be heterogeneous properties too. Are we to think that many or all composite objects lack these properties too?

Both possibilities also wrongly imply that properties like *black and white* are not intrinsic properties, at least on one natural construal of what an intrinsic property is (*cf.* Botterell, 2004). Lewis (1983, p. 197), for instance, characterises intrinsic properties in the following way:

> A sentence or statement or proposition that ascribes intrinsic properties to something is entirely about that thing [...]. A thing has its

> intrinsic properties in virtue of the way that thing itself, and nothing else, is (Lewis, 1983, p. 197).

If "The rectangle is black and white" describes the properties of the squares, and the squares are distinct from the rectangle, then *black and white* is not an intrinsic property on this view.

I suspect that most advocates of the orthodox view will want to say that we should instead characterise intrinsicality in such a way as to include properties of proper parts. Let's call this *weak intrinsicality*:

Weak Intrinsicality Being F is a weakly intrinsic property if and only if, necessarily, nothing that is F is F in virtue of the way anything mereologically disjoint from it is.[3]

However, this does not change the fact that *black and white* seems to be intrinsic in the sense described by Lewis. Call this *strong intrinsicality*:

Strong Intrinsicality Being F is a strongly intrinsic property if and only if, necessarily, anything that is F is F in virtue of the way it itself, and nothing numerically distinct from it, is.

Both possibilities, then, wrongly imply that *black and white* is not a strongly intrinsic property, and that it is not a colour property. That seems absurd.

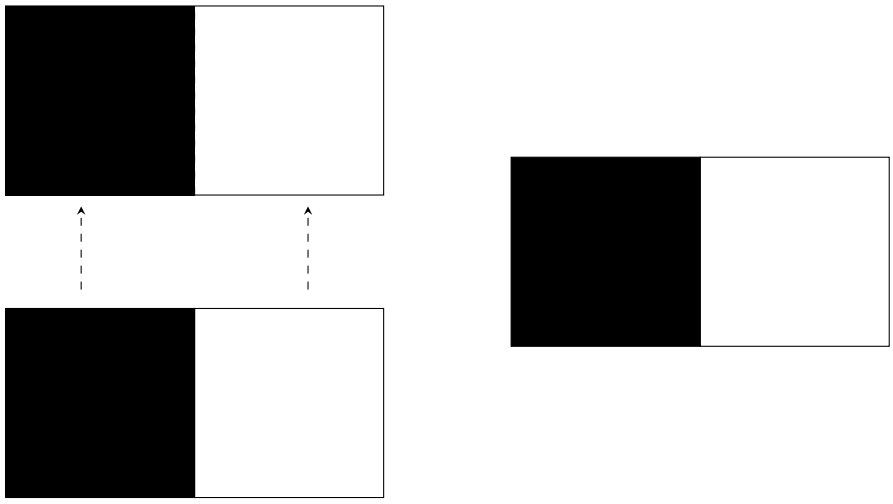
The first possibility faces further difficulties of its own. First, seems to imply that *no* composite objects have colour properties. Second, it seems to imply that

[3]This is adapted from (3) in Weatherson and Marshall (2014). Weatherson and Marshall (2014) characterise this as one type of property among many which might be understood to be intrinsic properties. They call this particular kind of property *interior properties*. Specifically, their definition is: "Being F is an intrinsic property iff, necessarily, anything that is F is F in virtue of the way it itself, and nothing wholly distinct from it, is." I have changed part of the definition to reflect the fact that the way an object's proper parts are, on the orthodox view, is not strictly speaking a "way it itself [...] is".

there is a "bottom level" at which objects do have colour properties. This is not unproblematic. It seems possible that there is no such bottom level, that the world is "gunky"—that is, contains no mereological simples—that every object is composed of some others. But such a possibility is incompatible with this view. After all, if there are no simples, then, on this view, there are no objects with colour properties. On this view, a sentence like "The rectangle is black" ascribes colour properties to the rectangle's proper parts. If the rectangle's proper parts don't have colour properties, then such a statement is meaningless or false.

Thus, I think that neither way of allowing that composite objects in themselves do not have heterogeneous colour properties looks tenable. Instead, the proponent of the orthodox view should say that composite objects do themselves have colour properties.

On this view, the rectangle has the property illustrated in Figure 8.



(a) The Orthodox View (b) Composition as Identity

Figure 8: A comparison between the orthodox view and composition as identity. In subfigure (a) the top left rectangle represents the composite object, the bottom left squares, its two halves.

Clearly, we will need some other account of the meaning of "black and white" which does not make reference to the proper parts of the object if we want to

hold such a view. This is not as easy as it might seem. The rectangle seems to instantiate both *black* and *white* and yet these are incompatible properties. (That is, to instantiate *black* is to not instantiate *white*.) Furthermore, the rectangle seems to be neither black (simpliciter) nor white (simpliciter); for that seems contradictory. How (if at all) can we account for all of this under the orthodox view?

I. Five Accounts of Heterogeneous Properties

Luckily we have some resources to draw upon here. If we are not allowed to appeal to properties of a composite object's proper parts then we have the same problem as those trying to account for similar properties in objects which have no proper parts. Objects which have no proper parts, despite being extended in space, are known as *extended simples* and have been subject to a fair degree of investigation by philosophers (see e.g., Markosian, 1998b; McDaniel, 2003; Markosian, 2004; Simons, 2004; Arntzenius and Hawthorne, 2005; Braddon-Mitchell and Miller, 2006b; Spencer, 2010). The challenge for those who think extended simples are possible is to explain how they could have properties, like *being black and white*, that vary across space, if they have no proper parts.[4] We have seen that having proper parts is no help either, so we will need to avail ourselves of exactly the same resources to explain how composite objects can have such properties. (This perhaps shouldn't be too surprising. After all, we would expect a black and white extended simple to be black and white in just the same way a black and white composite is.)

Discussions of extended simples have yielded a range of strategies for ac-

[4] Assuming that they could have such properties. It is open to the defender of extended simples to deny that they can have heterogeneous properties although this is generally seen as a cost. (It is also problematic if one wants to say that extended composites can have heterogeneous properties. Why the difference?)

commodating qualitative variation across space. Let us discuss them one at a time.

Stuff

Ned Markosian (1998b, 2004) argues that when we say of an extended simple that it is "black and white" (for example), we are actually talking about properties of portions of matter or "stuff". While a black and white extended simple does not have a proper part which is black, or a proper part which is white, the matter that constitutes it does have a black proper part and a white proper part, according to Markosian. It is these which we would be referring to if we were to talk about the simple's "proper parts".

I do not find Markosian's view appealing for several reason. Most importantly, it has the same deficiency as the Lewisian response. If we want to say that an extended simple *itself* has colour properties then we need to account for *its* properties. Appealing to facts about the colour properties of bits of matter will not help us do this. Of course, as with the Lewisian response, one could always bite the bullet and accept that extended objects (composite or simple) do not have colour properties (or at least heterogeneous colour properties), but this seems a high price to pay.

As before, there are two such views. On one we say that composite objects have homogeneous colour properties but do not really have heterogeneous colour properties. (Or: we say that composite objects have homogeneous colour properties as strongly intrinsic properties but have heterogeneous properties as merely weakly intrinsic properties.) On the other, we say that composites themselves have neither kind of property. Neither option is very appealing. It is quite strange to think that when we say that an object is black we are talking about the object itself, but when we say it is black and white we are talking about a portion of

matter and not the object. And it is perhaps even stranger to think that many objects do not really have colour properties at all.

All in all, Markosian's response gives us nothing the Lewisian response cannot give us, so there is no reason for us to accept it here.

Relativised Properties

An oft-discussed approach to dealing with problems related to persistence and change is to suggest that objects which change over time do so by having their properties relative to times. There are at least two variants of the view (see e.g., Lombard, 2003). First, we might say that the property *black* is really a relation, i.e., *black-at*, which holds between objects and times. Thus, an object changes properties by standing in the *black-at* relation to one time and the *white-at* relation to another. Second, we might say that the property *black* is really a time-indexed property: i.e., *black-at-*t_1. On this view a changing object simply has different time-indexed properties: e.g., *black-at-*t_1 and *white-at-*t_2.

The same strategy can be adopted with regard to spatial rather than temporal variation. That is, we can say that a black and white object such as our rectangle stands in the *black-at* relation to one region of space, s_1, and the *white-at* relation to another region of space, s_2; or has the property *black-at-*s_1 and the property *black-at-*s_2.

This strategy has at least two things going for it. First, it may be able to accommodate the intuition that the rectangle instantiates the property *black* and that it instantiates the property *white* without being either black or white simpliciter, so long as we allow that to instantiate the property *black* is to stand in the relation *black-at* or to have a space-indexed property of a certain kind. Second, it seems to fit with the way that people might talk about objects. For instance, it seems quite natural to say that the rectangle is "black *there* and white

here".

This view does, however, suffer several drawbacks too. To begin with, properties like *black* and *white* simply don't seem to be relations. While it may not seem unintuitive that an object be black relative to one time and white relative to another it seems less intuitive that it be black relative to one place and white relative to another place. Nor does the property *black* seem to be a different property at two different locations, as is entailed by the second variant of the view.

Furthermore, although it is tempting to describe the properties of the rectangle with reference to spatial locations, spatial locations don't really seem to have anything to do with the rectangle and its properties. It is simply an accident that the rectangle is where it is. We don't need to know anything about an object's location to know something about its colour properties. Worse still, the relativisation approach implies that moving an object around in space changes its colour properties. Moving the rectangle from one location to another changes its colour properties from *black-at-*s_1 to *black-at-*s_2 (say), or changes which locations the object stands in the *black-at* relation to. An advocate of this approach can of course reply that the same property and object is involved throughout, but it certainly seems that *no* aspect of an object's colour properties need change when it is moved. (Nor will this response work for the second variant.)

In addition to these problems the relativised property strategy faces what seems to me to be a devastating objection. Suppose our rectangle occupies a spatial region such that it is *black-at-*s_1 and *white-at-*s_2, as in Figure 9. If we flip the rectangle 180 degrees it will then have the properties *white-at-*s_1 and *black-at-*s_2 (see Figure 10). In other words, its colour properties will change.

Or, on the other variant: the rectangle will go from having the *black-at* relation to s_1 to having the *black-at* relation to s_2.

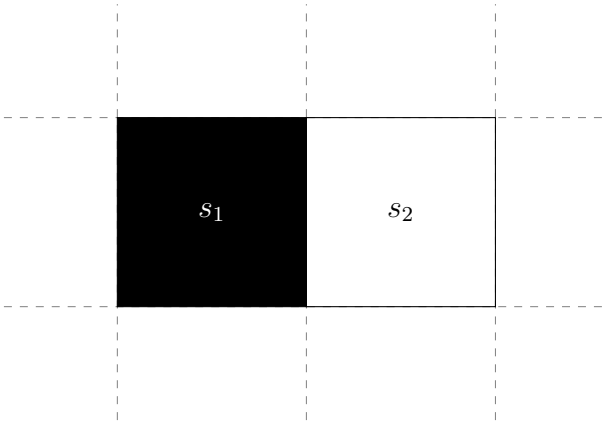


Figure 9: A rectangle located at the sum of the regions s_1 and s_2.

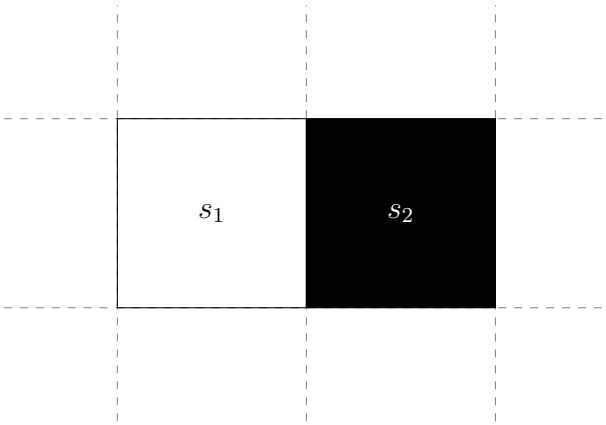


Figure 10: A rectangle located at the sum of the regions s_1 and s_2.

However, it seems clear that the colour properties of the rectangle should stay the same throughout. After all, all we did was rotate it in space.

Now suppose we had inverted the colour pattern of the rectangle instead, by painting the black part white and the white part black, for instance. The rectangle would be *black-at-*s_1 and *white-at-*s_2 again—or it would stand in the *black-at* relation to s_1 and the *white-at* relation to s_2 again—despite the fact that we would have changed its colour properties.

This approach cannot distinguish between a scenario in which the rectangle is left alone and one in which we invert the colour pattern of the rectangle and rotate

it 180 degrees either. In both cases the rectangle has the same colour properties; yet we stipulated that its colour properties had been changed.

The only escape seems to be to argue that we cannot make sense of inverting the colour pattern of the rectangle. But such a suggestion looks quite ridiculous. There is a clear difference between rotating an object in space and changing its properties. The latter, but not the former, can be achieved without moving the object.

This view, then, drives too great a wedge between an object and its properties. When we rotate the rectangle without changing its colour properties, what we want to say is the side of the rectangle which is black stays the same. However, this approach does not allow us to say anything of the sort. After all, the side of the rectangle is a proper part of it. What we need to be able to say is that it is the rectangle itself that instantiates the property *black* (relative to a spatial location), and not some proper part of it.

Adverbialism

A close cousin of the relativised properties strategy is *adverbialism*.[5] Instead of relativising properties to spatial locations this approach relativises the instantiation relation itself. According to the second variant of the relativised properties strategy, an object instantiates the time-indexed property *being black-at-*t_1; according to adverbialism the object bears the time-indexed relation *having-at-*t_1 to the property *black* (Van Inwagen, 1990a). In short, the idea is that a changing object may be both black and white by being black "t_1-*ly*" and white "t_2-*ly*" (say). The properties *black* and *white* are incompatible, but only if they are instantiated in the same way.

[5] Advocates of the temporal variant of adverbialism include Johnston (1987), Haslanger (1989) and Van Inwagen (1990a).

On the spatial variant of adverbialism our black and white rectangle instantiates black s_1-ly and white s_2-ly (for some spatial regions, s_1 and s_2).

Adverbialism shares most of its strengths and weaknesses with the relativised properties approach, though it does have some advantages. Foremost among these is that colour properties come out as intrinsic and non-relational. For instance, the view allows that our rectangle has blackness as an intrinsic property which is not relative to spatial location. It also allows us to say that an object instantiates *black* and also *white* without being either black or white simpliciter.

Again, however, this view strikes me as more plausible in the temporal case. It seems less objectionable that an object have properties in different ways at different times than at different spatial locations. Perhaps, (though I find this unappealing) as an object moves through time, it instantiates its intrinsic properties differently. However, intuitively, an object's location makes no difference to the way it instantiates its intrinsic properties. This view implies that no two objects which occupy different spatial locations instantiate the same property in the same way. The view allows that two people may have on the same colour shirt, but it does not allow that two people have on shirts which have the same colour *in the same way*. Yet surely, my white shirt is white in just the same way as anyone else's is.

And spatial adverbialism also faces the rotation problem. If we rotate our rectangle 180 degrees and invert its colour properties then according to adverbialism the rectangle has the same properties as it started with, and in the same way. Yet surely, the colour properties of the rectangle have changed. (After all, we stipulated that they did.)

Tropes

Given the failure of the previous strategies it looks like a different approach may be in order. One such approach is to appeal to short-lived tropes (Ehring, 1997; McDaniel, 2009). Tropes are properties which are abstract particulars. No two tropes are the same. Tropes may, however, resemble one another. The rough idea, then, is this: an object is black if and only if it instantiates a blackness trope, where a blackness trope is one which falls into a class of tropes which resemble each other in a certain way (McDaniel, 2009). Ehring (1997) proposes short-lived tropes as a solution to the problem of temporary intrinsics; McDaniel (2009) proposes the theory as a solution the problem of qualitative heterogeneity in extended simples.

The solution works as follows. An object is black and white (over time or space) just if it instantiates a blackness trope at one location (in space or time) and a whiteness trope at another. In the case of the rectangle in Figure 9, the trope view says that the rectangle instantiates a blackness trope which is located at s_1 and a whiteness trope which is instantiated at s_2.

The key feature of the view is that it says that objects do not instantiate properties relative to different locations in any way. Instead, objects exemplify tropes which are located at certain locations. Both the instantiation relation and the property remain non-relativised—it is the location of the tropes that is relative. This helps to avoid the problems associated with the previous two views. Properties are instantiated in the same way at different locations, they may be had intrinsically, and they need not be relations. Furthermore, it lets us say that the same object can instantiate both *black* and *white* without being either black or white simpliciter.

As with the previous two views, however, it falls foul of the rotation problem. If we rotate the rectangle 180 degrees then we change which kinds of tropes are

exemplified at which locations. Inverting the colour of the rectangle has exactly the same effect. Thus, we cannot distinguish the two states, even on the trope view. One might have thought that the way that the trope view locates properties would have allowed it to avoid the problem, however it does not. The problem is that, although the properties are not relativised in any way, they are still disconnected from the object itself. This means that we cannot distinguish between a black and white rectangle which has been rotated and one which has had its colours inverted. In both cases, the rectangle exemplifies a blackness trope at s_2 and a whiteness trope at s_1 (as in Figure 10).

Another problem with the trope view is that no object exemplifies the same trope at two times because the tropes are supposed to be instantaneous. Thus, strictly speaking, no object has the same property at more than one time. The trope theorist can reply that having the same property merely requires exemplifying a trope of the same kind. In this way, she may perhaps avoid the objection, though a view in which the very same property is instantiated will no doubt seem preferable to some.

Distributional Properties

Our final option, this time proposed specifically to deal with the spatial variant of the problem, is to appeal to *distributional properties* (Parsons, 2004). We noted earlier that the rectangle seems to be neither black nor white (simpliciter). Perhaps then we should say that the rectangle has some *other* property: namely, *black-and-white*. If we do so we can avoid the contradiction that we started with. On this view no object is both black and white. To think this is to confuse a distributional property (*black-and-white*) for the conjunction of two non-distributional properties (*black* and *white*).

Although this makes for an elegant solution it too has its problems. First, a

black and white object really seems to instantiate both blackness and whiteness. Second, and closely related, the property a black and white object has appears to be closely related to the properties *black* and *white*. More specifically, it is very hard not to think that the property *black-and-white* is somehow reducible to the properties *black* and *white*. (It is no coincidence that the words "black" and "white" appear in the expression "black-and-white".) However, on this view the fact that an object is black-and-white cannot be reduced to any facts about that object instantiating *black* or *white*. If it were reducible in this way then we would be back where we started: we would need to say how an object can instantiate both *black* and *white* if these are incompatible properties. (Nor can it be reducible to facts about the colours of the object's proper parts, if we want to say that the object, itself, has this property.)

Furthermore, because this view makes no reference to spatial locations it is difficult to distinguish between apparently different distributional properties. Suppose we reverse the colour pattern of the rectangle. Intuitively we have changed its colour properties—e.g., from *black-and-white* to *white-and-black*—but how can we account for that on the this view?[6] What is the difference between *white-and-black* and *black-and-white* if we cannot appeal to spatial regions or proper parts?

The good news for defenders of distributional properties is that this view avoids the rotation problem. For the rotation problem to get off the ground we need to be able to say that rotating the rectangle changes its properties. But because we can't distinguish between *black-and-white* and *white-and-black* we have to say the rectangles in Figures 9 and 10 have the same property. Thus, it seems that we have to say that rotating the rectangle does not change its colour properties. And that is what we wanted all along.

[6]This objection is inspired by one given by McDaniel (2009, p. 330).

Unfortunately, this is not much help. We may not be forced to say that objects change their properties when, intuitively, they do not, but now we cannot say that objects change their properties when, intuitively, they do. For instance, Figure 10 is compatible with two different stories. Either the rectangle in Figure 9 was rotated 180 degrees, or its colour properties were inverted. We may not be forced to say that rotating the rectangle in Figure 9 changes its colour properties, but we cannot make sense of the idea of inverting the colour properties of the rectangle either. If Figures 9 and 10 depict a rectangle with the same properties then it is simply impossible to invert the colour properties of the rectangle in Figure 9.

In response, a proponent of this view might try to argue that we can distinguish the distributional properties in Figures 9 and 10 in some way. Perhaps there is a way to do this; perhaps not. However, if there is, then the rotation problem will re-emerge. For we will still lack the ability to distinguish between a rotated object and a colour-inverted object.

II. Composition as Identity

That concludes our survey of the strategies available to defenders of the orthodox view. There may of course be others yet to be proposed, and there are no doubt considerations that I have missed. Still, the prospects do not look particularly good. The problem is clear enough. If we cannot make reference to the different sides of the rectangle then there seems to be no way to distinguish a scenario in which the rectangle is rotated and one in which it has its colour properties inverted. None of the views discussed allows us to do this, and it is hard to see how any such view could.

In addition, on many of these views we cannot even say what we want to say about heterogeneous properties. A black and white object appears to instantiate both *black* and *white*—and in the same way—without being either black or white

simpliciter. Only the trope view allows us to say even that much.

In fact, our discussion suggests a general problem for the orthodox view. It is possible for there to be a perfectly symmetrical circle that rotates. But how can we account for such an object without any appeal to parts? Maybe we can, but the natural way to do so is to say that the outer edge of the circle is travelling at a certain angular velocity. According to the orthodox view the circle itself has no outer edge. If it did then it itself would have a proper part, which is impossible on the orthodox view. But, surely every circle has an outer edge, a centre, and parts in between. It seems to me completely absurd to think otherwise. Anyone who tries to say that it is not the circle that has these features but some stuff, objects, or spatial regions with which it is co-located faces the challenge of explaining why, if that is true, we should think *the circle* is circular at all.

I think, therefore, that, at very least, the orthodox view is seriously underdeveloped. For the dominant account of composition to be lacking in such fundamental details strikes me as an embarrassment. Why should we take seriously a view that says so little?

The key question, of course, is: can composition as identity do any better? I think that it can. Certainly on the face of it composition as identity has an immediate advantage. If a composite object just is its proper parts (collectively) then if we describe the properties of the proper parts we thereby describe the properties of the composite. Thus, it seems that the Lewisian response is satisfactory if composition as identity is true. Let's see if this thought survives greater scrutiny.

If composition as identity is true the question, "What colour is the rectangle?" is essentially the same as the question, "What colour are the squares?" But we need to be careful in interpreting the second of these questions, for it is ambiguous. The question is not, "What colour is *each* of the squares?" but rather, "What colour are the squares *together*?" After all, the claim is not that the rectangle is

identical to each of the squares—the claim is that it is identical to the squares *together*, just as it is composed of the squares *together*.

So what colour are the squares together? Certainly, they are not black. Only one of them is. Nor are they white. Again, only one of them is. Hence, it seems correct to say that they have some other property: *being black-and-white* or (even better) *being half-black-and-half-white*. So far this aligns nicely with the distributional property view and appears to be quite different to the Lewisian response. The difference between the current view and the distributional property approach, however, is that on the current view the property *black-and-white* is reducible to the properties *black* and *white*. To say that the squares are black-and-white is just to say that one of them is black and one of them is white.[7] Thus, at least in many cases, the collective properties of some objects reduce to properties of the individuals.

We have seen that, "The squares are black and white," says (more or less) that one of the squares is black and the other is white. Even opponents of composition as identity should accept this. By accepting composition as identity, however, we get the added benefit of being able to conclude from this that to say, "The rectangle is black and white," is (more or less) to say that one of the squares which compose the rectangle is black and the other white. Because the rectangle just is the squares, we can say this without having to say that the rectangle itself has no colour properties. The Lewisian response is thus much more plausible if composition as identity is true.

Nevertheless, we still need to ask if the resulting view can meet the desiderata we came up with earlier. Can it accommodate the intuition that the rectangle instantiates *black* and *white* without being black or white simpliciter, for instance?

[7] At least roughly. If there were more than two squares, some black, and some white, we would still wish to say that the squares are "black and white". Thus the property *black-and-white* is more general than I make out. However, it should cause us no problems if we ignore this for the sake of simplicity.

It can. To see this we should return to thinking about the squares. One of the squares is black and the other white. Picture that in your mind. It should seem to you that both of the properties *black* and *white* are instantiated whenever the squares exist. Furthermore, this seems true in just the same way that both *black* and *white* are instantiated by the rectangle. I will admit that it seems wrong to say that the squares *collectively* instantiate *black* and *white*. But it also seems to me that the relevant intuition is only that *black* and *white* are instantiated *in some way* by the squares. Intuitively, *part* of the rectangle is black and *part* of the rectangle is white. Similarly, *one* of the squares is black and *one* of the squares is white. Facts about the squares guarantee that *black* and *white* are instantiated without it being the case that the squares are collectively both black and white. (The squares, collectively, are such that one of them is black and one white, just as the rectangle is such that part of it is black and part white.)

This solution seems to me to fit the facts remarkably well. The problem was to say how *black* and *white* could both be instantiated without contradiction, while also allowing that it is the composite object *itself* that instantiates them. If these colour properties are instantiated by the proper parts of the composite, and those proper parts are numerically distinct from the composite, then the fact that *black* and *white* are instantiated says nothing about the colour properties of the composite. If, on the other hand, the proper parts are identical to the composite, the fact that one is black and the other white *does* say something about the colour properties of the composite—it says that the composite is black-and-white.

The problem facing the alternatives we have discussed was essentially that they could not distinguish one side of the rectangle from the other. Thus, the problem with the orthodox view seems to be that it makes parthood *external* to an object. What are called "proper parts" on that view are too far separated from the composite object. Once we look at the object itself we see that it itself has

proper parts, and not in the orthodox way. Only composition as identity seems to be able to capture this fact.

III. Discussion

We have now surveyed what appear to be the best possible accounts of the properties of composite objects. Our discussion suggests that there are three main alternatives: (1) accept composition as identity and employ the Lewisian strategy; (2) deny that any sense can be made of inverting the properties of heterogeneous composites, or rotating them, and adopt one of the standard views about extended simples; or (3) deny that heterogeneous composites have their heterogeneous properties as strongly intrinsic properties.

All three alternatives require giving something up. We have just seen that accepting composition as identity allows for an elegant account of the properties of composites. But, as we will see in Chapter 3, accepting composition as identity means accepting a whole package of views about persistence, modality, and existence. Many philosophers will see this as a cost.[8]

The second alternative strikes me as completely untenable. Take the rectangle in Figure 8. It has a black proper part and a white proper part. If we were to switch the colours of these proper parts, we would change the colour of the rectangle. If changing the colour properties of the rectangle really means changing *its* colour properties, then we must be able to make sense of inverting the colour properties of the rectangle.

Of course, one might want to deny that changing the colour properties of the rectangle really means changing *its* colour properties. That is, one might

[8]However, I offer some reasons in Chapter 3 to think that any cost here is not particularly great. If we go by the strength of the available arguments for and against these views, the package of views consistent with composition as identity is at least as good as any package which is inconsistent with composition as identity.

want to say that the rectangle itself does not really have colour properties, at least whenever these are heterogeneous properties. This is the third alternative. We have already briefly discussed some of the costs associated with this view. Another cost is that we would have to deny that heterogeneous extended simples are possible. Strictly speaking, one could hold that extended simples with heterogeneous properties are possible, and that extended composites with heterogeneous properties are not, but that would defeat the purpose of the view. If we had a way to account for heterogeneous properties in extended simples then surely we could also account for heterogeneous properties in extended composites. The only good reason to deny that composite objects can have heterogeneous properties is because one thinks that none of the accounts we have discussed is successful. Why deny that a composite object itself can be black and white (or that it can have *black and white* as a strongly intrinsic property) unless one thinks that no sense can be made of this?

Therefore, anyone who accepts this view should take themselves to have good reason to deny that heterogeneous extended simples are possible. But heterogeneous extended simples do seem to be possible. Intuitions about the possibility of heterogeneous simples reflect our intuitions about properties. If someone thinks that heterogeneous extended simples are conceivable, this suggests that their intuitive understanding of properties is such that heterogeneous properties are strongly intrinsic. If, for instance, the property *black and white* were weakly intrinsic, but not strongly intrinsic, then no object could be black and white without having proper parts in the orthodox sense.

Of course, these intuitions reflect how we *think* about properties and not necessarily how properties actually are. If being black and white is simply a matter of having a black proper part and a white proper part then black and white extended simples *are* impossible. Still, I think these intuitions are probably the

best guide we have in these matters. They are also arguably quite respectable in the sense that they reflect semantic competency.

Incidentally, our discussion of composition as identity actually helps to clarify this view to some extent. The claim is that "The rectangle is black and white" says something about the colours of the squares: i.e., that one of them is black and the other white. We saw that this is a property of the squares collectively—the squares collectively are such that one of them is black and the other white—and we called this property "black-and-white". Thus, we can say that, on this view, "The rectangle is black and white" means that the proper parts of the rectangle are black-and-white. One then has the choice of saying whether homogeneous properties of composites are similarly reducible to properties of their proper parts. For instance, it could be that "The rectangle is black" says something about the colour of the rectangle, or it could say that the rectangle's proper parts are collectively black. As we saw, each of these views has its costs.

My own view is that having to say that the rectangle itself has no colour properties (strictly speaking) is a great cost. When I say that an object is black and white I mean to attribute a particular property to *it* and not to some other object or objects. Perhaps in doing so I am in error, but there doesn't seem to be much reason to think so. One might argue that the truth of the orthodox view gives us reason to think this. But surely it is more certain that the rectangle itself is black and white than it is that the orthodox view is true.

The choice we have is between a view on which composite objects are identical to their proper parts and a view in which composite objects cannot strictly speaking have heterogeneous colour properties at all. I want to suggest that the former view is preferable, all else being equal. The challenge facing us is then to show that all else *is* equal, or that other factors favour composition as identity. The remainder of the thesis is devoted to showing just this.

3

Composition as Identity: A Package View

Before arguing for composition as identity in more detail it is important to say more clearly what the view is and what it entails. I hope that what I have said so far is enough to convince the reader that there is value in investigating the view that a composite object is identical to the things that compose it, even if she or he ultimately concludes that it is false.

There are many other reasons to think that there is something important about the idea that composition as identity is true. Although, it is unintuitive in some ways, it is also very intuitive in others.

Some like to think that a composite object is "nothing over and above its (proper) parts" (e.g., Lewis, 1991). The idea is that composite objects are no further ontological commitment—once one has committed to the proper parts one gets the composite object for free (*cf.* Cameron, 2014). But composite objects *are* an additional commitment if they are distinct from their proper parts. After all, we have to commit to each of the proper parts *and then* also commit to the composite (Van Inwagen, 1994). Accepting composition as identity avoids this

problem: to commit to the proper parts just is to commit to the composite.[1]

Another intuition that favours composition as identity is that objects that mereologically overlap to a great extent seem to be "almost identical" (*cf.* Armstrong, 1978, p. 37–38). For instance, suppose you draw a circle on a piece of paper. The circle outlines a part of the paper. Now suppose you draw another circle in exactly the same place; then you have outlined the same object twice. The object outlined by the first circle is identical to the object outlined by the second. Instead you could have drawn another circle in almost the same place. What then? It seems that this circle would outline a part of the paper which is "almost identical" to the original part. That is, mereological overlap seems not to be discontinuous with identity. Rather, identity seems to be the limit of overlap.

We also tend to think that it is impossible for two objects to exist in the same place at the same time. That is, we tend to think that *coincident* or *co-located* objects are impossible.[2] And, unless composition as identity is true, it looks like we have to deny this since composite objects and their proper parts appear to occupy the same locations in space (*cf.* Wallace, 2011a). Of course, a composite and its proper parts are (arguably) not *quite* coincident as the proper parts are not located at a single location, but rather many locations.[3] If an object is located at region R, then it's proper parts are collectively located at some subregions of R.[4] Nevertheless, there seems to be something objectionable about the claim that both the proper parts and the composite exist within the bounds of R.

[1] Though see Cameron (2014) for another way one might try to get around the problem.

[2] Of course, many philosophers reject this intuition based upon discernibility arguments of the kind we have already discussed. These philosophers hold that constitution is not identity.

[3] Thanks to Kristie Miller and Antony Eagle (at the 2014 AAP Conference) for stressing this point to me.

[4] Wallace claims that the proper parts collectively occupy R (Wallace, 2011a, p. 815, fn. 2), but that is not obviously true. (Certainly, if composition as identity is true they do; but that doesn't help us.) Think of three objects located at regions r_1, r_2, and r_3, respectively. It seems to me that the objects are not individually located at these regions—they are collectively located at them. So their collective property is one of being collectively located at three regions of space. It is not obvious that the objects are located at the fusion of those regions.

The way we think and talk about composites and their proper parts seems to support composition as identity to some extent as well. The following two cases, due to Donald Baxter,[5] appear to support the intuition that a whole and its proper parts are identical.

> *Case 1:*
>
> Imagine you're at the supermarket doing some shopping. You pick up a six-pack of yoghurt and walk to the express aisle, which has a sign saying "six items or less". You briefly wonder whether you have six items or one, but decide it doesn't matter because either way you qualify. Unfortunately for you the person at the counter is a Mereologist. She tells you that you have seven items. You protest, but she shows you that each tub of yoghurt has a barcode as does the entire package. "See? You have seven items." Luckily she says she will serve you anyway as it's not busy. But your shopping experience is about to get worse. You watch in frustration as the Mereologist proceeds to scan all seven barcodes. You now have to pay twice as much as expected.

Is the Mereologist right? Intuitively she is not: you have been overcharged. After all, if you had bought each of the tubs separately it would have cost you half as much.

> *Case 2:*
>
> Lenman owns a piece of land and concocts a scam to increase its worth. He divides it into six parcels and offers them for sale. He figures the whole is distinct from each of the parts, and they are

[5] Case 1 is adapted from (Baxter, 1988a, p. 579), and (Baxter, 1988b, p. 200). Case 2 is a direct quote from Baxter (1988b, p. 197).

> distinct from each other, so the whole is a seventh thing. He will still own the seventh piece of land even after selling the six parts. The Bradley brothers learn of Lenman's intentions and each buys a different piece. Then they take Lenman to court arguing that he no longer owns the whole. Rather, they say, they jointly own the whole. For the whole is all its parts taken together (Baxter, 1988b, p. 197.)

Should the Bradley brothers win the court case? Clearly, they should. But why? The advocate of composition as identity takes it to be that the Bradley brothers, by buying all of the pieces, in fact bought the whole.

Of course, none of these motivations is enough to suggest that composition as identity is true. There are other ways to account for each of these intuitions. The point, however, is that there is a *prima facie* case for composition as identity, and there may be much that can be learned by investigating it.

Composition as Identity: A Package View

Composition as identity is best understood as part of a package of views about persistence, modality, and counting and ontology. In fact, composition as identity is incompatible with a number of common views on these topics. This is both a strength and a weakness. It is a strength because it makes composition as identity a very powerful theory. A scientific theory that makes many predictions is a better theory than one which makes fewer predictions in that it is potentially more productive. It is also a worse theory in that it is riskier and easier to refute. The same seems true of philosophical theories like composition as identity and its rivals.

In the case of composition as identity it seems to me that this predictive power is a great strength. If we can find good reasons to accept composition as identity, then we will also have a way to make progress with respect to a number

of seemingly intractable debates. (Notice that the same cannot be said for most scientific theories.)

What then is the package that composition as identity is a part of? The first part of the package is a theory of persistence; the second is a theory of modal predication; and the third is a theory of counting and ontology.

I. PERSISTENCE

Recall our definition of composition as identity:

Composition as Identity For any Xs and any y, if the Xs compose y then y is identical to the Xs (collectively).

This statement of the thesis of composition as identity is naturally read in the present tense: "if the Xs compose y *now* then the Xs are identical to y *now*." But we need an account of composition which can accommodate the fact that composite objects come into and out of existence,[6] as well as change their proper parts over time. That is, we need an account of *persistence* that is compatible with composition as identity. There are three major accounts of persistence: *endurantism*, *perdurantism*, and *stage theory*. Composition as identity is compatible with perdurantism and stage theory but not endurantism (at least given some extremely plausible assumptions).

Endurantism and perdurantism/stage theory can be understood as different solutions to a puzzle about change known as the *problem of temporary intrinsics* (Lewis, 1986, pp. 202–205). We have already come across this problem in Chapter 2. An object which changes seems to have incompatible properties: for example, it might be red at one time and then blue at another. The problem is

[6]Note that even universalists, who think that composition always occurs, think that composite objects come into and out of existence. Take the atoms that compose a particular chair. The atoms may always compose something, but what they compose is not always a chair.

this. If the red object is identical to the blue object then (by the indiscernibility of identicals) they have the same properties. Thus the red object is also blue. But if the red object is also blue then it is red and it is not red—a contradiction. How can this be?

Lewis' (1986) solution is to say that the object which is red and the object which is blue are not identical to one another. Rather, he claims, they are both *temporal parts* of the same four-dimensional object. Thus, Lewis suggests that persisting objects "perdure": they are four-dimensional objects which have a three-dimensional (proper) temporal part at each time at which they exist. For an object to change its properties, on this view, is just for the object to have temporal parts with different properties. This view is known as *perdurantism* or *temporal parts theory* and has proven to be very popular among philosophers. Indeed, it is often taken to be the view which best fits with contemporary physics. Prominent supporters of the view include Quine (1960), Noonan (1980), Robinson (1982), Lewis (1986), Heller (1990) and Hudson (2000).

Stage theorists also takes the red object and blue object to be distinct. The essential difference between stage theory and temporal parts theory is semantic. Suppose the object which changes from red to blue is a rubber ball called "Ball". According to the perdurantist Ball is a four-dimensional object with a red temporal part, R, and a blue temporal part, B. According to the stage theorist "Ball", spoken at one time, refers to the object R and, spoken at the other, refers to the object B. Thus, Ball is a three-dimensional object under stage theory and a four-dimensional object under perdurantism. (More on this difference later.) Defenders of stage theory include Sider (1996) and Hawley (2001).

In stark opposition to perdurantism is *endurantism*. The endurantist claims that the red object, R, and the blue object, B, are numerically identical and that objects persist through time by "enduring". An enduring object is sometimes said

to be an object which is "wholly present" at each time at which it exists, though this is not without its problems (see e.g., Sider, 2001). The problem facing the endurantist is then to explain how one and the same object can be both blue and red. We came across this problem and the various responses to it in the previous chapter when we talked about heterogeneous properties. The only difference here is that the properties in question vary across *time* rather than space.

As before, common responses include saying that properties are relations to times and saying that properties are instantiated in different ways at different times. On the first view the object stands in the *red-at* relation to a time *t* and the *blue-at* relation to a time *t** , and thus does not have incompatible properties. On the second view, the object is red and blue, but it instantiates red and blue in different ways (e.g., "*t*-ly" and "*t**-ly".) There is a lively debate about the viability of these responses (e.g., Lewis, 1986; Haslanger, 1989; Johnston, 1987; Wasserman, 2003). Lewis was well aware of these possibilities. His response was to say that the endurantist must then deny that colours, and other intuitively intrinsic properties, are in fact intrinsic (because they are relations to times), or endorse an implausible pluralism about the property instantiation relation. (We came across much the same objections in Chapter 2 when we discussed the possibility of applying these strategies to heterogeneous properties.)

Another option for the endurantist, also rejected by Lewis, is to deny that there is anything in our case which is both red and blue. She can do so by endorsing *presentism*, the view that only present objects (or times) exist. If presentism is true then Ball is either red or blue, but not both. Presentism, however, faces its own problems, which may be greater than those faced by endurantism alone (see e.g., Sider, 2001, chapter 2, and Caplan and Sanson, 2011).

Why is endurantism incompatible with composition as identity? If an object, O, goes from having the Xs as proper parts to having some wholly distinct objects,

the Ys, as proper parts, and O is identical to the Xs and identical to the Ys, then according to endurantism the Xs are identical to the Ys. For the object which has the Xs as proper parts is identical to the object which has the Ys as proper parts if endurantism is true. Yet the Xs and the Ys were supposed to be wholly distinct. The two views therefore lead to contradiction; unless perhaps presentism is true. If presentism is true then these problems (including the problem of temporary intrinsics) don't seem to arise. However, it still seems problematic for the presentist who accepts composition as identity that on their view the Xs are identified with the Ys. If we reject endurantism, on the other hand, there is no need to say that the Xs and the Ys are *identical* if composition as identity is true.

Another way to see why the two views are incompatible is by looking at how endurantism works under the orthodox view. Take the following principle, accepted by everyone involved in the debate about composition:

Fusion For any Xs and any y, if the Xs compose y then y is identical to a fusion of the Xs.[7]

"A fusion of the Xs" simply means "an object composed of the Xs" so *Fusion* is true by definition. Both defenders and opponents of composition as identity accept it. We can see immediately, for two reasons, that it is intended to be read in the present tense. First, the Xs may compose y at one time but not at another. Second, "the fusion of the Xs" may refer to different objects at different times. The same atoms, for instance, could compose a person at one time, and a rock at another. Thus, to be explicit it would be best to formulate *Fusion* as:

[7] I say "*a* fusion of the Xs" because some philosophers believe that the same objects can compose more than one thing at the same time. On such a view there may not be a unique fusion of the Xs.

Fusion (temp) If the Xs compose y at time *t* then y is identical to a fusion of the Xs at time *t*.[8]

This, however, is not entirely free of ambiguity either. There are at least two readings of both the antecedent and the consequent. Focusing on the consequent we get the following two readings:

(1) y and a fusion of the Xs are identical at *t*.

(2) y and a fusion of the Xs at *t* are identical.

The first reading makes identity relative to times. That identity can be had relative to times is highly controversial and not a popular view. An object is identical to itself at all times. What sense is there then in saying that a thing is only identical to itself at a particular time? We will want to stay clear of such a view if possible (though see Gallois, 1998, for an ingenious defence of just this view). This leaves the second reading, which relativises the fusion (of the Xs) to times. This seems largely unproblematic. The object which is a fusion of the Xs at *t* may be different to the object which is a fusion of the Xs at another time. Thus "fusion of the Xs" plausibly refers to different objects at different times and there is no problem in y being identical to the fusion of the Xs at one time and not another. This is true for all of endurantism, perdurantism, and stage theory.

But now consider a temporally relativised version of our statement of composition as identity:

Composition as Identity (temp) If the Xs compose y at time *t* then the Xs are (collectively) identical to y at time *t*.

As before, the consequent can be disambiguated in two ways:

[8] Quantifiers have been removed for the sake of brevity.

(1*) y and the Xs are identical at *t*.

(2*) y and the Xs at *t* are identical.

(Alternatively we could derive these from (1) and (2) together with the fact that under composition as identity the fusion of the Xs just is the Xs.)

Again, we will want to rule out the first of these on the grounds that a thing is always identical to itself. The problem now is that if endurantism is true "the Xs", unlike "fusion of the Xs", seems like it must refer to the same objects at all times. But if "the Xs" refers to the same objects at all times—that is, if it is *temporally rigid*—then it is impossible for y to be identical to the Xs at one time and not at another. If y is identical to some objects A, B, and C, then y is always identical to those objects (providing that "y" and the other names are temporally rigid).

Put another way: The standard endurantist solution to the problem of temporary intrinsics is to relativise properties to times. But this strategy will not work if composition as identity is true because the only property that could be relative is identity, and identity is not plausibly had relative to times.

If we go with perdurantism or stage theory, however, the problem disappears; for the strategy in this case is to relativise *objects* to times (so to speak). On these views "the Xs at *t*" and "the Xs at *t**" pick out different pluralities of objects. Thus, there is no problem in saying that y is identical to the Xs at *t* and not identical to the Xs at *t**.

Thus, composition as identity is compatible with perdurantism and stage theory but not endurantism. Given that these views are major contenders in the persistence debate we are on firm footing. Neither view is without its problems, of course, but the same is true of endurantism. My preferred view is stage theory. Perdurantism is a very successful theory which arguably solves all of the problems relating to persistence. However, it has the unintuitive consequence that names

like "Peter van Inwagen" refer to four-dimensional objects. This means that on this view it false in general that we see entire objects when we look around us.[9] Stage theory does away with this problem. According to stage theory names refer to three-dimensional objects which exist at the time of utterance.

One might wonder at this point what makes it true that Peter van Inwagen wrote *Material Beings* if "Peter van Inwagen" refers to a three-dimensional object, O, which exists only at the present moment. The answer, according to stage theorists, is that that object has temporal properties by virtue of the properties of objects existing in the past and future: objects to which it bears certain relations (Sider, 1996). These objects, which are similar to O in various ways, are known as *temporal counterparts* of O. In this case, they are all and only objects which bear the *Peter van Inwagen counterpart relation* to Peter van Inwagen. What exactly that relation is is a difficult question tied to issues of personal identity. At a bare minimum one might think that objects which bear this relation to O must be causally connected to O and be continuous with respect to certain key properties. (Perhaps the objects in between a temporal counterpart and O must form a chain of psychologically continuous stages, for instance.) The basic point is that O has temporal properties such as *wrote Material Beings* in virtue of having a temporal counterpart (or counterparts) in the past who wrote *Material Beings*.

This brings us to one of the most common objections to stage theory. It is worth responding to it. The objection is that if stage theory is true then you and I did not really exist yesterday. After all, there is nothing identical to the present stages of you or me at any other time. (See Sider (1996) for detailed discussion.)

[9]Well, technically we don't see entire objects because we don't see all sides at once. All we see is parts of those objects. (Thanks to Nikk Effingham for raising this point.) The point stands, however. Whether I can see the whole object or not, the whole object is there—or so, at least, it seems. (I can also *hold* a whole object at a single time, and presumably I could also see a whole object given clever use of mirrors.)

The objection, however, is not particularly compelling. While it is true that you and I are not identical to any object that existed yesterday, according to stage theory we did exist then—and we *really* did. Because each of us has a temporal counterpart existing yesterday it follows that each of us has the property *existed yesterday*. One might insist that this gets the truth conditions for claims about the past wrong; however the stage theorist will simply disagree. To deny that stage theory gets the truth conditions of claims about the past and future right, without argument, is not a good objection to the view. It is simply question-begging. And, given the other merits of stage theory and the problems facing endurantism, a stage theorist can argue that we have good grounds for thinking that the truth conditions given by stage theory *are* correct.

There are at least two other things that might worry us about stage theory. Discussing the first will lead us to the second. The first of the two worries is that accepting stage theory commits us to four-dimensional objects, and that there are no such things. Certainly, Sider (2001, chapter 5) seems to think that stage theorists are committed to four-dimensional objects. Sider appears to hold this view because he thinks that a variant of stage theory which includes only three-dimensional objects is inadequate.[10] He gives two arguments for this.

First, Sider takes the closest plausible three-dimensional alternative—a mereological essentialist view—and argues that it is seriously flawed. *Mereological essentialism* is the view that an object cannot survive even the smallest change of its parts. Strictly speaking, then, the only objects that persist through time are those that do not undergo intrinsic change. Suppose a statue and a lump exist on Monday, and only a lump exists on Tuesday. The mereological essentialist can say that the statue and the lump on Monday are identical without problem because the lump that exists on Tuesday is not identical to the lump that exists on

[10]Of course, he also thinks that stage theorists should be committed to four-dimensional objects on the basis of the arguments he gives in his book (Sider, 2001).

Monday (assuming that these lumps have different parts).[11]

This view seems severely at odds with common sense. It entails that you and I cannot survive even the loss of a single atom. Defenders of the view such as Roderick Chisholm (1973), however, respond that although the lump on Monday and the lump on Tuesday are not identical, they are nevertheless the "same" object. Note that this response mirrors what the stage theorist (including Sider) says. According to the stage theorist the two lumps are not identical either, but are temporal counterparts of one another. To the extent that the stage theorist's response is successful, then, so too is Chisholm's.

For this reason Sider (2001, p. 207) suggests that Chisholm's view is basically the three-dimensionalist[12] equivalent of his own view. (To be the "same" object on Chisholm's view is just like being a temporal counterpart on Sider's.) However, he argues that on Chisholm's view it cannot be said that ordinary objects *really* persist (Sider, 2001, p. 183). Sider gives the example of the term "contact". Despite the discovery that (contrary to appearances) objects are always separated by space we can rightly continue to talk of objects "being in contact" because there is not better deserver of the term. If there *were* objects that weren't separated by space, "contact" would refer to the relation between them, on Sider's view. The term "persistence", however, is not like the term "contact" in having no better deserver if Chisholm's view is correct. For on Chisholm's view objects that do not undergo changes in their parts may be identical over time. So long as

[11] Alternatively, the mereological essentialist might argue that the same lump exists on both Monday and Tuesday (because both lumps have the same parts), and that this means that the statue also exists on Monday and Tuesday, contrary to appearances (see e.g. Wasserman, 2012).

[12] I use "three-dimensionalism" here to refer to the view that material objects are three-dimensional. Sider's view is not three-dimensionalist in this sense, because he believes that there are four-dimensional objects. (Note that "three-dimensionalism" is often taken to be synonymous with "endurantism". Given the way I am using the term, this is not correct. As I will argue, there is at least one view on which objects persist without being four-dimensional *or* being wholly present at more than one time in the way that endurantists think. This view is three-dimensionalist in the sense specified above, without being an endurantist view.)

an object remains mereologically constant, it may exist at more than one time. According to Sider the best candidate to be the referent of the term "persistence" is therefore mereological constancy and not "sameness". If this is right, then being the "same" object is not enough for persistence, and we cannot say that most objects genuinely persist on Chisholm's view.

It is not obvious that one needs to accept this picture of reference. It is a plausible view, however, and it would take us too far afield to examine it more closely. So let us grant that Sider is right. The essential difference between Chisholm's view and Sider's, then, is that Chisholm is committed to saying that genuine persistence is mereological constancy. But it seems to me that this feature of the view is dispensable. There is a position in the vicinity which says exactly what Sider does. On this view—which seems to me to be just a version of stage theory—mereological constancy is not different in type from ordinary "persistence" (the former being true persistence). Rather, mereological constancy is simply a limit case of persistence. Whereas the lump on Tuesday is only the same as the lump on Monday to some degree, one of the atoms that compose the lump on Monday is *exactly* the same as one of the atoms that compose the lump on Tuesday. My point is that we need not say that an object that does not change its parts over time is *identical* across those times. We need only say that it is the "same" thing across those times. On this view we *can* say that the lump really persists—at least we can if we can say this on Sider's view.

So it looks like a three-dimensionalist theory more similar to Sider's than mereological essentialism exists. And this view seems to allow for genuine persistence. But Sider has another reason to believe in four-dimensional objects. The reason is that they allow him to avoid a serious problem with the stage view (the second objection mentioned earlier). The problem is that under stage theory atemporal counting goes awry. Suppose you were alone in a room between 1 pm

and 2 pm yesterday. How many people were in the room between 1 and 2 pm? One obviously. But the stage theorist, it seems, must say that there were many, many people in the room between those times (Sider, 1996, p. 20). Infinitely many if time is continuous. Sider solves the problem by saying that in such cases, where we count objects *across* time, we refer to four-dimensional objects and not stages. That is, he thinks that although we normally refer to stages when we talk about persons, trees, statues, and so on, in special cases we refer to four-dimensional objects.

Obviously, the three-dimensionalist stage theorist cannot mimic this reply; so we have found a relevant difference between the three- and four-dimensionalist versions of the stage theory. I am not convinced, however, that this problem is as bad as Sider thinks. After all, if two three-dimensional objects qualify as the same object on our account of persistence why should we count them as different objects? To be sure, they are not *identical*; but it is plausible to think that no two three-dimensional objects existing at different times will be. (Such objects bear different relations to times at very least.)

Sider thinks that the question, "How many people are there?" clearly means, "How many numerically distinct people are there?", but does it? Certainly this seems true when we count people *at a time*, but what about when we count people across time? Couldn't it be that, "How many people are there?" means merely, "How many different people are there?", where "different people" are stages which are not person-counterparts of one another. That is, when counting objects across time, couldn't it be that we count according to "sameness" rather than identity? In fact, this seems like the natural response given the way that stage theory characterises "identity" over time. If what matters for persistence is sameness and not identity, then it is natural to think that sameness and not identity should be what matters when it comes to counting how many things exist across

time. And even if it is not, saying so appears to solve the problem.

I think, therefore, that we needn't worry about either of these objections to stage theory. A stage theorist need not believe in four-dimensional objects—though of course she can—and counting objects across time poses no serious problem either. Thus, it is not clear that stage theory faces *any* particularly serious problems. And, not only is it well off in this respect, but it does better than both of its main rivals when it comes to solving the problem of temporary intrinsics.

Recall that the problem of temporary intrinsics is the problem of explaining how it is that an object can possess incompatible properties at different times. Endurantists solve the problem either by accepting presentism—which faces serious objections of its own (see e.g., Caplan and Sanson, 2011)—or by endorsing a revisionary view of properties or property instantiation. Lewis' perdurantist solution, on the other hand, is essentially to deny that there is any one object which both has and does not have a property at all. Suppose that Lewis is bent at one time and straight at another. Lewis' solution is essentially to say that *he* is neither bent nor straight. After all, on Lewis' view it is his temporal parts that have the properties *bent* and *straight*, not the four-dimensional object which is he. Arguably this is as much a cost as any of the endurantist solutions, for it seems that Lewis *himself* has these properties. (This is the same problem we came across in Chapter 2, this time applied to four-dimensional composites.) Stage theory can accommodate this intuition. The object called "Lewis" at the one time has the property of being bent, and the object called "Lewis" at the other time has the property of being straight. And these objects each have these properties intrinsically (assuming that shape is intrinsic) and in the same way—i.e., they have them *simpliciter* (Sider, 2000).

Of course, the object called "Lewis" at the second time does not have the property of being bent in the same way that it has the property of being straight:

one it has itself, the other in virtue of having a temporal counterpart which has that property. One might think this is a cost. In fact I think it is a strength. Consider, for example, a rotten apple. The apple has the property of being brown, and it has the property of *having been* red (let us suppose). Do we really want to say that the apple has the properties *being brown* and *being red* in the same way? I think not. The apple has these properties in very different ways. For instance, the property *being brown* is observable in the apple; the property *being red* is not. Stage theory makes good sense of this difference.

Thus, given the difficulties facing the endurantist responses, I think that stage theory provides the best solution to the problem of temporary intrinsics out of all three views. At very least, it would be unfair to consider it a real cost of accepting composition as identity that one has to accept either perdurantism or stage theory.

II. MODALITY

We have seen that composition as identity is part of an appealing package of views that can explain the properties of composite objects at a time, and over time. One might think, however, that it cannot be so nicely combined with a plausible view of modal properties and modal predication.

Certainly, composition as identity faces a *prima facie* problem. Think of a wall composed of some atoms. The wall cannot survive being hit multiple times with a sledge hammer (let us suppose), but the atoms can (though of course they will cease to be arranged wall-wise). Thus, it seems that the wall and the bricks have different modal properties. But objects with different properties are not identical; so it seems that composition as identity is false.

This objection is far from fatal. It merely leads us to a particular view of modal predication. The problem, essentially, is that if composition as identity is

true the following two claims about the wall are true:[13]

(3) The wall cannot survive being hit with a sledge hammer.

(4) The wall can survive being hit with a sledge hammer.

But not only do (3) and (4) seem contradictory, but (4) appears to be false.

We can respond by saying that the phrase "can survive being hit with a sledge hammer" is ambiguous, and that the meanings of modal predicates in general are context sensitive. The most widely known version of such a view is David Lewis' *counterpart theory* (see especially Lewis, 1971, 1986). According to counterpart theory objects have their modal properties in virtue of the properties of their *counterparts*. (We have already seen this idea at work in our discussion of stage theory, though this time the counterparts do not exist at different times, but at different possible worlds.) A counterpart of an object x is an object which exists in a possible world other than the world at which x exists, and which is similar to x in a certain way. Roughly, the idea is that "x is possibly F" is true if and only if x has a counterpart which is F at some possible world .

A key feature of Lewis' view is that a sentence of the form "x is possibly F" is context sensitive. In one context it may be true; in another false. This is because context determines which counterpart relation is evoked (Lewis, 1971). An object may have numerous different kinds of counterpart. For instance, an object may have person-counterparts, animal-counterparts, organism-counterparts, and so on. A person-counterpart of x is an object in a possible world which is similar to x with respect to properties related to personhood. The idea is then that, if the person-counterpart relation is evoked, a sentence like "x can survive becoming brain-dead" will presumably be false, whereas the same sentence will presumably be true if the organism-counterpart relation is evoked. This is because x's person

[13]The problem could also be put in terms of properties of the bricks.

counterparts are all and only persons (which presumably have fully functional brains), whereas x's organism counterparts are all and only organisms (some of which presumably will be brain-dead). Thus, on this view sentences like, "x can survive becoming brain-dead," vary in meaning depending on context. The one sentence may mean "x has a person-counterpart which is brain-dead," or it may mean, "x has an organism-counterpart which is brain-dead," or it may mean something else entirely. Some of these sentences may be true, and some false. Lewis calls this feature of modal claims the *inconstancy of representation de re* (Lewis, 1986, p. 254).

If we adopt a version of counterpart theory which incorporates inconstancy in this way we can make good sense of composition as identity. For instance, we can say that (3) and (4) are both true, and can be analysed as:

(3*) The wall does not have a wall-counterpart which survives being hit by a sledge hammer.

(4*) The wall has brick-counterparts which (collectively) survive being hit by a sledge hammer.

(One might think that we are deviating from Lewis' account here because we have to say that objects, plural, have counterparts, plural. Even if it is a deviation, however, this does not seem objectionable. If each brick has a counterpart then we can surely say that the bricks have counterpart*s*.)

We can then say that (3) and (4) are better expressed as:

(3′) The wall cannot survive being hit by a sledge hammer *qua* wall.

(4′) The wall can survive being hit by a sledge hammer *qua* bricks.

This way it is clear that two different notions of survival are being evoked in (3) and (4). On this view, what it means to survive is different for a wall, a person,

a house, or a sheep. To be able to survive *qua* wall is to have a different modal property than to be able to survive *qua* bricks.

It should be clear that what the counterpart theorist says about modal properties is analogous to what the stage theorist says about temporal properties. There is also a modal analogue of the temporal parts account. For instance, Wallace (2009, 2011a) argues that the defender of composition as identity may appeal to the notion of *modal parts* in much the same way that she may appeal to the notion of temporal parts in the temporal case. The resulting view is known as *five-dimensionalism* or *lump theory*.[14]

Here, what we have been taking to be the bricks/wall are taken to be parts of numerous five-dimensional objects. The identity theorist can then say that the term "the bricks" refers to one five-dimensional object, and the term "the wall" refers to another. Both five-dimensional objects, however, have what we took to be the bricks/wall (i.e., the three- or four-dimensional object/objects in the actual world) as a modal part. The response is then exactly as it was with the temporal parts theorist. The bricks and the wall are not identical, but they share a common part located at the present moment in the actual world. It is the actual, present part of the bricks and the actual, present part of the wall which the five-dimensionalist advocate of composition as identity claims are identical, not the five-dimensional objects themselves. Importantly, on this view modal predicates have a fixed meaning. It is the properties of the five-dimensional objects which differ. Because the wall and the bricks are different five-dimensional objects, there is no problem in allowing that they have different properties, modal or otherwise.

Thus, we have two options. One is to say that the modal predicates in (3) and (4) are ambiguous; the other is to grant the critic the point that the wall and the bricks are distinct, but deny that "the wall" and "the bricks" refer to three- or

[14]See Weatherson (ms) and Wallace (2009) for discussion.

even four-dimensional objects.

I do not believe in five-dimensional objects, let alone four-dimensional ones, and, even if there are such things, I don't think ordinary proper names and definite descriptions pick them out. Therefore, I prefer the inconstancy response, and will focus on it in what follows. Still, I doubt there is anything seriously wrong with the alternative, at least theoretically, and it is a viable alternative for anyone sympathetic to composition as identity.

Before discussing the merits of the inconstancy approach, however, we need to say something about how context determines which counterpart relation is evoked. The most straightforward way in which this may occur is when a definite description is used. (3) above is true arguably because the description "the wall" generates a context in which we evaluate the object mentioned *as a wall*. (4) on the other hand seems false; but if we change "the wall" to "the bricks" it appears to be true. We can explain this by saying that "the bricks" creates a different context, which thereby affects the meaning of the predicate "can survive being hit by a sledge hammer." The next step is to argue that proper names affect the meaning of modal predicates in the same way (e.g., Gibbard, 1975). This in fact seems plausible enough. Take the much discussed case of the statue and the lump. In setting up the scenario philosophers often name the statue and the lump by saying something like, "call the statue 'Goliath' and the lump "Lump1"' (*cf.* Gibbard, 1975, p. 191). If the term "the statue" affects the meaning of the modal predicates which are attached to it then it seems reasonable that any proper name associated with that description will also affect the meaning of modal predicates, and in the same way. That then is the claim I wish to make.

The resulting view is certainly not implausible. That there could be predicates whose meaning is affected by the subject term to which they are attached may seem strange, but there certainly are such predicates. Harold Noonan (1993)

calls them *Abelardian predicates* and offers Quine's (1953) famous example as a paradigm case:

(5) Giorgione was so-called because of his size.

(6) Barbarelli was so-called because of his size.

Here "Giorgione" and "Barbarelli" are names of the same person, yet (5) is true and (6) is false.[15] Noonan argues that this is because the predicate "is so-called because of his size" is Abelardian: its meaning changes depending on the subject term to which it is attached. Specifically, (5) and (6) mean:

(5*) Giorgione was called "Giorgione" because of his size.

(6*) Barbarelli was called "Barbarelli" because of his size.

(5*) is true and (6*) false, for obvious reasons, and we can happily maintain that Giorgione and Barbarelli are identical.

This analysis is, I think, very plausible. It is easy to see that (5) and (6) attribute a different property to the man in question, even though the predicate appearing in each sentence is the same. It also bears a striking resemblance to our case.

An immediate objection to the application of such an approach to modal predicates is that modal predicates seem to retain their meaning in some cases even when attached to different subject terms. Suppose, for instance, that I say, "the kitten over there could still be alive in five years' time." On our account this would seem to be equivalent to saying, "the kitten over there can survive for five years *qua* kitten." But this seems false; in five year's time the kitten won't be a kitten any more.

[15] "Giorgione" means "big George" in Italian.

Or I could have said "the black thing over there could have been brown." This too seems false on our account; for, *qua* black thing, the kitten could not have been brown. There is no brown black-thing counterpart in any possible world.

The problem, then, is that the predicates "could still be alive in five years' time" and "could have been brown" seem to have the same meaning regardless of whether they are attached to the subject term "the cat", "the kitten", or "the black thing". Both

(7) The kitten could still be alive in five years' time

and

(8) The cat could still be alive in five years' time

seem to evoke the same counterpart relation, if they evoke one at all. If this is right then we face a difficulty. At best modal predicates seem to be Aberlardian only some of the time. How can we account for the other cases?

One thing we can say, before giving a more detailed account of the meaning of modal predicates, is that there *does* seem to be a reading of (7) on which it comes out false. We do say things like, "the boy I knew is gone," where the implication is not that the person in question is dead, but rather that they are no longer a boy. Of course, we still need to account for the deviant reading of (7). I think that what we should say is that some kinds are more salient than others and so trump whatever description is used to pick out an object. We tend to think there are naturally such things as cats but not such kinds as *black things*. Although we can classify things according to colour, this does not seem to be a natural classification. Thus, when someone says, "the black thing over there," it is natural to take their intention to be to pick out something of a more natural kind by its accidental property of *being black*.

It is clear that objects meet many different descriptions. And it is quite plausible that some of these are canonical. Even those who deny that modal predicates are inconstant in the way I have been suggesting should think this. The cat, after all, is also a kitten and a black thing. This means that we can refer to the cat by using the descriptions "the kitten" or "the black thing". Thus, even those who deny the inconstancy of modal predication need to have some story about how context determines which object we are referring to. Take, for example the case of the statue and the lump. The statue and the lump that constitutes it have the same shape. Hence, the description "the statue-shaped thing" is ambiguous whenever both exist. If it refers to the statue, then the sentence, "The statue-shaped thing can survive being flattened," is false. If it refers to the lump, then the same sentence is true.

On either view, then, we will need to appeal to salience or something else to account for the meaning of sentences which contain modal predicates. On the view I am defending the account will be an account of the meaning of modal predicates. On the rival view, it will be an account of the reference of the subject terms involved. The view I am defending, therefore, faces no special difficulty in this regard.

This same point applies to a second objection to the view that modal predication is inconstant. The objection is that modal predicates seem to have a determinate meaning even when *no* proper name or counterpart-evoking description is used. For instance, it is possible to point to an object and say, "that thing can't survive being flattened," without causing confusion. This would pose a serious problem for an account under which it was claimed that "can't survive being flattened" has no determinate meaning unless it is attached to a subject term which explicitly or implicitly identifies a sortal such as *statue* or *cat*. However, we need not make such a strong claim. We can allow that contextual factors besides

choice of proper name or sortal term play a role in determining meaning. These may include conversational context (e.g., what the speakers have been talking about) and psychological factors relating to the way that people view and think about the world. If I point towards a statue and say "that thing" you will likely take me to have in mind the statue and not the lump of clay. This is true regardless of whether modal predication is constant or inconstant (and even applies to the five-dimensionalist who accepts composition as identity).

There is a final objection which we need to discuss. The objection is quite simple: objects seem to have modal properties, and they seem to have them independently of how we describe them. Thus, we have reason to think that modal predication is not inconstant. This objection is similar to the previous one, but subtly different. Here the objection is not that a counterpart evoking name or description is not needed to make sense of modal claims, but that no counterpart relation needs to be evoked at all (in any way) for modal claims to make sense.

Lynne Rudder Baker (1997, p. 608) puts the objection in the form of an argument: Any object which is not eternal[16] can cease to exist (and not just cease to fall under a particular kind). Therefore, objects have modal properties independently of how they are described. (The argument is somewhat more detailed that this, but this is the basic idea.)

I suspect that this kind of reasoning underlies most people's resistance to accounts like the one I have been defending. I do not find it convincing. For one thing, we might say that in this case a very general counterpart relation is evoked: an object can cease to exist *qua* non-eternal object. This suggests that Baker's conclusion is too strong. At best it shows that *some* modal properties do not depend on how an object is described. These properties, on our account, are those which all of an object's counterparts have (e.g., its statue-counterparts,

[16]Presumably she means *essentially* eternal. (Thanks to Nikk Effingham for pointing this out.)

lump-counterparts, black-thing-counterparts, and so on). Demonstrating that all of an object's counterparts share something in common is not the same as demonstrating that the object does not have modal properties relative to different types of counterpart.

Baker also claims that the fact that objects can cease to exist (and not just cease to exist as an F) means that objects *per se* have persistence conditions. This seems correct; however she also claims that it is inconsistent with the statue and the lump having different persistence conditions (Baker, 1997, p. 609). She argues that the fact that the statue *per se* has persistence conditions, together with the claim that the statue and the lump are identical, entails that the statue/the lump "cannot have more than one set of persistence conditions" (Baker, 1997, p. 609). More specifically, it entails that the following claim is false:

(9) There are persistence conditions C and C' such that [the statue/the lump] (qua statue) has C and [the statue/the lump] (qua bronze piece) has C', and $C \neq C'$ (Baker, 1997, p. 609).[17]

She explains (in parentheses):

> Otherwise, there would be a circumstance in which, on one of the persistence conditions, x would survive, and on the other of the persistence conditions, x would not survive. But it is impossible for there to be a circumstance in which both x would survive and x would not survive (Baker, 1997, p. 609).

This, of course, is true if we consider only persistence conditions which the statue *per se* has. But just because the statue has *some* persistence conditions *per se*, does not mean that *all* of its persistence conditions are like this. For instance,

[17] My numbering. This is Baker's (16).

both the statue and the lump can cease to exist *simpliciter*—i.e., not just as a statue or a lump—but it does not follow that the statue cannot cease to exist *qua* statue while continuing to exist *qua* lump.

Even if objects *per se* do have persistence conditions, it does not follow that all persistence conditions are had by objects *per se*. Thus, Baker's argument does not show that modal predication is not inconstant. One cannot conclude from the fact that objects *per se* have persistence conditions that all of an object's persistent conditions are had by the object independently of how it is described. It does not follow from the fact that the statue *per se* can cease to exist, for example, that the statue does not have other modal properties *qua* statue and *qua* lump. Thus, it does not follow that the statue and the lump must be distinct. Nor does it follow that an object and its proper parts must be distinct because they have different modal properties (under different descriptions).

It seems, then, that the inconstancy account holds up quite well to scrutiny. This is perhaps no surprise given the success of counterpart theory. The view is also very flexible. Although the counterpart theorist accepts that objects have modal properties (which are had relative to counterparts), it is consistent with our response to deny the existence of *de re* modal properties altogether (as in e.g., Gibbard, 1975).[18] I am sympathetic to this view as it allows us to easily explain what makes modal claims true or false, and how we come to know this. Take for instance, the sentence:

(10) The statue-shaped thing is statue-shaped.

We do not need to know anything about abstract objects, or concrete possible worlds to know that (10) is true, and necessarily so. Similarly, if it is part of the definition of "statue" that a statue is statue-shaped, it follows that,

[18]That is to say, to deny that objects themselves have modal properties. One will of course want to maintain that *propositions* have modal properties (such as necessary and contingent truth).

(11) The statue is statue-shaped

is necessarily true, and for the same reason. If that is right then we don't need to appeal to modal properties of the statue at all to explain the necessary truth of (11). Plausibly, the same goes for all apparent *de re* modal predications.

Of course, I cannot even hope to defend such a view here. My intention is merely to point out that counterpart theory and five-dimensionalism are not the only options available to the defender of composition as identity.

I also wish to point out that the alternative view—on which modal predicates have a fixed meaning—suffers from its own problems. I argued earlier that our ascriptions of kind membership must track certain properties, if only roughly. Our statue talk, for instance, must correspond to some difference in properties between statues and chairs (say). And that difference must, insofar as we make different ascriptions, be an observable difference. An object, then, is a statue (and not a chair) whenever it has certain (non-modal) "statue properties", whatever these are exactly.

Such a simple account of statuehood, however, is inconsistent with the view that statues have these properties essentially. To see this consider the lump. Whenever the statue exists, the lump that constitutes it also has statue properties. The claim, according to proponents of this view, is that the lump has these properties *accidentally*, whereas the statue has them *essentially*. Or they might say the statue has different properties altogether, like *being essentially statue-shaped*. But this means that our opponents cannot give an analysis like:

Statuehood Necessarily, for all x, x is a statue if and only if x has statue properties.

If they did, they would have to say that the lump is a statue.[19] Instead, they must say one of the following:

Statuehood (2) Necessarily, for all x, x is a statue if and only if x has statue properties essentially.

Statuehood (3) Necessarily, for all x, x is a statue if and only if x has the property of being essentially statue-shaped etc.

These, however, are no help to us if we want to identify statues in the world. We can see quite easily when an object has statue properties—assuming these include having a certain shape, being made out of certain materials, and having a certain causal origin—but we cannot see when an object has these properties *essentially*, or when an object has the property *being essentially statue-shaped*. I, at least, do not know what it looks like for something to have properties essentially; nor can I see a difference between the shape of a statue and the shape of the lump that constitutes it.

In fact, I believe that analyses (2) and (3) push us towards a form of nihilism. For how could we tell whether an object with statue properties has them essentially? What is the observable difference (if any) between a property which is had essentially and one which is not had essentially? Or what is the observable difference (if any) between having the property *being statue-shaped* and having the property *being essentially statue-shaped*? If analysis (2), or (3), is correct there would be no way to know whether the statue-shaped object in front of you is a statue or something else (like a lump, for instance). And if there is no way to

[19] One might argue that a lump is a statue, just not essentially so. If this is right then we need an account of what it is to be *essentially* a statue. The result is the same.

know whether statue-shaped things are statues then we should not believe they *are* statues. We should not go beyond the evidence that we have.[20]

III. Counting

We have seen that composition as identity entails certain views about persistence and modality. The final part of the package is a theory about counting and ontology. According to composition as identity, a composite object is identical to its proper parts collectively. On the face of it this seems to entail that a single thing can be identical to many things. But how is that possible?

Megan Wallace (2011b) suggests two responses. The first is essentially to deny that it makes any sense to say that one thing is identical to many. Rather, we can only say that one F is identical to many Gs (where F and G are kinds). This seems to have been Frege's view. For instance, he writes:

> If it were correct to take "one man" in the same way as "wise man", we should expect to be able to use "one" also as a grammatical predicate, and be able to say "Solon was one" just as much as "Solon was wise". It is true that "Solon was one" can actually occur, but not in a way to make it intelligible on its own in isolation. It may, for example, mean "Solon was a wise man", if "wise man" can be supplied from the context. In isolation, however, it seems that "one" cannot be a predicate (Frege, 1884, p. 40).

Frege's claim, then, is that "is one" is not a predicate. On such a view it makes no sense to say that an object is one and many at the same time. He admits that

[20]Note that this argument applies to all accounts on which modal predication is constant, including five-dimensionalism. The five-dimensionalist claims that a statue-shaped object is a modal part of both a five-dimensional object which is a statue and five-dimensional object which is a lump. Yet, at best, we have access to the four-dimensional object in our world only. On what grounds can we claim to know that that four-dimensional object is part of a statue?

there are cases which seem to contradict this but claims that they can either be explained along the lines of his "Solon was one" example, or else they are cases in which "'one' is not being used as a counting word—that what it is intended to assert is the character (not of being unique, but) of being unitary" (Frege, 1884, p. 40). (I am not sure why Frege thinks that "asserting the character of being unitary" is not to use "one" as a counting word.)

Frege's own view is that, while we cannot say that something is one, we can say that something is one F, where "F" is a sortal term. He writes:

> While looking at one and the same external phenomenon, I can say with equal truth both "It is a copse" and "It is five trees", or both "Here are four companies" and "Here are 500 men". Now what changes here from one judgement to another is neither any individual object, nor the whole, the agglomeration of them, but rather my terminology. But that is itself only a sign that one concept has been substituted for another. This suggests [...] that the content of a statement of number is an assertion about a concept (Frege, 1884, p. 59).

He goes on:

> This is perhaps clearest with the number 0. If I say "Venus has 0 moons", there simply does not exist any moon or agglomeration of moons for anything to be asserted of; but what happens is that a property is assigned to the *concept* "moon of Venus", namely that of including nothing under it. If I say "the King's carriage is drawn by four horses", then I assign the number four to the concept "horse that draws the King's carriage" (Frege, 1884, p. 59).

This, then, is one option for defenders of composition as identity (though see Yi, 2014; Lowe, 2003 for criticism of Frege's arguments). Note also that Frege appears to be endorsing composition as identity. The problem with his position, however, is that, although one might agree that "Solon is one" cannot properly be said, it does seem acceptable to say "Solon is one *thing*" (*cf.* Wallace, 2011b). Furthermore, "It is a copse" seems to entail "It is one thing", and "It is five trees", "It is five things." If this is right then "is one thing" behaves like a grammatical predicate after all.

Frege's view here is reflected in the way that predicate logic (which derives from his ideas) works. For instance,

$$\exists x$$

is not a well-formed formula. Instead one can only assert the existence of something if one ascribes a property to it, as in,

$$\exists x(Fx)$$

But as Van Inwagen (2002) argues, there seems to be little reason to think things *must* be this way. He asks,

> And why can one not say 'There are at least two objects' like this:
>
> $$\exists x \exists y \neg x = y,$$
>
> or say 'There are exactly two objects' like this:
>
> $$\exists x \exists y(\neg x = y \,\&\, \forall z(z = x \vee z = y))?$$
>
> (Van Inwagen, 2002, p. 180).

In fact, he points out (Van Inwagen, 2002, p. 184) that we can seemingly get around the rule entirely by adopting the following strategy:

$$\exists x(x \text{ is a chair} \vee \neg x \text{ is not a chair})$$

If Van Inwagen is right, then it seems that the Fregean view can be of no help to us. For if Van Inwagen is right it *does* make sense to say that the copse is one *thing* and the trees five *things*. And then our original problem returns. If composition as identity is true, then the one thing (the copse) is identical to the five (the trees).[21]

Unfortunately, Van Inwagen may well be right. Luckily, Wallace (2011b) has suggested an alternative which she calls *plural counting*. The idea behind plural counting is to treat the different answers to the question "How many objects are there?" as corresponding to different domains of quantification. There seem to be at least two answers to that question of how many things there are in Frege's example: namely, "one" and "five". Thus, on one way of counting there is one object; on another there are five. The plural counting response is similar in spirit to taking "thing" and "object" to be sortals (like "copse" and "tree") but seems less controversial (Wallace, 2011b). We can say that on one way of counting—or "on one count"—there is one thing, and on another way of counting there are five things. We avoid the contradiction by relativising each answer to a different domain.

There is also a third option which a defender of composition as identity may wish to accept. We saw that one way to get around the counting problem is to deny that composition as identity entails that one *thing* is identical to many

[21] One might think that a copse is not an object at all. In fact, I agree (see section VII, this chapter). A less controversial example is a chair and the atoms that compose it. Frege's strategy only works if we cannot say that a chair is one thing and the atoms many (and instead only that a chair is one *chair* and the atoms many *atoms*.) But we do seem to be able to say that a chair is one thing and the atoms many things. If we admit this we are back where we started: we need to explain how that could be.

things. Another way to deny the same thing is to say that one thing is never identical to many things, but rather to many *partial* things. Think of an object with two halves. It does not seem to be contradictory to say that the object is identical to two half-objects. And in fact this seems quite intuitive: we are all taught in primary school that one-half plus one-half equals one. To make this view work, we will need to be able to quantify over partial objects. We may call this *partial quantification* by way of analogy with plural quantification. With plural quantification we quantify over objects, plural, rather than objects, singular. With partial quantification we quantify over partial objects.

Interestingly, the resulting view allows the defender of composition as identity to say that there is a single right way to count the number of objects in the world. As an example, suppose we have a wall composed of bricks. We can say that the bricks exist without also saying that it is true that there is more than one object in the vicinity. For we can say that each of the bricks is a partial object, and not an object. Of course, we could also say that each brick is a partial object on one count and a whole object on another. Hence, the partial quantification solution is compatible with plural counting.

While it is not clear which, if any, of these accounts is correct, I think it is clear that we can make sense of the claim that a composite is identical to its proper parts. It is important to recognise that the issue of counting—and the question of what numbers are—is an extremely difficult one. It is overly simplistic to suggest that it is obvious that one thing cannot be many things. Before we can say this we would need an account of what it means to count something as one (if it means anything at all). But such an account is not easy to provide. Thus, it does not seem to me that we can say that defenders of composition as identity are much worse off (if at all) than those who think that there is a single right way to count the number of things in the world (and that there are no partial objects). That

there is a single right way to count is simply an assumption made by opponents of composition as identity. It requires defence.

IV. Ontology

The reader may be wondering at this stage what sort of ontological view the accounts of number we have been discussing entail. What is a world in which composition as identity is true like? This question is not easy to answer. It seems to me that the best reason to be sceptical of composition as identity is precisely this. There is something very hard to accept about the claim that there is no single answer to the question "How many objects exist?" What does it *really* mean to say this?

I think that the metaphor of carving reality up in different ways is partly responsible for the confusion. The metaphor suggests that there is something—reality—waiting to be carved up in various ways. This raises the question, "What is the world like independently of how we carve it up?". If the descriptions "There is a chair at R" and "There are atoms arranged chair-wise at R" are both true, what are they descriptions *of*? (*cf*. Hawley, 2013).

It seems to me that we should resist such questions. I have found it helpful to consider matters of ontology under composition as identity in a non-conceptual manner. Think of how you *see* the world. There is a sense in which you see objects and there is a sense in which you do not. Consider the unanalysed image which you are conscious of. If how we see the world is representative of the way the world is then we do not need to commit to there being anything more to the world than what we see. To use an example from Chapter 2, imagine a world like the one shown in Figure 11 below.

I am inclined to say that this world can be correctly described in many different ways (though some of these may be less detailed than others). For example, all of

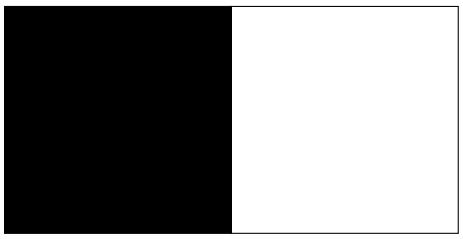


Figure 11: A possible world.

the following sentences seem to be true.

- "There is a black and white rectangle."
- "There is a black square seamlessly attached to a white square."
- "There is some stuff which is black and white and rectangular."
- "There is a rectangular portion of stuff which is black and white."
- "There is a black square portion of stuff seamlessly attached to a white square portion of stuff."

On the orthodox view these sentences can only all be true if structuralism is true. Each sentence is made true by a different fact, by the existence of a different level. Composition as identity says that the *same* fact makes all of the descriptions true. But here is a question: *What* is the fact that makes all of the descriptions true?

Compare a nihilist who says that only the first sentence is true to a nihilist who says that only the second is true. These nihilists disagree about more than just semantics. They think there is a genuine difference between a world with a single rectangle, and a world with two squares, seamlessly attached. Yet the defender of composition as identity thinks that a world with a single rectangle just is a world with two squares. How can we make sense of this?

Here is what I think. Our nihilists agree on many of the facts about the world in Figure 11. For instance, they will likely agree that *black* is instantiated at one region of space, and that *white* is instantiated at another. What they disagree about is the correct explanation of these facts. The first nihilist thinks that the correct explanation of this fact is that a rectangle exists and instantiates certain properties. (Our discussion in Chapter 2 raises issues with this position, but let us set that aside.) The second nihilist, on the other hand, thinks that the correct explanation is that two squares exist and instantiate certain properties. Take another look at Figure 11. In essence, our nihilists believe that there is more to that world than just the empirically observable properties which are instantiated. They believe that there is a *further* fact about which objects instantiate those properties. This fact is "hidden" in the sense that we cannot simply *see* the answer.[22] Although a world containing just a rectangle, and a world containing two squares might look the same to us, and might even have the same properties instantiated in the same locations (or in the same ways), they are very different worlds. The first contains one object; the second contains two.

If we understand the sentences listed above in this way, then it is clear that only one of them can be true unless structuralism is true. That a rectangle exists cannot be the correct explanation of the properties instantiated in the world in Figure 11 if the correct explanation is that two squares exist. These are plainly *competing* explanations.

I think that this may be why some find composition as identity so paradoxical. It makes no sense to explain the pattern of property instantiation in Figure 11 in two different ways.

But that is not the claim; at least not on my view. My view is that "There is a rectangle" and "There are two squares, arranged rectangle-wise" are compatible

[22]The two nihilists will also likely believe that there are hidden facts about temporal and modal properties corresponding to this fact.

descriptions of the world in Figure 11. The claim that a rectangle exists is a *description* of the way the world is, not an explanation of it. On my view, what makes these descriptions true is not some further fact. We can tell just by looking at the figure that the world contains a rectangle. And we can tell just by looking at it that it contains two squares. Thus, on my view, facts about which objects exist are settled by facts about observable properties. On the orthodox view, facts about which objects exist are not settled in this way. In a sense, facts about which objects exist are "deep" under the orthodox view.

We discussed deep nihilism briefly in the Introduction. I suspect that the distinction there is not the same as the one made here. For even the shallow nihilist, who thinks that English quantifiers are not joint-carving, nonetheless thinks that there is a substantive difference between atomism and existence monism. Bearing this in mind, I think we can still make a deep-shallow distinction here. In a way, our nihilists think that in addition to the properties shown in Figure 11 that world also has "joints" in the sense that there are further facts about which objects exist. If two squares exist, then the world has more joints than it would if (only) the rectangle existed. Thus, they seem to take claims about objects to track facts about these joints. (Whether there are then more *natural* joints, and therefore an additional level of "depth", is a further question. On such a view we would have a distinction between shallow, deep, and *super*deep ontological views.) My view, on the other hand, is that claims about objects do not track such facts. And I think this may be the only way to make sense of composition as identity. Facts about which objects exist, on my view, are *shallow*. Facts about which objects exist, on the orthodox view, are *deep*.

I will argue for the shallow view in Chapter 4. Roughly, the argument will be that ordinary speakers don't seek deep facts when deciding whether ontological claims are true or false. Ordinary speakers take the evidence we have to be more

than sufficient to settle what exists.

It is worth pointing out that the defender of composition as identity who accepts this picture need not say anything about whether there *are* such joints. The claim is simply that composition as identity is a thesis in English, and that the quantifiers of English are shallow in the aforementioned way. Thus, the claims "There exists a rectangle" and "There exist two squares" can both be true, and made true by the same facts. It is tempting to ask why the properties shown in Figure 11 are instantiated. What instantiates them? However, I think that perhaps we should not try to ask this. Once we have said that a black square and a white square exist and are located next to one another in such and such a way we have said all there is to say. There is no further fact about what *really* exists.

This may be too anti-metaphysical for many metaphysicians. My only argument for this position is that there seems to be no need for any further explanation. Why should we think that there are further facts about the world beyond those needed to explain what we see, hear, touch, smell, and taste? Perhaps there *are* good reasons; perhaps there are not. We needn't decide here. The important thing is that, if there are, this too is compatible with composition as identity. If composition as identity is true then the same (shallow) facts make each of the English sentences "There exists a rectangle" and "There exist two squares arranged rectangle-wise" true. Whether there are also deep facts is not important. If there are deep facts explaining why the properties which are instantiated are instantiated, then these are not facts about objects or about what exists in the English sense of the terms. That, at least, is my claim.

Of course, if there are deep facts, we can introduce new quantifiers to track them. Let us use bold text to denote these quantifiers. Then it may be that only two squares **exist** in the world in Figure 11. Or it may be that only a rectangle **exists**. But this is compatible with it being true, in English, that a rectangle exists

and is identical to two squares (collectively).

An alternative view on which there are deep facts is what we might call *deep stuff-ism*. On this view, the deep facts are such that only matter or "stuff" **exists**. (Stuff is the more general notion.[23] It need not be concrete or have mass, for instance, whereas arguably matter must.) While there exist (in the English sense) objects, there do not **exist** any objects. On such a view it would seem that there are deep facts, but there are no natural joints. In fact, some philosophers defend views like this (e.g., Sidelle, 2000), and claim that there exist only pseudo-objects. I think we can understand this kind of position as a view about what **exists**. When these philosophers deny that objects *really* exist, perhaps what they mean is that talk of objects is not joint-carving in the aforementioned sense. That is, we may be able to understand this view as the view that claims in English about the existence of objects are *supposed* to get at deeper facts, but fail. The defender of composition as identity would have to adopt a slightly different view. She would have to say that such claims are not supposed to track deep facts, and are therefore true regardless of the fact that there are no **objects**, but only **stuff**.

Although a viable option, the problem with this view is the same as that facing the nihilist views discussed earlier: Why should we think there are any deep facts at all? And even if we had reason to think there are, why should we think the world fundamentally consists of **stuff** rather than **objects**? Isn't it enough to say that there is a rectangle which is identical to two squares? That seems to me to be a perfectly good description of the world in Figure 11. Why think there's more to it?

For these reasons I think we should at least remain agnostic about questions of **existence**. Admittedly, there is much more to be said about the ontology of composition as identity. I must admit that I struggle not to slip from thinking of

[23] See Steen (2012) for discussion.

objects in the way I claim an identity theorist should, and the way that those who endorse the orthodox view do. But this is not reason to think the view is false.

I have not said enough about how we should think about the world if composition as identity is true. There are two reasons for this. First, I do not know the answer. Second, the purpose of this thesis is largely to motivate composition as identity. My goal is to present a number of arguments which I think tell strongly in its favour. If I am right that there are powerful reasons to accept composition as identity, then that gives us reason to explore the view further. If I am wrong, then perhaps we should place our efforts elsewhere. It seems to me somewhat premature to explore the finer details of the view without first finding reason to think it might be true.

There are at least two ways to defend a position. One is by responding to objections against it. The other is by providing arguments for it. Ideally one should do both, but that is not always possible. I will lean towards the latter strategy.

V. What Composition as Identity is Not

Having said a fair bit about what composition as identity is, it will perhaps be useful to say something about what composition as identity is not.[24] One view that is very close to composition as identity in many ways is orthodox nihilism. Some readers may be sceptical as to whether there is an interesting difference between these views. I think that the distinction we made in the previous section between deep and shallow views about objects and quantification helps to show why, and how, composition as identity is different to certain sophisticated versions of nihilism.

[24]Thanks to Kristie Miller for urging me to get clearer on these points. In particular, I owe the distinctions between the different forms of nihilism which I make below to her.

There are two important differences between composition as identity and orthodox nihilism. First, they say different things about *what it takes* for composition to occur. Both views are non-structuralist (i.e.,"flat") views. But, the nihilist thinks that if composition occurs, then structuralism is true. The identity theorist denies this. Second, the nihilist thinks that the English quantifiers track deep facts; the identity theorist does not. Thus, the two views clearly differ, and not necessarily just about semantics. For the nihilist also believes that there *are* deep facts of a certain sort, whereas the identity theorist is free to deny this, or to not take a stand one way or the other. Certainly, the difference between my own view and that of the nihilist is not merely semantic because I deny that nature has joints (at least in the sense the nihilist seems committed to).

But what about more sophisticated versions of nihilism? Suppose that we agree that elementary particles exist. Typically, one would think that there are also chairs and tables if, and only if, composition occurs. If the elementary particles do not compose anything, then there are no chairs and tables. However, it is possible to deny this. For instance, one could claim that chairs and tables exist and are not composed of elementary particles. In fact, a particular kind of sophisticated nihilist could claim that the words, "chair", and, "table", refer to atoms arranged chair-wise, and atoms arranged table-wise, respectively.

Ross Cameron (2011) calls this view "nihilism with some fancy talk" (p. 547). According to the fancy-talking nihilist, chairs and tables exist, but "chair" and "table" are disguised plural referring expressions. Cameron writes:

> It seems to me that what distinguishes [composition as identity] as an interesting ontological thesis from the [fancy-talking] nihilist theory is their additional claim that not only is everything identical to itself and that every collection of things is identical to that collection of things, but that there are collections of things identical to some *one*

> thing (Cameron, 2011, p. 547).

This, I think, is quite right. Composition as identity involves the further claim that if the Xs compose, they compose some *single* thing. Although the view in question is not *technically* nihilism because it says that composition occurs, it distinguishes itself from nihilism only with some "fancy talk".

However, Cameron also seems to think that composition as identity is to be understood as a different ontological view than orthodox nihilism (radical or not). He writes that:

> [the fancy-talking nihilist] might talk the [composition as identity theorist] talk, but it's clear that they have the mereological nihilist's ontology, and that everything else is just a way of talking. But [composition as identity] is not meant to be mereological nihilism with some fancy talk, it's meant to be a radical ontological thesis (Cameron, 2011, p. 547).

I think this is a mistake. Cameron seems to think that composition as identity is the incoherent view outlined in the previous section on which it is both a deep fact that only two squares **exist** *and* that only a rectangle **exists**. The view I am defending is not a radical ontological thesis at all. The only thing which is radical about it is that it denies that English quantifiers track deep facts.

Part of the reason why Cameron seems to think that composition as identity must be a radical ontological thesis is because he thinks that otherwise it would just be nihilism "with some fancy talk". But it should be clear from our earlier discussion that this isn't the case. The fancy-talking nihilist thinks that the truth of "There exist two squares" depends on further facts beyond the distribution of observable properties. She also claims that the truth of "There exists a rectangle" depends on the very same facts. This is very different to the composition as

identity theorist's claim that the truth of those sentences depends on the very same facts. For the identity theorist thinks that the facts on which it depends are not deep facts. The fancy-talking nihilist, on the other hand, disagrees. This is what allows her to say that "rectangle" in "There exists a rectangle" is *really* a disguised plural term. The deep facts are such that there is no single **thing** which is a rectangle.

The defender of composition as identity cannot say such a thing. "There exists a rectangle" and "There exist two squares arrange rectangle-wise" are equally accurate descriptions of the world. Even if she thinks there *are* further deep facts, the identity theorist cannot say that one or the other sentence is strictly untrue. For they are sentences in English, and sentences in English are not made true by deep facts. Of course, one can deny this. One can argue that sentences of English do track deep facts. But then one would no longer be a believer in composition as identity either. After all, it is impossible for there to be mind-independent facts such that it both is and is not the case that nature's joints carve out two rectangles. There is a clear and important difference between fancy-talk nihilism and composition as identity, though it is perhaps not what one might have thought. If you wish to call composition as identity "nihilism", then go ahead. Just keep in mind that it is not the view normally associated with that name.

Before moving on, I should note that I do not mean to imply that facts about which objects exist are mind-dependent if composition as identity is true. They are not. My point is that the same mind-independent facts make both "There is a rectangle" and "There are two squares" true on my view, whereas this seems impossible if these sentences are made true by the sort of facts that orthodox realists and nihilists think. Remember, supporters of the orthodox view think there is a genuine difference between a rectangle-only world and a world with only the two squares. And we might describe that difference as a difference in

where nature's joints are—in what sorts of portions they carve out. In both cases, these sentences are made true by mind-independent facts. It is just that the facts in question differ depending on whether composition as identity or the orthodox view is true.

VI. Making Sense of Composition as Identity

There is another reason to doubt the coherence of composition as identity. Suppose that the defender of composition as identity—the identity theorist—claims (as she should) that there exist elementary particles. She should also say that *all* that exists is elementary particles. After all, once we have accounted for the existence of elementary particles we have accounted for everything. (This, indeed, is my view.)

The question is then how to make sense of this claim. On the one hand, the identity theorist claims that all that exists are elementary particles. On the other, she claims that there are things which are not elementary particles. That, on the face of it, is a flat-out contradiction.

The problem is that the standard paraphrase of the identity theorist's claim that only subatomic particles exist is:

(12) Every thing that exists is an elementary particle.

And this entails

(13) There is no thing which is not an elementary particle.

Given that ordinary objects are most definitely *not* elementary particles, it seems to follow that there can be no ordinary objects given the identity theorist's claim.

Luckily, (12) is not the correct paraphrase of the identity theorist's claim. Consider the following sentence.

(12′) Every thing or things that exist is/are an elementary particle.

This is clearly false according to the identity theorist. Recall that objects (plural) have properties collectively. For instance, some elementary particles may *collectively* compose a chair or a table. One of the collective properties of elementary particles is certainly not the property of *being an elementary particle*. This is a property of *each* of them, but not all of them together. Thus, it is false that all things that exist are *an* elementary particle. There are things (plural) which are not (individual) elementary particles. So, if composition as identity is true (and those things compose something), there is a thing which is not an elementary particle.

Hence, it is clear that what the proponent of composition as identity means when she says that all that exists is elementary particles is, strictly speaking:

(12*) Every thing that exists is (identical to) an elementary particle or elementary particles.

This, an identity theorist can assent to. It is perfectly consistent to say that everything has the property *being an elementary particle* or the property *being elementary particles* if composition as identity is true. For ordinary objects like chairs and tables *do* have the property *being elementary particles* if composition as identity is true.

It is clear, then, that the problem results from a misunderstanding of composition as identity. If composition as identity is true (3) is simply not the right paraphrase of the identity theorist's claim that only elementary particles exist.

We can get similar results for claims like "there are exactly two atoms". That claim, for instance, is typically expressed formally as:

(14) $\exists x \exists y(Ax \wedge Ay \wedge \forall z(z = x \vee z = y))$

This is incompatible with the claim that chairs exist. However, it does not take into account the fact that, according to the identity theorist, there may be some z such that z is identical to x and y *together*. Instead, what we want is:

(15) $\exists x \exists y(Ax \wedge Ay \wedge \forall z(z = x \vee z = y \vee z = x + y))$

In other words, the fact that z is not identical to x or to y does not entail that z is numerically distinct from x or y (or x and y together). To count x is to count *part* of z. How this works can be understood more easily if we examine plural logic. Take some Xs and some Ys, such that the Xs and Ys share some but not all of their members. The idea is illustrated in Figure 12.

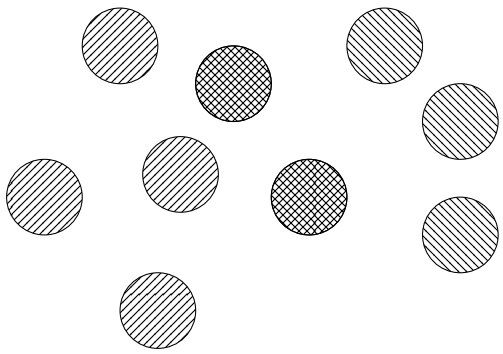


Figure 12: Plural proper overlap between the Xs and the Ys. The Xs have the north-west facing stripes; the Ys the south-west facing stripes. Circles with both kinds of stripe are among both the Xs and the Ys.

The Xs and the Ys are not identical. There are objects which are only among the Xs, and objects which are only among the Ys. However, to count the Xs and then the Ys would be to engage in a form of double counting. For if we were to count the Xs and then the Ys we would count some objects twice.

One might take the lesson here to be that, where plural quantification is involved, it is a mistake to count numerically distinct pluralities separately. On this view, reasoning as follows is a mistake:

> The Xs are distinct from the Ys. The Xs are six in number, and the Ys are five. Thus, there exist eleven objects in Figure 12.

That of course is true, but I think this is the wrong way to understand the case. For x and y to be numerically distinct is *by definition* for them to count as two things. This is what numerically distinctness *is*. Similarly, if the Xs and the Ys are numerically distinct then they should be counted separately.

The above reasoning is problematic not because it endorses the wrong way of counting pluralities. It is problematic because it contains false claims. The Xs are not numerically distinct from the Ys. The fact that they are non-identical to them does not imply this. Non-identity and numerical distinctness are not the same thing in the plural case. The Xs and the Ys are distinct if and only if they have no members in common. To say otherwise will lead to double-counting.

Similarly, if composition as identity is true x and y are distinct if and only if x and y have no parts in common.[25] Otherwise x and y are identical or *partially* identical. Proper parthood and proper overlap are both forms of partial identity, just as their analogues in plural mereology are. (See Chapter 6 for further discussion of these issues.)

VII. The Special Composition Question

The final aspects of composition as identity we need to discuss is what we should say about when composition occurs and when objects have proper parts. Let us start with the first issue. If composition as identity is true, what do we say about the special composition question?

[25] *Proof:* Suppose that x and y are composite objects and that x = the Vs and y = the Ws. If x and y have parts in common then at least one of the Vs is one of the Vs. Thus, the Vs and the Ws are not numerically distinct. Given that the Vs and the Ws are identical to x and y it follows that x and y are not numerically distinct.

Special Composition Question For any Xs, under what conditions does there exist a y such that the Xs compose y?

I think that we should say that composition is restricted. However, some have claimed that either composition as identity entails universalism, or else that the two views go together very naturally. Thus, we shall have to discuss those claims.

It is worth noting that superstrong composition as identity entails an answer to the special composition question. To see this, notice that it entails an answer to the general composition question:

$$\forall xx \forall y(xxCy \leftrightarrow xx = y)$$

("For any Xs and any y, the Xs compose y if and only if the Xs are identical to y.")

This in turn entails (by a form of existential generalisation) an answer to the special composition question: namely,

$$\forall xx \exists y(xxCy \leftrightarrow xx = y)$$

("For any Xs, there exists a y such that the Xs compose y if and only if the Xs are identical to y.")

However, this answer is not particularly helpful. For we still need to know under what conditions the Xs are identical to y. Thus, although superstrong composition as identity entails an answer to the special composition question, it is not obviously the right sort of answer.

Nevertheless, some have argued that superstrong composition as identity does entail an appropriate answer to the special composition question. Specifically, some have argued that it entails universalism: i.e., that composition always occurs. For instance, Merricks (2005) writes:

> Presumably, the Ys could compose something. So suppose that whatever must happen for the Ys to compose something happens. (Perhaps the Ys come to be arranged just so.) This should all make sense to the restricted compositionist. But, given composition as identity, it does not make sense. For after the Ys "come to compose" something, there is nothing other than whatever is identical with the Ys. Yet before the Ys came to compose something, there was whatever was identical with the Ys. As a result, the Ys going from composing nothing to composing something involves no change in what exists. But this is inconsistent with the claim that an object (namely, the sum of the Ys) did not exist before the Ys came to compose something, but did exist afterwards. (Merricks, 2005, p. 23).

Although Merricks is arguing that composition as identity is incompatible with restrictivism, it is clear that his argument commits him to the view that composition as identity entails universalism. For he claims that there is something which is identical to the Ys both before and after the Ys "come to compose" something.[26]

However, as many have pointed out, the definition of superstrong composition as identity tells us only that *if* there are some Xs which are identical to some y, the Xs compose y. But, for any Xs that exist, it does not tell us whether there exists a y, such that the Xs are identical to y (Effingham, 2006; Sider, 2007; Cameron, 2007, 2011). (See also McDaniel, 2010, for an independent proof that composition as identity does not entail universalism.) That is, the definition of superstrong composition as identity leaves it open whether composition occurs at all. Where Merricks appears to go wrong is in assuming that there is always

[26] Sider (2007) makes a similar argument which he attributes to Karen Bennett.

some (single) thing which is identical to the Xs. Given superstrong composition as identity:

(16) $\forall xx \forall y(xxCy \leftrightarrow xx = y)$

and this claim—i.e.:

(17) $\forall xx \exists y(...xx = y)$

we can indeed derive universalism:

(18) $\forall xx \exists y(xxCy)$

However, as Effingham (2006) and Cameron (2007, 2011) have argued, we have been given no reason to think that (17) is true. It could be that there are some Xs which are not identical to a single thing.

I think this is right. Nevertheless, there is more to superstrong composition as identity than just the claim that whenever some Xs compose y the Xs are identical to y. Thus, it may be more appropriate to ask whether a particular answer to the special composition question follows from any *particular* version of superstrong composition as identity. Or it may be better to ask whether a particular answer is *natural* given composition as identity. Taking this approach, Sider (2007) and Bøhn (2014b) both argue that universalism, rather than any other answer to the special composition question, is in the spirit of composition as identity.

Sider's argument is quite straightforward:

> [I]f the Ys are many, then speaking of them as one is just as good as speaking of them as many (and if the Xs are one then of course we may speak of them as one). To speak of some Ys as one thing containing each of the Ys as a part is just a redescription of the same fact (Sider, 2007, p. 11).

Bøhn (2014b) offers a similar reason to think that universalism follows from (his version) of composition as identity. Bøhn claims that Merricks' reasoning in the above quote is quite correct. His claim is that it is quite trivial that, for any Xs, *something* exists which is identical to the Xs, at least so long as we understand "something exists" in a very general way. He argues that both singular and plural existence claims are instances of a general schema. That is, "$\exists x(Fx)$" and "$\exists xx(Fxx)$" are both instances of the generic "$\exists\alpha(F\alpha)$". According to Bøhn the first statement says that the property *F* has the property of being instantiated by *an object*; the second says that the property *F* has the property of being instantiated by *objects* (plural). And these both entail the generic claim which says that the property *F* has the property of being instantiated. Bøhn points out that this view of quantification is standard in contemporary formal semantics. This gives us at least some incentive to accept it.

Bøhn focuses on the property of *being identical to the value of the variable "xx"*. This gives the three claims below.

(i) The property *being identical to the value of the variable "xx"* has the property of being instantiated.

(ii) The property *being identical to the value of the variable "xx"* has the property of being instantiated by an object.

(iii) The property *being identical to the value of the variable "xx"* has the property of being instantiated by objects (plural).

The move from (i) to (ii) is the move that has come under scrutiny by Effingham (2006) and Cameron (2007, 2011). Bøhn's claim is that this move is only illegitimate given a particular notion of *object*. He distinguishes a *thick* and a *thin* notion, and claims that his view should be understood in terms of the latter. The

thin notion is roughly as follows. Whenever a variable has a value there exists *something* which is its value. Therefore, if the plural variable "xx" has a value then there exists something which is its value, and (ii) follows from (i). In other words, whenever a property has the property of being instantiated there exists an object which instantiates it, providing "object" is understood according to the thin notion of existential quantification.

On the face of it this proposal is quite different to Sider's claim that we can think of any plurality as a single thing, but in fact they have a lot in common. The idea behind Bøhn's position seems to be that we can quantify singularly over whatever we like, and that doing so does not commit us to any particular metaphysical view (see especially Bøhn, 2014b, p. 17). (This is in line with what we said about deep and shallow views in Chapter 3.)

I think that Sider and Bøhn are quite right. There is a quite natural version of composition as identity under which universalism is true. The interesting question, however, is not whether there is a version of composition as identity which entails universalism, but whether the version of composition as identity which is *true* (if there is one) entails universalism.

Defenders of composition as identity will mostly agree about the ontological facts. Ignoring minor details we can say that any two defenders of composition as identity will endorse the same "flat" ontological picture, which we may represent as in Figure 13 below:

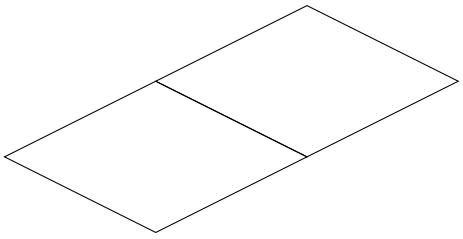


Figure 13: A non-structuralist or "flat" ontological view.

This ontological picture is consistent with multiple views about which objects exist. Suppose our identity theorists agree that each of the squares in the figure is an object. Even then there is a further question as to whether those squares compose anything. (All we know is that the identity theorists will agree that *if* the squares compose anything, they are identical to that thing.) Suppose that one thinks that the squares compose a rectangle, and the other does not. Given that they agree about the ontological facts this disagreement must be over semantics. This means that, if composition as identity is true, finding the correct answer to the special composition question is a matter of finding the right semantics for sentences about composite objects. The question is: Do terms like "chair" and "atoms arranged chair-wise" describe the same features of the world or not.

Superstrong composition as identity is consistent with a kind of nihilism; but why would anyone endorse both of these views? The whole point of composition as identity is to "rescue" composite objects, or to uphold the truth of sentences like "Chairs exist". A nihilist account of composition as identity fails to do this. Any version of composition as identity which entails the existence of trout-turkeys and other strange composites fails for the opposite reason. If we can, we should also try to uphold the truth of sentences like "Trout-turkeys don't exist".

Having said this, the question is not whether we *can* quantify over whatever we like, or whether we can "speak of some Ys as one thing". Rather, the question is whether we *do* do these things. I can use the term "donkey" to refer to chairs, but this does not mean that the English sentence "I am sitting on a donkey" is true. Bøhn's claim is that objects are identical to their proper parts, and that he understands "object" according to the thin notion of existential quantification. So long as Bøhn takes himself to be saying something relevant, his claim must also be that "object" is understood in this way by others too. That is, he must claim that "object" in English accords to the thin usage. Similarly, anyone who holds a

view of the type Sider has in mind ought to take themselves not to be providing a view about *how we should* talk about the world, but rather one about *how we do* talk about the world. Thus, anyone who holds such a view is committed to saying that the English use of "object" is such that any Xs are an object.

Both of these view, however, seem to me to be false. Sider and Bøhn are right that the existential quantifier can be used in the way they suggest. And it may even be the case that it *is* used in this way by some philosophers. But that is beside the point. It is a fact that people believe in chairs and tables, but do not believe in trout-turkeys, or fusions of multiple people. That is not to say that people don't believe there exist (undetached) trout and turkey halves, or people. What people deny is that an (undetached) half of a trout together with an (undetached) half of a turkey compose an object. If composition as identity is true, what they deny is that an (undetached) half of a trout together with an (undetached) half of a turkey is identical to any one thing. Even though we may be able to *treat* these things as a single thing, it seems wrong to say that they *are* a single thing.

If composition as identity is a thesis in English then we need to answer the special composition question by examining how English quantifiers work. My view is that some but not all things (plural) are objects in the English sense of the word. Bøhn claims that whenever a property has the property of being instantiated there exists an object which instantiates it. I don't think this is right. An undetached half turkey and an undetached half trout instantiate the property of being identical to themselves, but it doesn't follow from this that a single thing instantiates that property. In fact, if it did then anyone who denied the existence of trout-turkeys would demonstrate that they do not understand the meaning of "exists" and "object" in English. This strikes me as extremely implausible. If it is, then we have reason to believe that composition is restricted if composition as identity is true.

Still, there are two challenges facing a restrictivist version of composition as identity. The first is the general challenge facing any restrictivist theory posed by the vagueness argument. The second is the challenge posed by Merricks and Bennett and Sider. As we shall see the two are closely related.

The Vagueness Argument

The Lewis-Sider (Lewis, 1986; Sider, 1997, 2001) vagueness argument presents a serious challenge to restrictivism. Recall that the argument goes roughly as follows.[27][28]

(V1) If composition is restricted then there is either a sharp cut-off between cases in which composition occurs and cases in which it does not occur, or there are cases where it is vague whether composition occurs or not.

(V2) There is no sharp cut-off between cases in which composition does not occur and cases in which composition occurs.

(V3) There cannot be cases where it is vague whether composition occurs or not.

Therefore, composition is not restricted.

The vagueness argument has been widely discussed and there is much that can be said.[29] Arguably, it is most effective against a form of restrictivism which aims to respect commonsense judgements about when composition occurs. (This is quite explicit in Lewis' (1986) version of the argument.) Such a commonsense

[27]Note that I have left out the extra premise that nihilism is false which get us to the conclusion that universalism is true. For our purposes, we need only the argument against restrictivism.

[28]The presentation here is also very rough. For instance, not every case of vague composition involves anything like vague existence (see Merricks, 2005).

[29]See Korman, 2010 for an overview of the argument and possible and actual responses to it. (Other references are listed in the Introduction to this thesis.)

picture of composition makes (V2) redundant, for commonsense says that composition is vague. Such a picture also makes (V3) more plausible; for, as Merricks (2005) points out, there are cases of vague composition which do not imply vague existence. For instance, suppose that there are some objects that are definitely proper parts of you and some objects for which it is vague whether they are proper parts of you. It is vague whether these objects, taken together, compose you, but it is not vague whether you exist. (You determinately exist but your boundaries are indeterminate.) Vague existence is only a threat if composition is not always like this.

There are at least two reasons to think that (V2) is false, regardless. First, composition seems to occur gradually. There does not seem to be any exact point at which some objects come to compose something. Second, it is implausible that there *could* be an exact point at which some objects come to compose something. Why *that* point rather than another? There are ways to resist these points (see e.g., Markosian, 1998a; Merricks, 2005; Smith, 2006), but ideally we would *like* to say that composition is something which occurs gradually (*cf.* Smith, 2005; Carmichael, 2011). Thus, I will focus on views which allow us to say this.

(Of course, not every restrictivist's view is motivated by commonsense. Van Inwagen (1990b) and Merricks (2001) both defend restrictivism by giving arguments that rule out the existence of certain objects but not others. Nevertheless, I think that Van Inwagen and Merricks would both agree that, all else being equal, a view which respects our commonsense beliefs about composition is better than one which does not. My goal in this section is to show that composition as identity provides the best theory that is compatible with ordinary beliefs about when composition occurs. My goal elsewhere is to establish that, at worst, all else is equal between composition as identity and its rivals.)

That leaves (V3). Lewis and Sider argue that composition cannot be vague

because this would entail vague existence, which is impossible. Suppose we take some Xs which compose nothing, and bring them together to compose something. If composition is vague, then there is a point at which it is indeterminate whether there exists a y which is composed of the Xs. But how could it be indeterminate whether y exists or not? Either y exists or y does not exist—there is no middle ground.

As before, it is possible to resist this line of argument. One type of response denies that there is a problem with vague existence (e.g., Smith, 2005); the other denies that vague composition entails vague existence (e.g., Carmichael, 2011).[30]

There seem to be two ways to try to make sense of vague existence. One is to say that vagueness is in the world rather than a product of language use; the other is to say that there are non-existent objects (Hawley, 2002). Both of these possibilities seems implausible. We already have perfectly good accounts of vagueness under which vagueness is a linguistic phenomenon. If these can explain all other cases of vagueness, we should be reluctant to accept ontic vagueness in our case too. Van Inwagen (1990b) argues that vagueness is ontic, but it is difficult to make good sense of his position. Hawley (2002) suggests that he is not committed to vague existence, but only to it being indeterminate whether some properties are instantiated or not. This in itself seems problematic. What does it mean for it to be indeterminate that a given property is instantiated? But even if we are happy with indeterminate instantiation, the fact remains that Van Inwagen is committed to there being composite objects if and only if some atoms instantiate the property of *participating in the same life*. If it is indeterminate whether this property is instantiated, then it must be indeterminate whether any

[30]These responses are very closely related. In fact, responses that are stated as versions of the former type can often be rephrased as versions of the latter type. Nick Smith's view is a good example of this. I am inclined to say that it is a variant of the latter type of view although Smith presents it as a version of the former. It all comes down to what is meant by "vague existence" and this varies from case to case.

composite object exists. That seems like vague existence to me, and it seems highly objectionable.

The other way to understand vague existence is also problematic, although I think there are ways to make sense of it. Lewis and Sider are right that there is a tension in saying there is an object, y, such that it is vague whether y exists of not. The phrase "there is an object, y," is naturally taken as committing one to the *existence* of y. One cannot then turn around and deny that y exists.

One way around this is to embrace *Meinongianism*, the view that there (actually) are non-existent objects. Unicorns and other fictional objects are all things which do not exist. On the face of it, then, there are non-existent objects. The defender of restricted composition could argue that whenever we have a case of vague composition there is a composite object which neither exists nor does not exist determinately. The response is highly implausible, however, because we are still left to make sense of the claim that it is vague whether the composite object exists or not. What is it for something to "sort of" exist? Embracing non-existent objects does not help. On top of this, Meinongianism faces serious problems of its own.

Nicholas Smith (2005) offers an alternative. He argues that there exist objects which are non-actual. That is, whenever we have a case of vague composition, there exists an object such that it is vague whether it is actual or merely possible. Vague existence *simpliciter* is problematic, but vague *actual* existence is not.

The idea is that, for any objects, there is something which those objects *possibly* compose. Smith makes sense of this by saying that, for any objects, there exists a possible object which they compose. What is vague is not whether there exists anything that the objects compose, but whether there *actually* exists anything that they compose. This allows Smith to maintain that composition is (actually) restricted and that it is vague.

This view, however, faces the same problem as the Meinongian response. It is not entirely clear what Smith thinks that (merely) possible objects *are*, but his use of the term "concrete" to refer to actual composition suggests that he thinks possible objects are abstract. If so, it is difficult to see what it could mean to say that it is vague whether an object is actual. How could it be vague whether an object is concrete or abstract? Smith thinks that vagueness has to do with degrees of truth (Smith, 2008), and that composition occurs as a matter of degree. Thus, it would seem that he is committed to the existence of abstract objects which gradually become concrete.

If, on the other hand, Smith thinks that possible objects are concrete too (as in e.g., Lewis, 1986), we are left needing to make sense of the idea that it is vague whether a particular (concrete) object exists in the actual world or some non-actual world. Instead of abstract objects gradually becoming concrete we now have concrete objects in non-actual worlds gradually becoming located in the actual world. Again, I do not know how to make sense of this. Certainly, Smith is correct that *formally* there is nothing incoherent in the idea of vague existence he has in mind, but there seem to be problems in applying the formal apparatus to actual cases of composition.

Furthermore, since I believe that what actually exists is *all* that exists, I cannot accept Smith's view. His view commits him to the existence of possible objects, but he hasn't given us reason to believe in such things.

Things don't look good for the defender of vague existence. However, Chad Carmichael (2011) offers a different, (though related) response. Like Smith, he wants to provide a view which fits quite closely to ordinary beliefs about when composition occurs and does not occur. He claims that we can do this because vague composition does not entail vague existence. He also wants to hold a linguistic account of vagueness, and specifically one which relies upon

precisifications. The idea is that the vagueness of a sentence like "Bob is tall" is accounted for by claiming that the predicate "is tall" has multiple admissible precisifications. For example, "is 180cm or taller", "is 181cm or taller", "is 182cm or taller" might all be admissible precisifications of "is tall". In other words, the claim is that our use of the predicate "is tall" simply does not settle which of these is the right interpretation.

The problem facing restrictivists is to explain how the fact that it is vague whether some objects are arranged in the right way to compose anything does not entail that it is vague whether a further object composed of those objects exists. The problem with most restrictivist accounts is that, if it is vague whether any atoms meet the conditions to compose something, then it is vague whether a further object exists. This is because the existence of a further object *depends* upon the existence of some atoms arranged in the right way. Carmichael's solution is to say that the existence of the further thing does not depend on the atoms being arranged in the relevant way. (This is not to say that it doesn't depend on the arrangement of the atoms at all. The atoms still must be arranged such that it is vague whether a composite object exists.) A further thing exists even when it is vague whether the atoms compose anything. And it is vague whether this object has the atoms as parts.

More specifically, Carmichael's view is the following. Suppose the world contains just a handful of simples which are arranged in such a way that it is vague whether they compose anything. (This is Carmichael's own case. He calls the simples the *cloudishly arranged simples*.) In addition to the cloudishly arranged simples there exists a further thing, a *proto-cloud*. It is vague whether the proto-cloud is composed of the simples. When the simples are arranged so as to definitely compose a cloud the proto-cloud becomes a cloud, and is now definitely composed of the simples. (A proto-cloud is supposed to be a borderline case of a

cloud, or a borderline-borderline case, or a borderline-borderline-borderline case, or...)

For reasons which we need to go into here Carmichael argues that the proto-cloud is located at the sum of the regions at which at least some of the simples are located. To simplify things we can assume that there is only one candidate referent of the term "the proto-cloud". On Carmichael's view the proto-cloud is then located exactly at the region which is the sum of the regions occupied by the simples. It is just like any composite object in this respect, only it is vague whether it *is* a composite object. The proto-cloud *spatially* overlaps each of the simples (and everything which spatially overlaps the proto-cloud spatially overlaps at least one of the simples), but it is vague whether it *mereologically* overlaps them.

Finally, Carmichael claims that when the simples are arranged in such a way that they *super-definitely* do not compose anything, then no further object exists. (To say the simples super-definitely do not compose something is to say that it is definitely definitely definitely definitely definitely....the case that the simples do not compose anything. The idea is that there are progressively clearer cases of non-composition. The super-definite cases are the clearest possible cases.) A further things exists both whenever it is vague whether the simples compose something, and whenever the simples definitely compose something.

Carmichael proposes to solve the problem with vague existence by eliminating vague existence from the picture. Although it is vague whether the simples stand in the relation of *composing* to anything, it is not vague what exists. There is vagueness in which properties are instantiated but not vagueness in which objects exist.

I find this solution unappealing for several reasons. I will focus on just one objection which seems to me to be fatal. Carmichael claims that no further

object exists when the simples super-definitely fail to compose anything. This reintroduces the original problem. When we bring the simples together there must be some point at which the proto-cloud comes into existence. But it is implausible that the proto-cloud suddenly comes into existence at any one point. And it seems impossible for the proto-cloud to come *gradually* into existence. (Besides, this is exactly what Carmichael was trying to avoid.) Carmichael is aware of this objection but I find his response unconvincing. First, he argues that the best account of the *super-definitely* operator is one in which it does not admit of vagueness. That is, there is sharp line between cases in which the simples definitely definitely definitely definitely...fail to compose something and cases in which the simples do not definitely definitely definitely definitely...fail to compose something.

Let us grant him this point. Carmichael then claims that it is not implausible that there is such a sharp line. He writes:

> Intuitively, there is no sharp line between (say) the red and the not red in a standard sorites series for 'red'. And, intuitively, there is no sharp line between the definitely red and the not definitely red. But, when we iterate the 'definitely' operator a few more times, I think most of us will admit that we lose our grip on any sense of whether there is a sharp line. I have no intuition, for example, that that tells against a sharp line between the definitely definitely definitely definitely red and the not definitely definitely definitely definitely red. As a result, accord with intuition cannot guide us in settling the issue; other virtues of the available theories must point the way (Carmichael, 2011, p. 323).

I myself find it plausible that there is no sharp line between the definitely

definitely definitely definitely red and the not definitely definitely definitely definitely red. I see no way that the meaning of "red" could be so precise. But even if I did agree that we lose our grip on whether or not a predicate is vague when attached to an iterated "definitely" operator, this is beside the point. Even if it were highly intuitive that "super-definitely" does not admit of vagueness, the problem would still stand. For the problem is not that it is unintuitive that super-definite non-composition has a sharp cut-off *per se*. The problem is that it is highly implausible that there could be *any* point at which a proto-cloud suddenly pops into existence. Why would a minute change in the arrangement of the simples bring about a change in the number of things that exist? (*cf.* Sider, 1997).

Plausibly, whether the simples compose anything depends in part on the distance they are from one another. Thus, if there is a super-definite case of non-composition, one would expect it to be a case in which the simples are a long way away from one another. But then suppose we move the simples closer together. It is not at all plausible that there is an exact distance at which a proto-composite comes into being, or even an exact combination of distance and some other factors. Thus, it seems to me that Carmichael's response to the objection fails, and his response to the vagueness argument with it.[31]

[31] Carmichael offers the following counter (personal communication; see also Carmichael (2011) p. 322): Anyone who is committed to an account of vagueness involving precisifications is committed to the existence of a sharp cut-off between the super-definite cases of non-composition and the rest. Thus, if such a sharp cut-off is objectionable, this is a problem for those accounts of vagueness. But the vagueness argument depends upon a precisificational account of vagueness. If a sharp cut-off is always objectionable, then the vagueness argument fails before it can get off the ground.

I find the response unsatisfying. There is a perfectly acceptable way to retain both a precisificational account of vagueness and object to the sharp cut-off: embrace universalism. So the claim that precisificationalists are committed to the objectional cut-off is just false. True, they may be committed to a sharp cut-off between cases of super-definite non-composition and the rest; but they are not committed to saying that this is the cut-off between being and non-being. That is, they are not committed to objects popping into and out of existence at the slightest change. It is that which seems to me to be most objectionable, not the sharpness of the cut-off *per se*.

The obvious fix is to suggest that there exists a proto-composite even when composition super-definitely does not occur. However, this leads to new problems. For now the view looks like universalism combined with a restriction on quantification. As we saw in the Introduction, rather than saying that composition is restricted, universalists often claim that we don't believe in strange fusions because we implicitly restrict our quantifiers so that they range over only ordinary objects. One way we can spell out such a view is as follows. Call ordinary objects, "objects", and strange fusions, "groups". Both are *things* in the most basic sense of the word; but one might claim that the ordinary English use of "object" is more restricted than this. That seems to me to be quite plausible. We can then say that it is vague exactly which things count as objects and which count as groups. In other words, we can say that there are borderline composite objects (as in fact there seem to be) without committing to there being borderline *things* (and therefore to vague existence).

The problem with this kind of view is that it does not seem to capture the restrictivist intuition. Restrictivists take their view to be about *everything* that exists (and therefore not merely about "objects" in the above sense) (*cf.* Markosian, 2005). On this view, when we talk about "a pair" of socks, we are either talking about the socks (plural), or perhaps we are talking about a set of socks. Either way, there is no *fusion* of the socks. Universalism plus restricted quantification is a poor substitute for restrictivism. Universalism, for instance, entails that it is impossible[32] for there to be just two things in a box (or a room, or a world); restrictivism does not.

There are many other responses to the vagueness argument, but most of them give up on commonsense beliefs about when composition occurs. Those who stick to common sense in that regard, such as Smith and Carmichael, do so at

[32]Either metaphysically or nomologically, or both, depending on one's views.

great cost.

Composition as identity offers an alternative solution, though one which is quite similar to the view just discussed. The problem with vague composition is that we want to say both that (a) the conditions under which some atoms are arranged in the right way for composition to occur are vague, and that (b) the existence of a further thing depends on the arrangement of those atoms. Together these entail that the existence of a composite object is a vague matter. If we accept composition as identity, however, composition does not imply the existence of a further object. Before and after composition only the atoms exist. The vagueness applies only to whether the atoms are many things or whether they are one thing (perhaps as well as many things).

Call the conditions under which some Xs compose something *being arranged object-wise*. Being arranged object-wise, I claim, has something to do with the Xs being functionally integrated to the right degree. Maybe applying a force to one of the Xs has a high enough probability of affecting the other Xs. Maybe there are different conditions that need to be met for different sorts of Xs. In that case we would have many different properties: *being arranged object-wise*$_1$, *being arranged object-wise*$_2$, and so on. I imagine that just as spelling out exactly what it takes for something to be a chair is probably impossible, so too is spelling out what it takes for objects to be arranged object-wise. Thus, let us not get caught up in the details. It is enough that it is plausible that there is *some* story, albeit a vague one, that we can gesture towards.

This is the kind of story we would like to tell. And we can tell it if composition as identity is true. For some Xs to compose a composite object *just is* for them to be arranged object-wise. In other words, for some Xs to be a single thing is for them to be arranged object-wise. If they are not arranged object-wise then they are (merely) many things. Whenever it is vague that the Xs are arranged

object-wise, it is vague whether the Xs are identical to one thing. No objects pop into and out of existence on this picture. It is only the properties of the Xs that change.

The distinction here is between vague existence and vague property instantiation. Suppose that it is vague whether Bob is bald. Then it is vague whether a bald person exists. (Ignoring other people.) But this does not entail vague existence. What is vague is not whether there exists a person, but whether the person who exists is bald. Similarly, if composition as identity is true we may say that what is vague is not whether a further object exists but whether the Xs are a single thing.

The solution is tidy. I also think it is very appealing. Imagine some scattered bricks. It seems that there is no single thing made up of the bricks. But arrange the bricks wall-wise and it seems there is a single thing—a wall—made up of the bricks. If we accept the orthodox view, then we are under pressure to say that there is either a single thing composed of the bricks all along, or that there never is. For at what point in the process do the bricks go from not composing something to composing something (or vice versa)? It is completely implausible that at some precise moment a wall pops into existence. And it is even more implausible that the wall comes gradually into existence. Existence does not come in degrees.

The key difference between this view and a universalist view combined with restricted quantification is that universalism of any variety entails that, for any objects, there is always something composed of those objects. If composition as identity is true, it follows, under universalism, that any objects whatsoever are identical to a single thing. A pair of socks is a single thing; some people walking down the street are a single thing; the undetached front half of a trout and the undetached back half of a turkey are a single thing; and so on. Whether we call that thing a "group" or an "object" does not change the fact that it is a single

thing.

The view I have just proposed, on the other hand, allows us to deny that any of these are single things. A pair of socks is, of course, two things, and not one. The undetached front half of a trout and the undetached back half of a turkey are also two things, not one. As far as I can see, no account based upon the orthodox view will let us say this without making implausible appeals to composites that pop suddenly into existence, vague existence, or possible objects. Composition as identity gives us what we want, and does so without incurring any of these costs.

Before we move on it is worth quickly responding to the arguments put forward by Merricks (2005), and Sider (2007) and Bennett against restricted composition as identity.

Merricks, as we saw earlier, argues that if composition as identity is true then composition involves "no change in what exists" (Merricks, 2005, p. 23). "But", he goes on, "this is inconsistent with the [restrictivist's] claim that an object (namely, the sum of the Ys) did not exist before the Ys came to compose something, but did exist afterwards." Merricks is simply wrong about this. Before the Ys came to compose anything there was no single thing, x, identical to the Ys. After the Ys came to compose something, there is. The objection is misguided.

Sider (2007) endorses a similar argument which he attributes to Karen Bennett:[33]

> Unless composition is unrestricted, it is in general an open question whether some Xs compose something. But then in cases where some Xs do compose something, the composed object seems to be something "over and above" the Xs. For it is an open question whether the object exists given that the Xs do, whereas it is not an

[33]Note that Sider does not wholeheartedly support the argument. He acknowledges that it is hard to evaluate its strength.

> open question whether the Xs exist given that the Xs do (Sider, 2007, p. 22).

Merricks (2005, pp. 22, 24) makes a very similar point. He argues that if restrictivism is true and we have some Xs arranged R-wise, it may be controversial whether the Xs compose anything. (After all, if restrictivism is true, they might not.) But if composition as identity is true, there is nothing more to know. So what could be controversial about the case? "Endorsing [the composite] object's existence is as ontologically venturesome as endorsing the existence of Tully, given the uncontroversial existence of Cicero" (Merricks, 2005, p. 22).

These are not good arguments. First, as Cameron (2011) points out in reply to the Bennett-Sider argument, it is an open question whether the composite object exists even given that the Xs exist because it is an open question whether the Xs are arranged in the right way to compose anything. It is not true that something extra needs to exist when composition occurs—it is only true that "something more needs to happen for the sum of the Xs to exist" (p. 549). We need to know both that the Xs exist *and* that they are arranged object-wise to know that they compose something.

One might think, therefore, that Merricks' argument is better, for he claims that it is an open question whether the Xs compose anything even given that we know how the Xs are arranged. It is, but not by much. Consider Merricks' own claim that "Endorsing [the composite] object's existence is as ontologically venturesome as endorsing the existence of Tully, given the uncontroversial existence of Cicero". It is well recognised that one can know that Cicero exists without knowing that Tully exists (even though Cicero and Tully are identical). Take, for example, Frege's famous case of Hesperus and Phosphorus (Frege, 1980). If Merricks were right it would be impossible to discover that Hesperus is identical to Phosphorus. Nor would any such "discovery" be of any import whatsoever.

But astronomers did discover this, and the discovery was an important one, as Frege is quick to point out.

Thus, even if a composite object, x, is identical to some Ys arranged R-wise, it can still be a sensible and important question to ask whether the Ys compose anything. Only someone who *knows* that the Ys = x cannot sensibly ask such a question.

Given all this, it seems that composition as identity is compatible with a restrictivist answer to the special composition question which meets all of the intuitive desiderata. The view I have been arguing for allows us to say that all and only the composite objects we ordinarily take to exist exist and that composition is vague. No version of the orthodox view seems to be able to meet these desiderata while remaining at all plausible. I think this is not only an interesting result, but one which gives us further reason to believe that composition as identity is true.

This leaves us only the inverse special composition question to discuss.

VIII. The Inverse Special Composition Question

Van Inwagen's *inverse special composition question* is the following:

The Inverse Special Composition Question Under what conditions is an object composite?

The question is closely related to Markosian's (1998) *simple question*:

The Simple Question Under what conditions is an object a mereological simple?

As with the special composition question, the definition of superstrong composition as identity does not entail a useful answer to either question. However,

I think that there is a natural answer to both if composition as identity is true. I will merely state my view here and defend it in Chapter 4.

My view is this. A (concrete) object is composite if and only if it is extended in space. From this it follows that an object is simple if and only if it is not extended in space. Whether there are any such objects—i.e., point-sized objects—is an open question.[34] We will see in Chapter 4 that there are good reasons to hold both of these views. Very briefly, I think that what it is to say that an object is "extended" is that it has a proper part in more than one spatial location. (The argument given in Chapter 2 also lends support to the position.)

I hold a similar view about spatial regions. A spatial region is composite if and only if it has non-zero volume. Any region with non-zero volume has halves—thus it has proper parts. That is, any region with non-zero volume can be correctly described as being two smaller regions. On the other hand a region of zero volume (if there is such a thing) cannot be correctly described as being identical to two smaller regions.

Of course, it is consistent with composition as identity to say that it is sometimes (or even always) wrong to count a single thing as multiple things. Arguably, however, that is not how English works. It seems correct to say of any extended object that it has two halves. Thus, if number facts are shallow as I claim, it is never wrong to count a single extended thing as multiple things.

[34] I'm inclined to say "no", at least insofar as we are talking about concrete objects. I have no argument for this besides to say that such a thing does not strike me as the kind of thing which should be described as a "concrete object".

4

THE EMPIRICAL ARGUMENT

Having outlined my own version of composition as identity in more detail, I want to present some arguments in its favour. In this chapter I will argue that orthodox realism—the view held by most philosophers—is unmotivated.

We have already seen that it is strikingly incomplete. It is also striking how weak the arguments commonly given in its favour are. In fact, to my knowledge there is only one widely held reason for holding orthodox realism, and that is simply that orthodox nihilism is unbelievable. I do not wish to argue that this is not true—orthodox nihilism is extremely hard to believe—or that this is not a good reason to reject it. In fact, I agree on both counts. However, I do want to argue that this is not a good reason to accept orthodox realism.

We will see that orthodox realism is a view without any good arguments in its favour. This does not mean that realism in general is indefensible; only that orthodox realism is. Once we see why orthodox realism is unmotivated we will also see that there are powerful reasons to believe composition as identity.

The argument in this chapter depends on the assumption, mentioned at the outset, that all knowledge of what exists must ultimately be grounded in experi-

ence. If you do not accept this you will likely not find the argument which follows convincing. But you should accept it. There is no reason to think that any other method of gaining knowledge about what exists in the external world is reliable.

I. The Ontology of Orthodox Realism

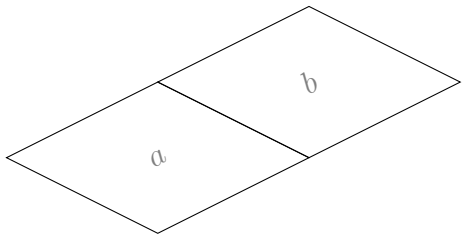
As with composition as identity (and any view of composition) orthodox realism has an ontological component and a semantic one. The ontological view entailed by orthodox realism is structuralism. This is illustrated in Figure 14 below, alongside ontologies consistent with two different versions of nihilism.

Let us suppose that a world like (i) contains only elementary particles. We have been calling this view "atomism". A world like (ii), taken to extremes, is one in which only one thing exists. This is known as "existence monism". (i) and (ii) are both representative of ontologies which are endorsed by nihilists. Although existence monism is not typically seen as a nihilist theory, it is one (*cf.* Schaffer, 2007). There is no composition in such a world. Since they have only one level each, both of these views are non-structuralist views.

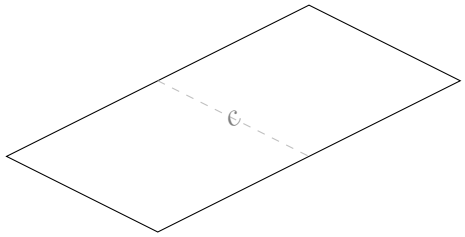
According to orthodox realism the actual world is like (iii), though typically with more than the two levels shown in the figure. Since this world has more than one level, it is a structuralist world.

(Note that the figure presupposes deep ontological facts. Without such facts there would be no distinction between (i) and (ii), and no difference in what exists at each of the two levels in (iii).)

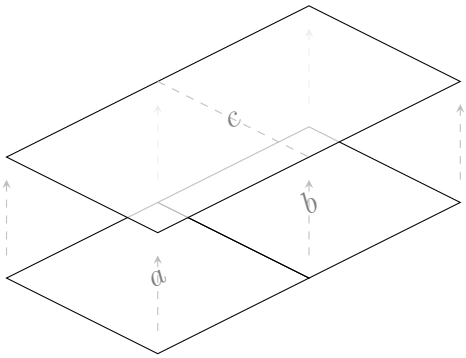
It turns out that the distinction between the ontological and semantic components of theories of composition is extremely important. The usual debate between nihilists and realists is muddied by a failure to separate the two. We will see that it is often better to focus on each debate separately. These are: (a) the debate about which general ontological view is correct, and (b) the debate about



(i) Non-structuralism (atomism)



(ii) Non-structuralism (monism)



(iii) Structuralism

Figure 14: Three different types of ontological view.

which account of the meaning of mereological terms is true.

In what follows we will examine the main arguments for orthodox realism and find them lacking. What they show is not that *orthodox* realism is true, but that *realism* is true. That, of course, is not the same thing.

II. Three Arguments Against Nihilism

I know of only three arguments which have been made for orthodox realism. Each of them is an argument against orthodox nihilism (or rather, just nihilism).

The first argument, due to Sider (1993), though no longer defended by him (see Sider, 2013), is that nihilism is false because it entails that gunk is metaphysically impossible. The second argument, due to Tallant (2014), is that nihilists cannot answer what he calls the "special arrangement question". The third, and the one I believe is *the* motivation for orthodox realism, is that nihilism is simply unbelievable.

Combined with the claim that composite objects are distinct from their proper parts, these arguments, if they are any good, show that orthodox realism is true. The first two, however, are not any good; and the third ends up so paradoxical that we have good reason to think the distinctness claim is false. Carefully keeping the ontological and semantic components of each view apart reveals this.

The first two parts of this section are devoted to refuting Sider and Tallant's arguments. The remainder of the section will be given to discussing the third argument.

Nihilism and Gunk

Sider (1997, 2001) makes what is probably the most comprehensive and powerful cases for an orthodox realist view (though his arguments draw heavily from Lewis, 1986). Most of Sider's attention, however, is focused on variants of orthodox realism besides his own account. He offers only two arguments against nihilism. One is the argument that nihilism is too at odds with common sense (Sider, 2001, chapter 5, section 6). This is the third argument mentioned above and we will discuss it later in the chapter. The other is the argument that nihilism entails the impossibility of gunk, which, he argues, is in fact possible. (Sider relies upon this argument in both Sider, 1997 and Sider, 2001, but he defends it in most detail in Sider, 1993.)

In attacking nihilism Sider focuses mainly on Van Inwagen's particular quasi-

nihilist view. This, we shall see, causes problems for his argument. Sider claims that Van Inwagen (1990b) appears to accept that nihilism about non-living composites is metaphysically necessary if true. It follows from such a view that nihilism, if true, entails the metaphysical impossibility of gunk—that is, of infinitely divisible objects with no simple parts.

Recall that the nihilist makes her view less objectionable by offering paraphrases of (by their lights) false sentences like "There is a chair over there" into true sentences of the form "There are some atoms arranged chair-wise over there". But what if there are no mereological atoms? We have a long history of discovering that objects we thought were simples are in fact composed of smaller objects. So why think that we have reached the end of the chain? Sider (1993) argues that it is possible that subatomic particles are composed of smaller particles which are themselves composed of smaller particles, and so on *ad infinitum*. Sider claims that many scientists seem to take this possibility seriously and that we should not rule out legitimate scientific theories a priori. Thus, Sider concludes, there are possible worlds which are gunky, and in these worlds the nihilist's paraphrasing strategy will fail. Thus, nihilism fails on both counts.

It is worth considering why Sider does not simply appeal to the premise that the "atoms" of the nihilist's theory could possibly have proper parts. After all, it is a legitimate scientific hypothesis that quarks, for instance, are composed of smaller particles. The problem with this argument is that the nihilist can respond that the scientific hypothesis in question is not that quarks have proper parts, but rather there exist smaller particles arranged "quark-wise" and no quarks. By appealing to gunk Sider effectively blocks this move. If the hypothesis that objects are gunky is legitimate, it seems it must say what it seems to say: that quarks are composed of smaller particles.

Sider's conclusion is that orthodox realism is true. But if this were right, then

his argument would demonstrate that the actual world is like (iii) in Figure 14. Yet, clearly, it demonstrates no such thing. How could the *possibility* of gunk show that there are composite objects in the actual world? Something has gone wrong.

Sider (2013) now thinks that he was wrong to hold that gunk is metaphysically possible. Instead, he claims, gunk is merely epistemically possible. Sider's argument for this is complex but boils down to this. Nihilism and gunk both seem to be metaphysically possible, yet cannot both be. Thus, the objector needs an argument showing that it is gunk that is possible and not nihilism. But there is no way to produce such an argument except by arguing directly against nihilism. Sider concludes that "the argument from [the] possibility [of gunk] is superfluous" (Sider, 2013, p. 37).

We need not go into more detail here. It seems right that the nihilist can perfectly well insist that nihilism is metaphysically possible and that gunk is not, so long as her opponent who claims the opposite has no argument for this claim. But this does not explain how the gunk argument could lead to the conclusion that there *actually* are composite objects. We should not accept even this much.

I think that while the argument from gunk rules out *some* versions of nihilism it does not rule them all out. Thus, it does not entail realism in the first place. Recall that nihilism says:

Nihilism For any (non-overlapping) Xs, it is not the case that there is anything that the Xs compose.

This, however, overlooks the modal scope of the claim. Van Inwagen (1990) puts the special composition question informally as: "what would one have to do—what *could* one do—to get the Xs to compose something?" Thus, typically, nihilism is actually the view that there is nothing one could do to get the Xs to

compose something. And the "could" here is naturally taken to evoke metaphysical possibility, for we are not only concerned with what it is within an individual's power to do.

Still, this leaves too much open. One interpretation of the nihilist's claim is,

(4) There is no possible world in which there exist some Xs such that the Xs compose something.

Another is,

(5) There are no actual Xs such that there is a possible world in which the Xs compose something (or in which counterparts of the Xs compose something).

(The difference here is the scope of the modal operator.) The gunk argument rules out the possibility of (4) but not (5). To see this consider a possible world in which the objects the nihilist takes to be mereological atoms—elementary particles, say—in the actual world exist as they do in the actual world and are gunky. (Assuming there is such a world, of course.) In this possible world composition occurs; so this possible world is incompatible with (4). However, this possible world is one in which the atoms of the actual world do not compose anything. There are no chairs, no tables, no people. Thus, the existence of such a possible world is compatible with the truth of (5). The possible world in question is no counter-example to the claim that there is nothing that one can do to any of the elementary particles in the actual world to get them to compose something.

It is clear that Van Inwagen and others have the first interpretation in mind; yet the second is not an implausible view. In fact, one could well confuse the two and mistake arguments for the second for arguments for the first. Van Inwagen (1990b), for instance, motivates his view that there are no non-living composites

by telling stories intended to make it clear that, when one appears to compose something (non-living) out of some Xs, all one does is move the Xs around—nothing new comes into existence. If this were right it would show that there is nothing that one can do to any actual Xs to get them to compose something. But that is the second view, not the first. Even if Van Inwagen is right, it seems that there could be some strange objects which *do* compose things when arranged in the right way. Or at least nothing in his stories rules this out.

More importantly, both views are consistent with the kind of world view shown in subfigure (i) of Figure 14. They differ only in what they say *can* happen. (And even then, the two views agree that there could be no chairs and tables composed out of the elementary particles in the actual world.) Therefore, if the possibility of gunk fails to rule out (5), it fails to rule out worlds like (i) and (ii). It is a mistake to conclude, as Sider did, that the gunk argument supports the ontology of orthodox realism (i.e., an ontology like (iii) in Figure 14).

The only way to reach Sider's conclusion seems to be to argue that all objects are the same with respect to composition. If some atoms can compose something, then some bricks can too—and the same goes even for alien objects not found in the actual world. I find this claim quite implausible. It is fairly plausible that objects of the *same type* will behave the same way with respect to composition (though see Cameron, 2007, for an opposing view). After all, why should we expect a difference in the mereological facts in the absence of any (relevant) difference in non-mereological facts? However, it is much less plausible that every kind behaves in the same way. For instance, it is natural to think that things can be composed out of atoms, but far less natural to think that anything can be composed out of people.

I can think of only one way to defend that claim, and that is to appeal to the vagueness argument (discussed in Chapter 3). It is common to think that if the

vagueness argument is sound it shows that, if composition occurs at all, it occurs without restriction. But this is not quite right. The argument shows (if sound) that, if there is any way to get *some particular objects* to compose something, then they always compose something. (For if they did not then there would be either be a sharp cut-off between cases of composition and non-composition, or it would be vague at which point a composite object came or went out of existence, both of which seem implausible.) Thus, if some bricks can be made to compose a wall by placing them on top of one another, then they compose something when they are separated from one another too. The argument does not work if we slide from one type of object to another. If the bricks can come to compose a wall, we ask, at what point does the wall come into existence? What we should conclude, if the argument is sound, is that the bricks composed something all along. What we cannot conclude is that this entails that you and I composed something all along too. That simply does not follow.

Accepting universalism about bricks allows us to say that there is no sudden or vague change in the number of things that exist when we arrange the bricks wall-wise. Accepting universalism about people is no help whatsoever. Why then should we do it (unless we want to say that there are sometimes objects composed out of people)?[1]

The upshot of this argument is that the fact that some tiny particles in some possible world compose quarks (and, if the vagueness argument is sound, never fail to compose anything) provides us with no reason to think that quarks compose

[1]One might think that this claim undermines my argument in the previous chapter that it is a strength of composition as identity that it avoids the vagueness argument. After all, if the vagueness argument does not establish that restrictivism is false in the first place, what value is there in dodging it? The value comes from the fact that, although it doesn't show that restrictivism is false, the vagueness argument does seem to show that any atoms, in any arrangement, compose something. And that claim seems to be false. Being able to say that *people* never compose anything does not help.

anything in the actual world.[2]

To put the point another way: The standard orthodox realist view is one on which elementary particles compose things like chairs, tables, and people. Sider claims (or rather, claimed) that the possibility of gunk entails such a view, but that is not quite right. The possibility of gunk entails only that elementary particles could have proper parts, not that they could compose anything. The view that elementary particles exist and cannot compose anything is perfectly consistent with the possibility of gunk. Sider's argument can at best be used to defend realism about composition (of some sort). It cannot be used to defend realism about chairs, tables, and people.

We should conclude, therefore, that the possibility of gunk provides no argument in favour of an orthodox realist ontology. *If* gunk is metaphysically possible then the standard version of nihilism is untenable; but that is a big if. And even if the standard version is untenable, there is at least one alternative view which captures the intuitions which nihilists have about composition. For those nihilists who think that composition is simply inconceivable, and therefore that this alternative view is not worth having, the obvious response is to deny the possibility of gunk. If composition is inconceivable then so too is gunk. It is as simple as that.

The Special Arrangement Question

In a recent paper Jonathan Tallant (2014) has presented a new argument against nihilism. Although proponents of the orthodox view have not appealed to this argument in defence of their position, it is nevertheless worth discussing.

Tallant argues that nihilism is false because it cannot answer what he calls the *special arrangement question*. As the name suggests, the special arrangement

[2]It is also possible to argue that nihilism is not metaphysically necessary. I think that is quite plausible too, given the orthodox view, though I will not press that point here.

question has parallels with the special composition question. While the special composition question asks when some objects compose something, the special arrangement question asks when some objects are arranged F-wise (for some kind, F).

Special Arrangement Question For all Xs, the Xs are arranged F-wise if and only if _____?

He argues that nihilists cannot answer this question.

We cannot discuss all of Tallant's arguments here, and luckily we will not have to. It will be useful to look briefly at his argument against Van Inwagen's answer to the special arrangement question. I will then argue that nihilists can provide a perfectly good answer to it.

I will follow Tallant in quoting Van Inwagen who writes:

> "The Xs are arranged chair-wise" is true iff they fill a chair-receptacle and satisfy certain other conditions (Van Inwagen, 1990b, p. 109).

Here a "chair-receptacle" is one of "those regions of space that, according to those who believe in the existence of chairs, are occupied by chairs" (Van Inwagen, 1990b, p. 105). He explains that chair-receptacles are filled with "rigidly interlocking wood-particles", and that there are no wood-particles outside of the chair-receptacle, etc. (1990). This ensures that wood-particles inside large trees, for instance, do not count as being arranged chair-wise.

Thus, Van Inwagen's answer to the special arrangement question is (for any kind K):

> For any Xs, the Xs are arranged K-wise if and only if the Xs fill a K-receptacle.

Tallant claims that this will not do. He argues, following Williams (2006), that if there are no chairs, for instance, then the term "chair" in Van Inwagen's definition of "chair-receptacle" will fail to have a referent. It follows that Van Inwagen's answer is useless.

It is not clear that "chair-receptacle" *will* fail to have a referent on Van Inwagen's view. There are certainly many perfectly meaningful terms which have no actual referent. And I am inclined to say that if there are no chairs then the term "chair" refers to atoms whenever they are arranged chair-wise. Still, let us grant Tallant this. It seems to me to be beside the point. No matter which semantic story is true it seems to be true that whenever people take a chair to exist there are some objects which are in a certain kind of arrangement. Why can't the nihilist say that atoms arranged chair-wise are atoms which are arranged in such a way as to be the kind of things which people point towards and say the word "chair"?

Perhaps the worry with Van Inwagen's approach (and the others Tallant discusses) is that it does not specify the collective property some objects must have in order to be arranged K-wise in terms of those objects, but rather makes reference to the linguistic practices of people. This, however, is avoidable. The fact is that whenever a chair exists it is composed of some objects which have a certain sort of arrangement. So even if there is a problem with existing strategies for defining "being arranged K-wise" there is no problem in principle with doing so. Even for the nihilist.

For example, we might say that some objects are arranged chair-wise if and only if they are of a certain kind (maybe they are wood-particles), they occupy a spatial region of a certain shape, they have certain historical properties, and so on. No mention has been made of chairs here. Regardless of whether chairs exist or not, there are objects which have the above properties. Of course, what I

said above is not the right account, but there is no reason to think that a correct answer along these lines cannot be given.[3] (Try this: Find someone who believes in chairs; draw their attention to the properties of the objects that compose the chair; now ask them to identify other objects that are arranged in the same kind of way. There is no doubt that they will be able to do it.[4] Identifying objects that have the property of being arranged chair-wise is no more difficult to identifying an object which has the property of being a chair.)

The Challenge from Commonsense

This brings us to the final objection to nihilism, and the one that I think plays the largest role in motivating orthodox realism. The objection is not so much an argument as a refusal to accept nihilism: nihilism is simply unbelievable so we should reject it. It is obvious that objects like chairs and tables exist, it is obvious that people exist; so nihilism is false, regardless of how compelling the arguments in its favour are.

I think that this is in fact a good response. However, I do not think the falsity of nihilism entails what philosophers usually think it entails. Specifically, it does not entail that the actual world is like (iii) in Figure 14. It does not entail orthodox realism.

This, I think, can be shown quite easily. Consider the ontological views in Figure 14. Is it obvious, or plain to see, or part of commonsense, (or all three) that the world is like (iii)? It is not. In fact, I doubt that non-philosophers have a view on this matter at all let alone one that favours orthodox realism. We should therefore be suspicious of this strategy for motivating orthodox realism.

[3] Of course, problems of vagueness make the task very difficult, or even impossible, to complete; but those problems also apply to the meaning of "chair"—a term which the realist wants to make use of themselves. Thus, vagueness will not help them.

[4] It may be that some will do this by first identifying chairs, but clearly this isn't necessary. Objects that compose chairs have certain features, and these can be identified quite easily, even if listing them correctly is difficult.

It is natural to endorse the following dichotomy: either we should take seriously the fact that it seems obvious, or part of commonsense, that chairs and tables exist and conclude that our world is like (iii), or we should not take facts about commonsense too seriously and instead should appeal to philosophical arguments to motivate our ontological views. I think that many metaphysicians think that something along these lines is true. (Korman (2009), for instance, provides an excellent discussion of the literature which is quite explicitly along these lines.)

The dichotomy, however, is a false one. Certainly, metaphysicians disagree about how much weight we should place on commonsense. But we are not stuck with a choice between commonsense and philosophical argument. Each has its place. All knowledge of what exists must come ultimately from the senses. Commonsense cannot tell us what exists unless "commonsense" includes facts concerning observational evidence. It is part of commonsense that there *appear* to be chairs—we should take that seriously. Commonsense also plausibly includes facts concerning the meaning of words. It is part of commonsense that water is the watery stuff found in oceans and lakes. This seems to be a semantic fact about the referent of the term "water". We should take this seriously too, for obvious reasons. However, there are also parts of commonsense that we should not take seriously. We should not take seriously the intuition that the size of objects stays constant when they move, or that solid objects have no gaps between their proper parts, or that time passes at the same rate for all objects. These intuitions have all arguably been refuted by science. The way that things seem is not always how they are.

I have no hard and fast method for determining which parts of commonsense are worth holding on to and which are not. Nevertheless, I think there are clear cases in which we should not put any stock in commonsense whatsoever. If it is

part of commonsense that objects exist for which we have no empirical evidence, then commonsense should be rejected. There is no way to intuit facts about what exists. And even if there were, this would need to be demonstrated, and not taken as an article of faith.

Most orthodox realists appear to agree with the nihilist's claim that nihilism is compatible with experience. That is, they agree that, if nihilism were true, things would appear just as they in fact do. Worlds like (i) and (ii) in Figure 14 are, on this view, empirically indistinguishable from worlds like (iii). Certainly, most orthodox realists do not offer any arguments to the contrary. Call these realists *non-emergentists*, and those who think that the additional objects in (iii) are empirically distinguishable, *emergentists*.

Note that all orthodox realists are emergentists in one sense of the term, for all orthodox realists think that composite objects have different temporal, modal, and numerical properties than their proper parts collectively (*cf.* Chapter 3). This is not the sense in which I am using the term. Nor am I using it to refer to those who think that parts and whole have different non-modal, non-temporal, and non-numerical properties. Philosophers like Trenton Merricks (2001) and probably Peter van Inwagen (1990b) think that persons are composite objects which have properties their proper parts do not have, such as consciousness. That in itself does not make them emergentists, for these differences in properties may not be empirically observable. In fact, neither seems willing to make such a strong claim.[5] As such they may still qualify as non-emergentists as I am using the term.

Non-emergentists, who, as I have said, appear to make up the majority of orthodox realists, have no good reason to be orthodox realists. This is a bold claim, but I think it can easily be shown to be true. Non-emergentists claim

[5]Merricks (2001) comes close. He claims that these differences *may* be observable. See below.

that (a) there is no way to tell which of (i), (ii), and (iii) is the actual world, by empirical means.[6] Yet they claim to know that chairs, tables, and atoms exist and that the atoms "generate" (in some sense) the chairs and tables. This claim is completely unfounded. Any appeal to obviousness or commonsense to support it is quite unjustified. How could it be obvious that we are in world (iii) if we have no way of telling we are in world (iii) on the basis of empirical evidence? The only possible response would seem to be that reason or intuition tells us so. But the idea that reason or intuition could form the *basis*[7] of our knowledge of what exists is extremely implausible, and, at any rate, I highly doubt many orthodox realists would believe such a thing.

Thus, I think it is clear that any appeal to commonsense on behalf of the non-emergentist orthodox realist is not a good one. Those who like Moorean responses like this must say why we should accept such a response in the present case. G. E. Moore is famous for arguing against general scepticism about the external world by insisting that the premise that he had hands is more plausible than the sceptical conclusion.[8] Some find this compelling, but even if it is compelling in its original form it does not seem to make for a compelling response here. This is because the premise that we are in a world like (iii) is not obvious at all. If we insist that chairs and tables can only exist in a world like (iii) then, if it is part of commonsense that such objects exist, this part of commonsense should be rejected. After all non-emergentism, plus the very plausible claim that the

[6] Assuming that one of them is the actual world, of course.

[7] It is not implausible that reason and intuition play *some* role in our knowledge of what exists; but ultimately that knowledge must be grounded on information obtained through the senses. Of course, philosophers who deny the existence of an external world, such as idealists, will not accept this claim, and this is fair enough. However, that debate is far more fundamental that the current one, and we will have to make do with the assumption (stated in the Introduction) that there is an external world and that idealism is false. On such a view it *is* completely unfounded to think that knowledge of the world can come from thought alone.

[8] However, it is not clear that the view attributed to him is quite the one he held (see Baumann, 2009 for discussion and useful bibliography).

only knowledge we have of the external world is based on empirical evidence, suggests that any commonsense defence of the claim that our world is like (iii) must be groundless. (It is also doubtful that commonsense even says that our world is a structuralist world in the first place.)

There is one line of response which we should discuss. I have argued that our only source of knowledge about the world is empirical. Merricks (2001, Chapter 4) argues that there is another.

Before discussing this point, a little background information will be useful. Merricks endorses the kind of argument I have been offering, that orthodox realists cannot defend their beliefs in ordinary composites by appeal to commonsense. He offers two arguments against such beliefs. First, if ordinary composites exist they overdetermine the effects that they cause. We will discuss this argument in more detail later in the chapter. In brief, the argument is that if composite objects existed then they would have redundant causal powers because both they and the objects that compose them would cause the very same effects. He claims that this is implausible and that we should therefore deny that most composites exist (Merricks, 2001, Chapter 3, section III). Second, he argues that the fact that our sensory experiences would be just the same if there were no composite objects undermines our claim to know that such objects exist (Merricks, 2001, Chapter 3, section III).

(I disagree with this last point, although I agree that the fact that our sensory experiences would be the same if we were in a non-structuralist world like (i) undermines our claim to know that we are in a structuralist world like (iii). These are different claims, and the one made by Merricks is stronger. My claim, after all, does not entail that our beliefs about ordinary composite objects are unjustified; Merricks' claim does.)

Since Merricks wants to say that persons exist (and are material composites),

he needs to defend this claim against his own arguments. His response to the overdetermination problem is to argue that persons have non-redundant causal powers and therefore do not overdetermine their effects. His response to the epistemic problem is to argue that we have knowledge of ourselves which is not empirical. Thus, even if persons do overdetermine the events that they cause, we can nevertheless know that we exist. He writes:

> One's evidence for one's own existence, and so for the existence of at least one human organism, is not straightforwardly sensory or even obviously causal. So even if our atoms did overdetermine all that we caused, our atoms might not wholly account for—and so might not undermine—some of our reasons for believing in ourselves (Merricks, 2001, p. 88).

Van Inwagen (1990b) also appeals to such knowledge to support his view that living things exist in the face of similar arguments against non-living composite objects.

There is a fairly obvious problem with this argument. Our introspective evidence tells us only that we exist—it does not tell us that we are material objects, much less material composite objects. Indeed it does not even clearly tell us that a *single* thing exists. For couldn't it be that we are a pluralities of objects which are collectively conscious?[9]

Merricks is aware of this problem. And he agrees that introspective evidence does not support our belief that we are organisms (and thereby presumably material composites) (Merricks, 2001, p. 120). His response is as follows:

> I am exploring whether the assumption that we exist and are organisms can hold up under the sort of scrutiny that forced us to abandon

[9]Or see Dennett (1992) for defence of an even more extreme view.

> the assumption that there are statues and baseballs. So I can rightly start off assuming that if we exist, we are organisms (see Chapter 4, introduction). And so reasons to think one exists are—given that assumption—reasons to think a human organism exists (Merricks, 2001, p. 120).

Merricks, then, claims that he is entitled to the assumption that we are material composites if we exist. Yet he is not entitled to that assumption. To see that the assumption is clearly problematic, consider what it implies when combined with introspective evidence and the orthodox view. If the orthodox view is true, and we are entitled to assume that persons, if they exist, are material composites, then our introspective evidence tells us that structuralism is true and non-structuralism false. But surely we are not entitled to conclude that structuralism is true on the basis of introspective evidence alone.

The following passage from Merricks, gives us a good idea why he thinks that we *are* entitled to the assumption in question.

> I defend some surprising ontological conclusions. But this does not imply that I am entitled to no premisses *whatsoever*. And surely I ought to proceed with premisses that seem true rather than with premisses that do not. The bits of common sense noted above seem true. So I proceed with them as premisses (Merricks, 2001, p. 87).

This sounds quite reasonable, but it is undermined by two related considerations. First, as we saw in the Introduction, the fact that Merricks' arguments suggest that so much of commonsense is not to be trusted *does* seem to undermine our practice of accepting commonsense beliefs without further justification (Korman, 2009). Merricks is right that he is surely entitled to *some* premises, but there are plenty of premises available to him which aren't of the sort undermined

by his arguments. Second, the assumption that we are material composites if we exist is *in fact* undermined by his arguments. For surely our belief that we are material composites is based on the same kind of evidence that our belief in chairs and tables is. Indeed, Merricks himself says explicitly that he takes our beliefs that we are material objects to be empirically based (e.g., Merricks, 2001, p. 85). He claims that we are entitled to take these beliefs at face value so long as they survive his arguments (which, he thinks, they do). But they do not survive. Our beliefs in ourselves survive his arguments because those beliefs are not based upon sensory evidence. However, our beliefs in ourselves *as material composites* do not survive. For those beliefs *are* based upon sensory evidence—evidence which would arguably be the same even if there were no composite objects.[10]

Thus, whereas our beliefs in ourselves arguably survive philosophical challenge, our beliefs in ourselves as material composites do not, given Merricks' arguments. So long as non-emergentism is true, there is no good reason to accept the alleged commonsense belief that composite objects in the orthodox sense exist, and therefore that structuralism is true. Unless there is an observable difference between a non-structuralist world like (i) and a structuralist world like (iii), at least in principle, there is no way that commonsense beliefs about composite objects could be justified (given the orthodox view). There is no good reason to accept orthodox realism over orthodox nihilism if non-emergentism is true.

This leaves us with emergentism. Emergentists claim that a world like (iii) is empirically distinguishable from a world like (i) or (ii). Thus, they can at least *claim* to have evidence that our world is like (iii) without committing to an implausible epistemological position. Yet most orthodox realists are not emergentists, and (I think) for good reason. In fact, as far as I am aware, orthodox realism has not been defended on the grounds that emergentism is true.

[10]So long as one is a non-emergentist, one has to accept this. For that is just what it means to be a non-emergentist.

Some philosophers do come close. Merricks (2001), for instance, thinks that emergentism may well be true:

> We humans are not causally redundant. So our atoms may not even account for the sensory experiences we cause, at least not all by themselves and without relying somehow on us. It could be, for example, that we non-redundantly cause our atoms to cause those experiences (Merricks, 2001, p. 88).

And Jonathan Schaffer (2010) argues that composite objects have properties that do not supervene on the properties of their (individual) parts. He claims that the phenomenon of entanglement means that the existence and properties of the individual particles that make up a physical system do not account for the properties of the system itself (Schaffer, 2010, p. 53).

But neither claims that this is good reason to think that orthodox realism is true. Merricks does not base his defence of realism about persons on the ground that we can see (or otherwise sense) the effects caused by the actions of persons. Schaffer, on the other hand, uses his claim to argue that an object's proper parts and their properties are grounded by (or explained by) the object which they compose and its properties.

Of course, it seems that these claims *could* be used to defend orthodox realism. If it could be shown that a full explanation of the world in terms of atoms cannot be given, then this would be good reason to believe that orthodox realism, and therefore structuralism, is true. The fact is, however, that there does not seem to be good reason to think that the atoms that compose a person do not *collectively* explain all of the effects of that person. The term "collectively" is crucial here, as Bøhn (2012) has rightly pointed out. Take Schaffer's case of entanglement. If entanglement is to be used to support orthodox realism it has to be shown

that the properties of an entangled system are different from the properties of the components of the system collectively. After all, we have seen that objects have properties both individually and collectively. It is not enough to show that a composite object has properties which do not supervene on the properties of the individual parts. Note also that the claims of physicists do not even clearly support the claim that composite objects have properties that do not supervene on properties of the individual parts. For "system" could refer plurally to the individual parts, rather than some further object. (See Bøhn, 2012, for a more detailed discussion of these issues. We will also discuss some related points in Chapter 7, section III.)

The point is that observations which may appear to support emergentism are in general compatible with non-emergentism. Observing that this atom here is invisible, and that that atom there is invisible, and that that atom over there is invisible, ..., and so on, is not good grounds for concluding that the object that the atoms compose has a property—*being visible*—that the atoms do not. For the atoms *do* have this property. They have it *collectively*.

Thus, not only has emergentism not been defended in this context, but it looks like such a defence would be very difficult indeed. It seems, then, that emergentist orthodox realism is not well supported by empirical evidence. Since we have seen that non-emergentist orthodox realism *cannot* be justified empirically because it implies that there can be no such evidence for realism over nihilism, it follows that orthodox realism in general is unmotivated.

I want now to argue that this does not mean that realism of any kind is unmotivated. Although commonsense does not support orthodox realism over orthodox nihilism—and thus structuralism over non-structuralism—it does support composition as identity, which is also a realist theory.

III. The Argument for Composition as Identity

I have argued that common sense cannot in any way support the ontological view presupposed by orthodox realism, and that other arguments given in the literature are no help either. This is quite surprising given the overwhelming tendency for metaphysicians to endorse orthodox realism.

I suspect that orthodox realism is so popular because philosophers have failed to separate the ontological and semantic components of their views. Because commonsense beliefs support realism, and realism has been conflated with structuralism, philosophers have tended to think that structuralism is true. But, as we have seen, that is a mistake. In this section I will attempt to show how disentangling these two view leads us to composition as identity. Commonsense can be used to support realism, just not *orthodox* realism.

The argument I will give for composition as identity is, in short, this. We have reason to think that atomism or some other version of non-structuralism is true. Realism about composite objects is also true. Therefore, even if non-structuralism is true, realism about composition is true. Realism about composite objects is only compatible with non-structuralism if composition as identity is true. Therefore, composition as identity is true.

More formally, the argument, which I call the *empirical argument* for composition as identity, will be:

(P1) Some form of non-structuralism is true.

(P2) Realism about composite objects is true.

(P3) Non-structuralism and realism are both true. [from (P1) and (P2)]

(P4) If non-structuralism and realism are both true, then composition as identity is true.

Therefore, composition as identity is true.

We will discuss each premise in turn.

Non-structuralism

Recall that structuralism, (as in subfigure (iii) of Figure 14) is the view that the world is structured or "layered": that at one "level" there are atoms, say, and at another there are chairs and tables. According to structuralism there are at least some objects such that a further object occupies the sum of the regions of space occupied by those objects. Non-structuralism, as we have seen, is the view that the world is "flat" or has only one level. Recall that atomism and existence monism (Figure 14 (i) and (ii) respectively) are both versions of non-structuralism. It is also possible to imagine views which are in between. For instance, instead of particles, the non-structuralist could say that the world is made up of only mid-sized objects like chairs and tables (or things a lot like them).

We have seen that arguments for structuralism are lacking. I want to argue now that, not only do we have no reason to believe structuralism, but we have reason to think that structuralism is false. My argument is this. If there are no good arguments for structuralism this gives us reason to favour non-structuralism since non-structuralist views are more parsimonious.

It is hard to say why exactly a more parsimonious theory is better, all else

being equal. However, at least one reason has to do with explanatory redundancy. If we can explain everything in terms of particles, for example, why posit any other objects? A theory which incorporates both particles and atoms is not worse because it posits more entities, but rather because some of the entities it posits play no role in explaining the way the world is. Even if we grant that parsimony is no guide to truth, it is clear that, given two theories which are exactly alike except that one posits additional entities which do not have any additional explanatory power, the more parsimonious of the two is to be preferred.

As we have seen, Merricks (2001) provides an argument along these lines which he calls the *overdetermination argument*. Suppose that there exist atoms arranged baseball-wise *and* there exist baseballs; then both of these cause the very same effects. Now suppose you throw a baseball at a window and break it. Both the baseball and the atoms arranged baseball-wise cause the window to break. Merricks argues that this causal overdetermination of effects is implausible, and for various reasons. (His argument is a close relative of the much discussed *causal exclusion argument* in the philosophy of mind. In that context the overdetermination argument is used to argue that there are no mental properties distinct from the physical properties of the brain. See e.g., Robb and Heil, 2014.)

It is not entirely clear exactly why Merricks thinks overdetermination is problematic. Sider (2003) identifies three objections that Merricks might be making. The first he calls the *metaphysical objection*. This is the objection that there is something incoherent about the idea of overdetermination. The second is the *coincidence objection*. This is the worry that systematic overdetermination is incredibly unlikely because it would be massively coincidental. The third objection is the *epistemic objection*. This is the objection we have just been discussing. The objection here is that there seems to be no justification for a belief in both atoms arranged baseball-wise and baseballs given that we need only

appeal to atoms and their properties to explain events in the world.[11]

Sider (2003) rules out the first two objections. He argues that the first objection seems to presuppose a view of causation which nobody holds. On popular views of causation, he claims, both the baseball and the atoms *do* cause the window to shatter and there seems to be no reason to think this is a mistake. The second objection fails too, according to Sider, because it is no coincidence that the baseball and the atoms both cause the window to break. After all, there are necessary connections between the baseball and the atoms that explain the correlations in their locations, movements, and so on.

He accepts that the third is a better argument, however he claims that it is not an argument against composite objects, but rather "an argument against one argument *for* those entities" (p. 6). He claims that "it only shows that such an ontology cannot be supported merely by the simple causal argument that non-living macro-entities must be postulated as causes of our sensory experience" (p. 6). But what other form of support is there? Sider suggests that "global theoretical study" is needed; however, even this must ultimately be founded upon information obtained through the senses. No theoretical study can, on its own, tell us what exists. It may help us to figure out, on the basis of empirical data, what exists. But that is not the same thing. If a world in which there are only atoms arranged baseball-wise is empirically indistinguishable from a world in which they exist together with an additional, coincident, baseballs, then no amount of theorising can tell us that we are in the world with the additional objects.

It is unfortunate that most attention from critics has been focused on the first two kinds of objection.[12] The epistemic argument is a powerful objection in itself.

[11] Merricks (2001) makes this objection explicitly in Chapter 3, page 73.

[12] It is unfortunate, but also quite understandable. As Sider (2003) points out, Merricks seems to think that the epistemic objection is not the main reason to oppose overdetermination of the sort in question. Still, the epistemic objection plays an important role in Merricks' overall argument for his position, and, even if it did not, it should do.

It is not obvious that structuralism is true. It is not obvious that whenever some atoms arranged baseball-wise break a window, there is another object which also causes the window to break. An argument for this is needed, and Merricks' point is essentially that giving one will be no easy task. If atoms arranged baseball-wise and baseballs have the same causal effects, then it is in principle quite impossible to find empirical evidence that both exist. Why then believe in baseballs?

We can compare this to a less contentious case. Suppose a man's body is found, shot with two bullets. A person is caught and admits to shooting two bullets at the man. Without further evidence, it is not reasonable to conclude that there were in fact two shooters, each of whom hit the man with one bullet (*cf.* Merricks, 2001; Sider, 2003). Such a hypothesis is extravagant—it goes beyond the data that are available.

Some may be inclined to respond to the epistemic objection by arguing that in our original case we *do* have perceptual evidence of baseballs. After all, we can see them.[13] I agree—we can see baseballs; but the issue is not so much whether we have perceptual evidence of baseballs, but whether we have perceptual evidence for *both* baseballs and atoms arranged baseball-wise. And it seems that the defender of the orthodox view cannot maintain that we do; for that would imply that we have perceptual evidence that we live in a structuralist world. Yet surely we don't have such evidence. We can't *see* that structuralism is true. After all, if structuralism were false, our perceptual experiences would be just as they are.[14]

[13]This response was suggested to me by Chad Carmichael.

[14]Merricks (2001) offers a slightly different response to this kind of objection. He points out that noone thinks belief in the existence of strange fusions (like trout-turkeys) can be supported by perceptual evidence. But since strange fusions are analogous to ordinary composites, we ought to think that belief in ordinary composites cannot be supported by perceptual evidence either. (Thanks to Chad Carmichael for bringing this to my attention.) I agree. The argument I have given explains *why* perceptual evidence cannot be used to support either the belief in strange fusions or the belief in ordinary composites.

To be clear, I think Merricks is wrong to conclude from considerations like this that there are no baseballs. On my view, we have perceptual evidence of both baseballs and atoms. My claim is simply that those who reject composition as identity cannot easily agree with me on this. In order to do so they would have to show that emergentism is true, and that is no small task.

It seems, then, that the epistemic objection is a good one. I also think the metaphysical objection is more promising than is sometimes made out, though admittedly it is far from inconclusive. Sider (2003) claims that none of the common views of causation rule out overdetermination of the kind Merricks thinks undesirable, but this seems to me to be incorrect. There are popular views of causation in which a cause and its effects are linked by physical processes, energy flow, property transference, and so on (see Schaffer, 2014). If causation is viewed in such a way—e.g., as the transfer of energy (of a "conserved quantity") from one thing to another—then there indeed does seem to be a problem with overdetermination. For instance, if energy transfer which results in the window breaking is fully accounted for by the atoms, there does not seem to be any transfer of energy left for the baseball to do. Thus, if Merricks has in mind a view of causation in which causation involves physical processes which have "biff" (as some like to say), then his distaste for overdetermination seems justified.

Of course, not everyone buys into this account of causation. Merricks argument, thus construed, is only as strong as the process view of causation. I think the real issue here, however, is not causation at all. It is explanation. The reason for citing the atoms as a cause of the window breaking is to *explain* it. Regardless of one's views about causation, our best science seems to tell us that the atoms *fully explain* the breaking of the window. This is true regardless of whether we accept that the explanation is a causal one. And there is something very suspicious about the view that the atoms *and* the baseball *each* fully explain

the breaking of the window.

Consider, for example, counterfactual accounts of causation. On these theories causal claims are taken to be claims about what would have happened had things been different. To say that A causes B, on such a view, is to say that if A had not occurred B would not have occurred, or something to that effect (Menzies, 2014). Thus, if the atoms and the baseball exist in the exact same possible worlds, as most philosophers seem to think, they both cause the window to break according to counterfactual theories of causation. So the advocate of this kind of account of causation seems to avoid the overdetermination argument, as Sider suggests. However, the counterfactual account does not warrant the move from the claim that the atoms (alone) *cause* the window to break to the claim that the atoms *explain* why the window broke. We can link the breaking of the window to both the atoms and the baseball, but we cannot link it to either one on its own—not counterfactually. For us to be able to do this there would have to be possible worlds in which one but not the other existed and caused the damage.

Thus, I think the correct analysis of *causation* is not what is really relevant here. The important claim is not so much that the atoms *cause* the window to break but that the atoms fully *account* for it. According to our best physics, the existence of some atoms, arranged baseball-wise, and moving at a certain velocity, in a certain direction, in a certain region of space, at a certain time, together with the laws of physics, guarantees (or almost guarantees) that a window in the right region of space, at a certain time, under certain conditions, will break. Whether we say that the atoms "cause" the window to break or not is not important. The physics tells us that the properties of the atoms, together with the laws of nature, explain why the window breaks. This seems to avail itself of a counterfactual analysis. If the atoms had had different properties, or if the laws of nature had been different, the window would not have broken (or would have broken in a

different way). The properties of the atoms and the laws of nature are what makes a difference to the state of the window—and what make *all* the difference. If the laws of physics are deterministic then things are quite simple. Take the laws of nature; plug in details about the atoms; and the result is a broken window.

If causal claims are counterfactual claims then causation *per se* is not what we care about in these cases. Suppose that a person called "Bob" shoots and kills someone. Suppose also that every possible world in which Bob exists, another person, Rob, also exists, and vice versa. Then according to a counterfactual account of causation both Bob and Rob cause the death of the victim. If Rob had not been around then Bob would not have been around either and the victim would not have been shot and killed. Yet surely it is Bob's actions which explain the death, and Bob's alone.

This is, of course, a highly fanciful example, but it shows that at least in principle, facts about explanation and causation (under a counterfactual account) can come apart. Even if the two are always aligned it remains the case that it is the explanation that matters, not the causation *per se*.[15]

The metaphysical objection to overdetermination can therefore be reconstrued as follows. It is incoherent to suggest both that the atoms fully explain why the window breaks and that the baseball fully explains why the window breaks. If the atoms (and the laws of nature) fully explain the window's breaking then nothing else is needed to explain it. If something else were needed then the atoms would only *partly* explain the window's breaking. And if the atoms (and the laws of nature) fully explain the window's breaking then nothing else in fact does explain the window's breaking, unless it accounts for the way the atoms are, or the atoms account for it. (For instance, an event A may cause event B which in turn causes

[15] Alternatively, one could simply conclude that counterfactual accounts of causation are incorrect. I am inclined to do just this. Not doing so seems to commit one to the view that something can cause an event without explaining that event, for the reasons stated above.

event C. B may fully account for C even though A also fully accounts for C. This is only possible because A fully accounts for B, which then fully accounts for C. Thus, A fully accounts for C. It makes no sense to say that A and B both *independently* fully account for C, regardless of whether it is true of both A and B that, if they had not occurred, C would not have occurred.)

Suppose you want to know the full story of why the world is the way it is at the present day. And suppose that I tell you that the events of the present were caused by certain events yesterday, which were caused by certain events the day before, and so on, all the way back to the Big Bang. I cannot claim that this is a *full* explanation of today's events if I also claim that God exists and that God directly (i.e., not by causing the Big Bang) caused today's events to occur, and that *this* fully explains them. The natural response on your part would be to ask, "Well, which is it?" It can't be that *both* are full explanations.

Or so, at least, it seems to me. I have no argument for this except to say that it makes no sense to me to say that an event C can be fully explained by each of two causally independent events. To say that C is fully explained by A seems to me to be to say that there are no other factors to consider when explaining C besides A (and anything linking A and C, or anything which fully explains A). It cannot be that each of A and B are all that we need to consider when explaining C. That seems to me to be a flat out contradiction.

One might argue that if this were true it would rule out genuine cases of overdetermination. For instance, if someone is shot in the heart by two people at the same time, then the actions of both shooters appear to fully explain the victim's death. I think this is compatible with what I have said. After all, the actions of neither shooter fully explain why the victim died in exactly the way she or he died (e.g., with two bullets in her or his heart rather than one). Thus, we do need to appeal to both shooters to fully explain the victim's death. The

mereological case, on the other hand, is different. The baseball has no effect *whatsoever* on the world over and above the effects of the atoms. The atoms fully explain the way the world is, to the finest detail. Appealing to the baseball gives us absolutely nothing extra. On the other hand, appealing to the second shooter in our example does add to the explanation.

I will admit that I am not certain that this argument is correct. Overdetermination is a tricky matter, and one that requires far more detailed discussion than I have given it here. (There are, for instance, apparent cases of genuine overdetermination in which two actions have *precisely* the same effects.[16] Such cases pose a serious problem for the argument I have given, and one which I have no solution to.) I do think, however, that the epistemic objection is powerful, and I know of no good response to it. So long as one thinks that our knowledge of what exists must come via the senses there is a serious problem in claiming that atoms and the objects they compose have precisely the same causal effects. If they do then they have precisely the same effects on our senses, and there is no way to know whether it is only atoms, or both atoms and ordinary objects, which exist. In such a case the best we can do is go with the most parsimonious view. The hypothesis that there are only atoms does the same work as the hypothesis that there are both atoms and composite objects, only for a smaller price. Thus, I think we have very good reason to endorse premise one of the empirical argument for composition as identity:

(P1) Some form of non-structuralism is true.

It remains, of course, to decide *which* version of non-structuralism we should

[16]Thanks to Chad Carmichael for pointing this out. An example of such a case is magic. Suppose two wizards each cast a spell to turn someone into a frog. They cast exactly the same spell, at exactly the same time, nothing interferes, and each spell has exactly the same effect on the world. This seems like a genuine case of overdetermination, and one which is immune to my defensive strategy above.

believe. But let us set that aside for now. This brings us to the second premise of the argument.

Realism

Let us return to the commonsense platitude that chairs, tables, and people exist. I have been careful to argue that common sense does not support a structuralist ontology over the non-structuralist alternatives. I do think, however, that common sense supports realism over nihilism. That is, while it is not obvious (or a part of commonsense that we should accept) that the actual world is a structuralist world like (iii), it is obvious that chairs and tables exist, and this is a part of commonsense that we should accept. Philosophers have generally assumed that these amount to the same things; but realism and nihilism are not equivalent to structuralism and non-structuralism, as we have seen.

I will say more about why I think we should accept this part of commonsense after I have finished presenting the argument. For now it is enough that the vast majority of philosophers accept that composite objects exist. They should, therefore, accept the second premise of the argument:

(P2) Realism about composite objects is true.

From this and the conclusion in the previous section it follows that premise 3 of the empirical argument is also true:

(P3) Non-structuralism and realism are both true.

We now just need to show how non-structuralism together with realism entails that composition as identity is true. (We will then return to the assumption that composite objects exist.)

From Non-structuralism and Realism to Composition as Identity

Consider an atomist world. It contains, by definition, only elementary particles. This fact is, on the face of it, in tension with the claim that realism about composite objects is true. Certainly, if we deny that elementary particles are composite objects it is hard not to conclude that there cannot therefore be any composite objects in an atomist world.

I suspect that this tension explains why almost all realists are also structuralists. If realism is clearly true, and in tension with non-structuralism, then non-structuralism must be false. We have seen, however, that such reasoning is suspect. It seems then that either realism is not obviously true or we already have good reason to think that non-structuralism is false. I have argued that in fact we have good reason to think that non-structuralism is *true*, so this might push us towards thinking that we have good reason to think that realism is false. But that too does not seem right. Surely there *are* chairs, tables, and people. What should we do?

Luckily, it turns out that there is no real tension between realism and non-structuralism. Take the claim that only elementary particles exist. As we saw in Chapter 3, it is standard to paraphrase this as "Every thing that exists is a particle." For instance, the claim that there exist only two particles is written in first-order logic as:

(2) $\exists x \exists y (Px \ \& \ Py \ \& \ \forall z (z = x \vee z = y))$

(Where "Px" is read as "x is a particle". In other words, anything that exists is identical to something which is a particle.)

Given such a reading it seems impossible that there could exist chairs and tables in our atomist world. But if composition as identity is true there are things which are identical to pluralities of things. Suppose there is something—a

molecule—which is identical to our two particles together. It is still true that all that exists is two particles. But it is also true that all that exists is one molecule.

Thus, it is incorrect to paraphrase "There exist only particles" as "Everything that exists is identical to a particle". For there may be something which is identical to the particles together. (We saw this too in Chapter 3.) Instead what we want as a paraphrase is "Everything that exists is identical to a particle or particles." And we can describe our two-particle world as follows:

(3) $\exists x \exists y (Px \ \& \ Py \ \& \ \forall z (z = x \vee z = y \vee z = (x + y)))$

("$x + y$" here is to be read as "x and y together".) (3) is consistent with the claim that a molecule exists; x and y together may be a molecule, for all it says. This demonstrates that there is a way to reconcile non-structuralism with realism. This is an important result, for we have seen that there are compelling reasons to accept both of these views. Any account which allows us to do so is therefore desirable.

The result is also important for another reason. We wondered earlier what the best version of non-structuralism was. We can now see that there is no need to decide. The very same world can be described as containing only two things, each of which are particles, or only one thing which is a molecule. Although (3) is consistent with the existence of a molecule which is identical to x and y collectively, it is also consistent with nothing but x and y existing. (All it says is that anything that exists is identical to x *or* identical to y *or* identical to x and y together. It does not say that there *is* any single thing identical x and y together.) If we want to express the fact that the world contains only two particles which are identical to a molecule we need to say:

(4) $\exists x \exists y \exists z (Px \ \& \ Py \ \& \ Mz \ \& \ z = (x + y) \ \& \ \forall v (v = x \vee v = y \vee v = z))$

(4) is consistent with the claim that only two objects exist, each of which is a particle. It is also consistent with the claim that only one object exists: a molecule. This shows that if we accept composition as identity we don't need to make a decision about which non-structuralist view is best supported by the empirical data we have available to us. Of course, we *can* make a decision. It is consistent with composition as identity that the world contains just one object and that that object has no proper parts. Adopting such a view, however, is problematic, due to our findings in Chapter 2. We saw that it is hard to make good sense of any object which lacks proper parts and also has heterogeneous properties. Thus, it seems that the data, if consistent with the existence of a single massive object at all, are only likely to be consistent with the existence of a single massive object which is identical to many smaller objects.[17]

We have not yet done enough to show that composition as identity is the only way to reconcile the two views. One might argue that sophisticated versions of nihilism generate the same result. We discussed some such accounts in Chapter 3. According to sophisticated versions of nihilism sentences like "There exist chairs" are true, and equivalent to sentences which assert the existence of atoms arranged chair-wise. The difference between these views and composition as identity is that the sophisticated nihilist denies that the referents of terms like "chair" are composite objects composed of atoms. There are numerous reasons why one might adopt such a position, but ultimately it will not resolve the tension between non-structuralism and realism. That is because realism (in this context) is not the view that chairs and tables exist—rather, it is the view that *composite objects*

[17]It is also open to the defender of composition as identity to say that deep non-structuralism of either the atomist or monist variety is true. In this case I can see no way the two views could be equivalent. It also looks like she would have to accept atomism, due to the aforementioned problems with heterogeneous properties in extended simples. The argument in this chapter still goes through on such a view, but as I said in Chapter 3 I have doubts about deep ontology of any kind.

exist. As far as I can see, the only way to resolve the tension between realism, properly construed, and non-structuralism is composition as identity.

One might object that I have not resolved the tension either. After all, I have argued only that chairs and tables exist and not that they are composite objects. This is true but easily remedied. Not only does it seem obvious that ordinary objects exist, but it is also obvious that ordinary objects are single things which are composite objects. Thus, if we have reason to think that there exist ordinary objects, we also have reason to think that these are single things. The sophisticated nihilist who denies that referents of the term "chair" are not single things, but rather are pluralities, faces the objection that referents of the term "chair" are *paradigm cases* of single things. People understood the meaning of the expression "single thing" long before scientists demonstrated the existence of microscopic particles. It is therefore quite implausible to suggest that a chair is not a single thing, but a quark is.

The claim about ordinary objects being composite objects is more difficult to establish. This is because it is possible to argue, not unconvincingly, that composition is supposed to be "generative"—that is, the type of relation which produces *new* objects. I agree that the generative view is intuitive, however it seems to me that composition is whatever the relation that holds between atoms and larger objects is. Since I believe there is no generative relation of the sort some take to obtain, I deny that composition is generative. As far as I can tell, most people who use the term "composition" do not take themselves to be automatically committed to something generative. Furthermore, on closer inspection the view that composition is generative appears to be quite unfounded. The vagueness argument arguably shows this. Composition appears to be restricted, but there is no point at which anything new comes into existence when composition occurs.

Look at it this way: if it is obvious that chairs exist, then it is equally obvious

that most chairs have legs, and that those chair-legs are proper parts of the chairs. Anyone who claims that the meaning of names for kinds of ordinary object is fixed one way and the meaning of names for mereological relations another needs to tell us why. One reason why the two might be different is if names for types of ordinary object were given ostensive definitions—e.g., by pointing and saying "Call that a 'chair"'—whereas names for mereological relations were defined by the role that they play in a theory. (An example of the latter type of term is "phlogiston" which was coined to describe a substance playing a particular functional role.) But why should we think that a word like "part" has an explicit functional definition? I am sure that I learned the meaning of "part" and other mereological terms through use and not explicit definition. (We certainly aren't taught mereology in primary school, for example.) Therefore, I think that it is not only obvious that ordinary objects exist—it is also obvious that they are composite objects.

If what I have said is right then the following English sentences are, literally and strictly speaking, true:

- "Chairs and tables exist."
- "Chairs and tables are single things."
- "Chairs and tables are composite objects."
- "Chairs and tables are composed of atoms."

If these sentences are literally and strictly speaking true then we can appeal to a simple disquotational principle to conclude that realism is true. The disquotational principle is this: If the English sentence "Grass is green" is true, then grass is green. If "chairs exist" is true, then chairs exist. This kind of principle runs into well known problems when applied to belief and knowledge etc. (see e.g.,

Russell, 1905), but it seems completely uncontroversial in the present context. In fact, I can see no possibility of rejecting it whatsoever.[18]

The principle, together with the (literal, strict) truth of the above sentences, entails that realism is true. For it entails that chairs and tables exist, that they are single things, and that they are composite objects composed of atoms. Thus, if the above English sentences are all true when understood literally and strictly, then realism about composition is also true.

And because composition as identity appears to be the only way to reconcile realism with non-structuralism we have good reason to believe the fourth premise of the empirical argument for composition as identity:

(P4) If non-structuralism and realism are both true, then composition as identity is true.

Together with (P3), (P4) entails that composition as identity is true. From the truth of non-structuralism and realism we can deduce that composite objects exist and are identical to the objects that compose them (collectively).

I see no way to avoid this conclusion without significant cost. The best approach seems to me to be to deny (P4) and argue that if non-structuralism is true then a sophisticated version of nihilism is true. The burden of coming up with a plausible account of the meanings of mereological terms like "part" falls squarely on the shoulders of anyone who chooses to go down this route, however. And I am inclined to think that any such attempt will fail. The appropriate response to anyone who claims that chairs and chair-legs exist, but that chair-legs are not parts of chairs, is, in my opinion, complete bafflement.

I suspect that even some readers who agree with this may nevertheless feel unsettled by my argument. The first two premises of the argument are well

[18]Note that the principle I am appealing to is not to be confused with the deflationary theory of truth (see Stoljar and Damnjanovic, 2014), though the two may well be related.

supported; but surely if we really thought that non-structuralism was true we would reject the second premise. That is, if non-structuralism is true, shouldn't we reject the commonsense belief that there are composite objects? I address this concern in the next section.

IV. Realism in a Flat World

Let us return to the commonsense platitude that chairs, tables, and people exist. I have been careful to argue that common sense does not support a structuralist ontology over the alternatives. I do think, however, that common sense supports realism over nihilism. That is, while it is not obvious (or a part of common sense that we should accept) that the actual world is a structuralist world like (iii), it is obvious that chairs and tables exist (and this is a part of common sense that we should accept). I have two arguments for this.

First, we saw that while it seems obvious that "There are chairs" and "There are people" are true—both literally and strictly speaking—it is not at all obvious that structuralism is true. This suggests that the claims that there are ordinary objects and that structuralism is true are not equivalent. Think of a region of space, R, which we would ordinarily say contains a chair. This is a case in which "There is a chair at R" seems to be true. Suppose we agree that there are atoms arranged chair-wise at R. It is not at all obvious whether there exists a further object. After all, what evidence do we have for such a thing if we can give a complete account of our sensory experiences by appealing only to the atoms? Taking these facts at face value it seems that we know,

(2) There exists a chair at R,

but we do not know,

(3) There exists an object at R which is not identical to the atoms at the subregions that compose R (individually or collectively).

This, I claim, gives us a *prima facie* reason to think that (2) does not entail (3). Yet, according to the orthodox view, (2) does entail (3); for a chair exists at R only if there exists an object at R which is not identical to the atoms (individually or collectively).

Of course, as is well known, one can know something and yet fail to know everything that it entails. For instance, someone can know,

(4) Mark Twain wrote *Adventures of Huckleberry Finn*,

but not know,

(5) Samuel Clemens wrote *Adventures of Huckleberry Finn*,

even though Mark Twain and Samuel Clemens are the same person.

I do not think that the present case is like this, however. One key difference between the two cases is that, if we accept non-emergentism, it seems that we know (2) but that we *cannot* know (3). This on its own is not a solution because we can envisage a case in which it is impossible for someone to know that Samuel Clemens wrote *Adventures of Huckleberry Finn*. (Perhaps he kept his identity secret.) Nevertheless, it is possible to know the proposition expressed by both (4) and (5) (assuming that they express the same proposition) just in different ways.[19] However, if non-emergentism is true, then it seems that it is (practically) impossible to know the proposition expressed by (3). Assuming that we do in fact know the proposition expressed by (2), it is not (practically) impossible to know that proposition. Thus, we have an argument that (2) does not entail (3). If it did,

[19]The claim that these sentences express the same proposition is not uncommon. See Speaks (2014).

then it could not be (practically) impossible to know the proposition expressed by (3).

For emergentists the argument is weaker, but still applies. If (2) is obviously true then we must have very good reason to think that the proposition expressed by it is true. But we have seen that we have no good reason to think that the proposition expressed by (3) is true. So (2) does not entail (3).

This is an important point, if true. For realists seem to infer (3) from (2). If chairs exist, they argue, and if chairs are distinct from the atoms that compose them, then there exists something more than just atoms. Someone can learn (5) from (4) if they know that Mark Twain and Samuel Clemens were the same person. Similarly, knowing that a chair is distinct from the atoms that compose it allows us to infer (3) from (2). Yet it is pretty clear that we do not have good reason to believe the proposition expressed by (3), much less think that it is *obviously* true. Something has gone very wrong.

The only way to know that "There exists a chair at R" is true, if the orthodox view is correct, is by knowing that there is an object distinct from the atoms at R. It is not appropriate for the orthodox realist to admit that we have no good evidence for structuralism *and then* use the obvious truth of "There exists a chair at R" to justify their belief in structuralism. That is to argue in a circle. (2) and (3) are not independent truths that can be used to support one another. They rely on the very same evidence. The orthodox realist needs good evidence to support *both* claims. Yet we have seen that there is no such evidence (or at least that none has been offered).

Compare this to a (perhaps) hypothetical argument in metaethics. Philosopher X claims that it is part of the meaning of "good" that moral facts are non-natural facts. (What exactly it is to be non-natural is difficult to say, but let us suppose that this philosopher believes that they must be spooky non-physical facts.)

Philosopher X also thinks that there is no empirical evidence for any non-natural facts and implicitly denies that there are non-empirical means to access them. But Philosopher X insists that moral claims are often true. After all, the sentence "murder is wrong" is obviously true. Hence, he reasons as follows: "There are moral facts. Moral facts are non-natural facts. Therefore, there are non-natural moral facts." Philosopher X's argument is flawed, and for the same reason that the orthodox realist's argument is flawed. If there is no way to know there are non-natural moral facts, then how can he be so sure that "murder is wrong"—as he understands it—is true?

What Philosopher X should conclude, in my opinion, is that moral facts are not non-natural facts. He may instead conclude that there are no moral facts (or that we have no reason to believe in them), but that seems the less attractive of the two options. One thing is clear, however: given his implicit views about how non-natural facts can and cannot be learned, Philosopher X should not claim to know that there are non-natural moral facts. For, by his own lights, there is no way he could know this.

For much the same reason I think we should conclude that either "There exists a chair at R" is far from obviously true or that it does not commit us to structuralism. I favour the second alternative because I think "There exists a chair at R" is obviously true. That is to say, I think that no matter which world in Figure 14 we are in, sentences like "There exist chairs" and "There exist people" are true.

This is not a thesis in the philosophy of language so I will not attempt to give a detailed argument for any particular theory of meaning. Still, I think there are general reasons to think that sentences about composite objects are often true, both literally and strictly speaking. It is widely agreed that competency in a language does not require knowing everything there is to know about the referents

of one's terms. As a consequence it is possible to be a competent speaker and yet be in error about the meaning of one's terms. For instance, one does not need to know that water is H_2O to understand the meaning of "water". In fact, one could even be wrong about the chemical composition of "water" and still know what it means.

Despite this, it seems that we can't easily be wrong about the existence of water itself. We can easily fail to know what water is, but we can't easily fail to know whether or not there is any. It is quite natural to explain this by pointing to the history of the use of term "water". The word did not magically come to refer to water. It is only in virtue of an (implicit) agreement to use the term "water" to refer to water that it does so. The term "water" was introduced to refer to the watery stuff we encounter daily on Earth. Given this, it is virtually impossible to be wrong about the existence of water. So long as there is watery stuff on Earth, there is water. And we need not know what the watery stuff is to know so.

If this story is roughly correct it is not implausible to extended it to apply to terms for composite objects as well. For instance, the term "chair" was introduced to help describe certain states of affairs—those in which competent speakers are disposed to say that a chair exists, for example. The widespread refusal of competent speakers to accept nihilism seems to suggest that speakers believe that it would take something very drastic indeed (if anything) for the term "chair" to fail to refer. Imagine a "water nihilist": someone who specifically denies that water exists on Earth. Suppose that their claim was that Earth contains no H_2O and therefore that it contains no water. Would they be right? I think not. Whatever the watery stuff on Earth is, it is water. What it would take for there to be no water on Earth is for there to be no watery stuff (in the past, present, or future). So long as there is watery stuff of the same kind as the watery stuff which was around when the term "water" was introduced, there is water. (And perhaps there

is even water if the watery stuff now is *not* of the same kind.)

Something similar seems to be true for composite objects. Roughly, so long as there is something causing our experiences as of chairs, there are chairs. Anyone who claims that there are no chairs, but admits that there are atoms arranged chair-wise, is therefore mistaken. Competent speakers' refusal to endorse nihilism is evidence of this. If the world contains only atoms, then the term "chair" was introduced to pick out atoms arranged chair-wise (even if we do not know this). Thus, I think that chairs exist regardless of which ontological view—existence monism, atomism, structuralism—is true.

We do not, therefore, need to appeal blindly to common sense to defend premise (P2) of the empirical argument. That composite objects exist is a part of commonsense that we should accept. The conviction that chairs and tables exist seems to me to based upon everyday empirical evidence combined with intuitions about the meanings of the terms "chair" and "table". Since empirical evidence is a legitimate way to gain knowledge about what exists, and since intuitions about the meanings of words are a reliable guide to the correct use of those terms, it follows that commonsense is vindicated in this case.

Of course, commonsense is often not a good guide to truth, but this is because it is not always based upon empirical data or reliable semantic intuitions. The commonsense belief that ordinary objects exist and are composed of smaller objects is one that we should retain unless it can be shown that it rests on a mistake. Since there is good reason to think it does not rest upon a mistake we should be realists about ordinary objects and about composition.

V. The Special and Inverse Special Composition Questions

The foregoing argument works in both directions. Suppose we agree that there are chairs and tables and other mid-sized objects. It is hard to deny that each of these objects has proper parts. On the orthodox view this is an open question, and one which cannot be explained by ignorance of any identity statement (as some open questions are). Any object which is extended in space can be described as having two halves. I think we should accept this as true for two reasons. First, so long as an object is extended in space the sentence "the object has two halves" seems obviously true to competent speakers. Even an extended simple (according to the orthodox view) appears to have two halves (*cf.* Markosian, 1998b). We should respect this intuition because it is indicative of the meaning of terms like "proper part" and "half". The defender of the orthodox view can insist that such an object has no proper parts, but the fact is that any competent English speaker without a particular model of parthood in mind would disagree. I see no reason to conclude that ordinary speakers are therefore wrong about the meaning of "part". How could they be? The meaning of "part" is plausibly determined by use, and not by explicit definition.

Second, we saw in Chapter 2 that heterogeneous properties like *being black and white* must be understood in terms of properties of an object's proper parts. Thus, any object which has heterogeneous properties has proper parts. The argument can be generalised to apply to all extended objects. Think of a rectangular object exactly located at a region of space s_1. There are two ways the object can be exactly located at s_1. Think of one way, then rotate the rectangle 180 degrees. That is the other way. No sense can be made of this fact unless we say that the rectangle has proper parts. If we cannot distinguish the two sides of the rectangle then we cannot make sense of its being rotated, and we cannot make sense of the

idea that there are two ways it can be exactly located at s_1.

Of course, not all objects are symmetrical. Asymmetrical objects cannot fit into the same spatial region in more than one way. But there is no reason to think that asymmetrical objects are fundamentally different tp symmetrical objects. Thus, if symmetrical objects have proper parts, so too do asymmetrical objects. (As we saw, it will do the orthodox realist no good to explain these facts by appealing to objects which are numerically distinct from the rectangle. It is impossible to account, in the right way, for the properties of an object by appealing to the properties of other objects.)

We thus have an answer to the inverse special composition question: An object is composite if and only if it is extended in space.

Our argument from the previous section also gives us an answer to the special composition question. I argued in Chapter 3 that composition as identity allows us to accept a commonsensical restrictivist answer to the special composition question. The empirical argument gives us reason to think that we *should* accept such an answer. If our reason to believe in chairs and tables comes from facts about language use, then we should draw our answer to the special composition question from facts about language use as well. We concluded that, so long as there are atoms arranged chair- and table-wise there are chairs and tables, because the meanings of "chair" and "table" are fixed by practices towards atoms arranged table- and chair-wise. The argument extends to the meaning of the term "object". The meaning of "object" is fixed by our language practices in just the same way. Only philosophers and madmen use the term "object" to refer to scattered atoms. Thus, we should conclude that scattered atoms are not objects. By similar reasoning we should conclude that there are no trout-turkeys or other strange fusions. Our argument for realism about composite objects leads

to restrictivism.[20]

Therefore, as well as being on firm ground for philosophical reasons, the empirical argument is appealing because its conclusion is compatible with commonsense beliefs about which composite objects exist under certain conditions and which objects are composite given certain properties they have. That, I believe, is another point in its favour.

VI. Implications of the Empirical Argument

If the empirical argument is sound I think it has the potential to help settle the debate about composition. So far we have seen that composition as identity stands or falls with particular views about persistence, modality, and ontology. Almost all opponents of composition as identity reject it because they are opposed to one of these views. For instance, those who reject perdurantism and stage theory, or those who reject counterpart theory will also be inclined (if not forced) to reject composition as identity as well. But the debates about persistence and modality are in something of a deadlock. There is no knock-down argument against any of the popular views, and nothing close to consensus has been reached.

The empirical argument may give us a way to make progress. If it is sound then we have good reason to reject endurantism as a theory of persistence, and we have good reason to think that modal predicates are Abelardian. And if it is right we have good grounds to narrow the field of possible ontological views, especially as they relate to counting. In my view the question of what the right ontological view is is particularly intractable. The empirical argument may help us find some traction. Settling the meanings of terms like "chair" and "table" and

[20] An exact answer to the special composition question is more difficult to offer, but it is clear that whatever the answer is, it supervenes upon our linguistic practices. If we want to know what it takes for some objects to compose another we need to uncover the rule by which people in fact judge such objects to compose something. I doubt that there is a single rule, and any rule that exists will surely be vague.

figuring out whether and when they are correctly applied seems to me to be a much easier matter than figuring out the right way to go about answering deep ontological questions.

Which side of the debate about persistence one falls on is largely a matter of which intuitions one feels most strongly about identity over time. Endurantists, for instance, insist that you and I are the very same object we were yesterday, just with different properties. Others give up this intuition for one reason or another and explain it away by appealing to an ambiguity in the phrase "the same object". The empirical argument presents a very different way into this debate. If both non-structuralism and realism are true then we have good reason to think that endurantism is false. Composite objects are generally made up of different atoms at different times. It is implausible to claim both that a composite object *is* these atoms and that composite objects endure.

The debate about modality is perhaps even more intractable. Some philosophers insist that which modal properties we ascribe to an object depends on how we think about that object (or at least that this is true in many cases—see Chapter 3). Others strongly reject this claim. How are we to settle the dispute? The empirical argument gives us a way. Realism, combined with non-structuralism, implies that one and the same thing (or things) may have different modal properties depending on how we conceive of it/them. For instance, some atoms *qua* wooden chair cannot survive an encounter with an axe, but the same atoms *qua* atoms certainly can.

If I am right, then, the empirical argument may provide a new way to make progress in two very important metaphysical debates. This is, at very least, a reason for metaphysicians to pay more attention to arguments of this type. It won't do to insist that realism is true and conclude that non-structuralism is false. Separating the ontological and semantic components of any theory of composition

is essential. Once we do so new possibilities emerge, foremost amongst them being composition as identity.

A Possible Response

I can think of one somewhat plausible way to accept the premise that all knowledge of what exists must come via the senses but deny the conclusion of my argument. In the philosophy of mathematics Platonists sometimes argue that the fact that scientists quantify over numbers gives us reason to believe in them, despite the fact that we have no direct evidence of them (e.g., Colyvan, 2001). The idea seems to be that although we do not have direct evidence of numbers our evidence, taken as a whole, and theoretically unified in the best way, implies that numbers exist. The same view might in principle be applied to defend structuralism. Although we have no direct evidence that structuralism is true, the argument might go, the best overall metaphysical picture is structuralist.

I find such an argument implausible for two reasons. First, it needs to be shown that it is possible for the structuralist features of the world to have some bearing on our total evidence. It seems, however, that it is not. If non-structuralism were true then arguably our evidence would be no different. And arguably, non-structuralism is the best explanation for the empirical data, given that it is more parsimonious. Second, we can pinpoint the precise parts of the orthodox view which are responsible for the conclusion that non-structuralism is false. The move from realism to non-structuralism is supported by the argument that composite objects have different temporal, modal, and numerical properties than their proper parts. But this argument relies entirely upon contentious assumptions. It is assumed that endurantism is true. It is assumed that counterpart theory is false. And it is assumed that one thing cannot be many. Admittedly, the last of these seems close to a truth of logic, but as we have seen there are ways to make sense

of it. For instance, we can say that what is one thing according to one way of viewing the world, is many things according to another. This may be strange but it is no contradiction. So long as the empirical evidence strongly favours non-structuralism, as I have claimed it does, we also have reason to think that non-structuralism is true. Empirical considerations should trump intuitions about difficult philosophical matters. Who, after all, can claim to have such a firm grasp on the concept of number?[21]

[21] And (as we have seen) Frege, who perhaps has the best claim of all to have a firm understanding of the concept of number, seems to have held just the kind of view the defender of composition as identity needs.

5

THE INTIMACY OF PARTHOOD

This chapter deals with realist views about composite objects. Composition as identity is consistent with nihilism, but the whole point of the view is to give a realist account of composition without the ontological commitments. The orthodox view is also consistent with realism.

Composition as identity and the orthodox view are obviously inconsistent. The goal of this chapter is to compare realist versions of the orthodox view and composition as identity. My aim is to explore where taking the orthodox view seriously leads us if we want to be realists about composition.

By "realist view" I mean any view of composition under which there exist composite objects. This includes views under which only living things exist (van Inwagen, 1990b) or only things with non-redundant causal powers exist (Merricks, 2001), but my focus will be on views which correspond more closely to common sense. The argument I will give, however, applies to all orthodox realist views.

My argument will be that we should reject orthodox realism because it cannot explain certain important facts about the correlations between the properties

of composite objects and the properties of their proper parts. I will argue that composition as identity can explain these facts.

I. Explaining the Intimacy of Parthood

We have seen that the orthodox view does much worse than composition as identity when it comes to accounting for heterogeneous properties in composite objects. The orthodox view is also at a disadvantage when it comes to accounting for the necessary connections between the existence and properties of composites and the existence and properties of their proper parts. We have already briefly discussed some so-called "principles of composition" in Chapter 1. If we want a complete account of composition we need to be able to say something about why these principles of composition hold.

I have argued that there is at least one general principle of composition under which many of the others are subsumed:

9. If the Xs compose y and y is F, then the Xs are collectively F (for any non-mereological property F).

However, for now let us focus on some less controversial cases. It seems clear that (for macro-sized objects at least) if a composite object has a colour C then its proper parts collectively have colour C. Suppose, for instance, that you have a large square of paper, creased down the middle so as to divide it into two rectangular halves. If the square of paper is grey, then the halves must be too (and vice versa).

This case poses at least three related puzzles. The first concerns necessity. Why is it that the rectangles *must* be collectively grey? The second concerns contradictoriness. Why is it that it is contradictory to claim that the square is grey and the rectangles some other colour? The third concerns knowledge. How is it

that we can know the colour of the rectangles just by knowing the colour of the square? And how do we know that the answer is a necessary truth?

Not enough has been said on these matters. In fact, many metaphysicians seem happy to simply take it for granted that necessary connections obtain between part and whole, and that we have knowledge of these connections, without asking why or how. My aim in this chapter is partly to draw attention to the importance of reconciling these facts with one's view of composition.[1] My central aim is to show that the orthodox view cannot easily be reconciled with these facts.

The Puzzle about Necessity

Let us start with the puzzle about necessity. Why is it that, *necessarily*, a large square of paper which is grey has halves which are grey? It seems that there should be some explanation for this. Why couldn't the rectangles be a colour other than grey? If the orthodox view is true this question is not an easy one to answer. Looking at Figure 15 below, it is clear that we can fill in the colour of the square independently of filling in the colour of the rectangles, just as we can ask separate questions about each (see Chapter 2). So why is such a state of affairs impossible?

A natural response on behalf of the defender of the orthodox is to say that metaphysical impossibility is governed by metaphysical laws, just like nomological impossibility is governed by the laws of nature. Or she might say that it is simply a brute fact that things must be a certain way. However, there is something very undesirable about unexplained necessities. Why is it a metaphysical law that the rectangles must be grey if the square is? If something is impossible it is

[1] Sider (2007), Cameron (2014) and Bøhn (2014a) also stress this point, but little has been said in response. (Note that Bøhn's (2014) argument is quite similar to my own in this chapter. I will not discuss his argument here because outlining the similarities and differences between his argument and my own would not serve much purpose. I also think my argument is sufficiently different to warrant separate attention.)

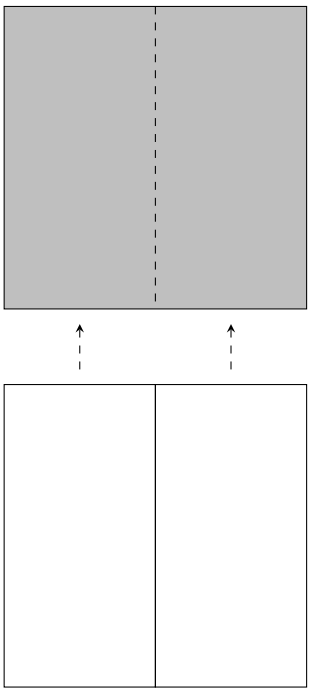


Figure 15: A large square of paper (top), divided into two rectangular halves (bottom), under the orthodox view of composition.

natural to think that there must be some reason for this. Part of the reason for this, I think, is that, if somebody claims that something is impossible, we tend to think they had better have a reason for thinking so. But if there is no explanation for the impossibility in question, how could anyone have reason to think it is impossible? Put another way, if some modal facts are brute how can we come to know them? No matter how much evidence we have that *actual* grey squares of paper have grey halves, we can never justifiably draw the conclusion that it is metaphysically necessary that grey squares have grey halves.

Orthodox realism seems to commit us to brute or unexplainable necessities. Composition as identity, on the other hand, does not. We can quite easily explain why it is impossible for the square to the grey and the rectangles some other colour: the rectangles *are* the square. It is impossible for some thing or things to be both grey and non-grey (simpliciter). If a thing is grey then it is grey and

not some other colour. But the defender of the orthodox view cannot say this. So what *can* she say?

Even if the orthodox realist is happy to countenance brute impossibilities, a problem remains; for the issue runs deeper than just what is possible and impossible.

The Puzzle about Contradictoriness

The second and third puzzles relating to our square of paper are arguably even more of a threat to the orthodox view. They generate two fiendish paradoxes, or perhaps two versions of the same paradox. The first version of the paradox is this. Imagine that I told you that I have a large grey square of paper (like the one in Figure 16) that its rectangular halves are (collectively) red. How would you respond? I think your immediate response would be to doubt that you had understood me properly, or perhaps to think that I was attempting to deceive you. Upon confirming that I in fact meant what I said, I think you would be forced to conclude that I was simply contradicting myself. That is, the sentences:

(1) The square is grey

(2) The rectangles are not grey

appear to contradict one another. The problem, however, is that it appears that (1) and (2) cannot contradict one another. To contradict oneself is to both assert and deny the same proposition. But, according to the orthodox view, (1) and (2) express propositions about different things. In what sense, then, does (1), which is about the square, express a proposition which is denied by (2), which is about the rectangles? It seems to follow that one could not contradict oneself by asserting both (1) and (2) if the orthodox view were true.

The paradox, then, is this: (1) and (2) contradict each other; but (1) and (2) cannot contradict one another.

Composition as identity yields a simple and effective solution. We start by noting that "The square is grey" and "The rectangles are grey" express the same proposition. Now, it is clear that "The rectangles are not grey" contradicts "The rectangles are grey". But since "The square is grey" and "The rectangles are grey" express the same proposition, it follows that "The rectangles are not grey" contradicts "The square is grey".

This solution is not available to proponents of the orthodox view. On that view, it seems, "The square is grey" and "The rectangles are grey" cannot express the same proposition, for they are about different things.

The Puzzle about Knowledge

The third and final puzzle is very similar. Suppose that someone were to tell us that they have a large square of paper which is grey, and that the square has two rectangular halves. Suppose then that they ask us what colour the rectangles are. We would both, I'm sure, answer "grey", without much hesitation. But how could we possibly know this? We were told *only* the colour of the square; or at least so it seems. So where did the additional information that the *rectangles* are grey come from?

We know from what we were told that the rectangles are grey; but we cannot know from what we were told that the rectangles are grey. Contradiction.

Again, the defender of composition as identity has a ready solution. If "The square is grey" and "The rectangles are grey" express the same proposition, then it is no surprise that we can know the one just by knowing the other. When we envisage the grey square we cannot help but envisage the grey rectangles; for they are the same. (Of course, in principle one might not know that one is

envisaging the grey rectangles, but it is clear than anyone competent with the concept *rectangle* would.)

And, again, this solution is not available to proponents of the orthodox view. "The square is grey" and "The rectangles are grey" do not express the same proposition if the orthodox view is true, and it is unclear how being told one could amount to being told the other.

Related Puzzles

There are a number of additional related puzzles. For instance, why is it that whenever there exists a chair there exist objects arranged chair-wise? Why *must* there be? How do we know this? And why does it seem contradictory to say otherwise?

I have just shown that such puzzles make a *prima facie* case against the orthodox view. In the remainder of the chapter, I will argue against the orthodox view in more detail. My goal will be to show that the above puzzles are as threatening as they seem to the orthodox view, and to argue that the best way to solve them is by accepting composition as identity.

II. HUME'S DICTUM

The three puzzles just presented have important connections to a principle known as *Hume's Dictum*, which is not unpopular among metaphysicians. Discussing Hume's Dictum will help us make a more rigorous case for composition as identity.

Jessica Wilson offers the following definition of Hume's Dictum in its contemporary form:

Hume's Dictum (Contemporary) There are no metaphysically necessary connections between distinct, intrinsically typed, entities (Wilson, 2010, p.

595).

The principle is closely related to the idea of brute necessities mentioned earlier. (We will see how shortly.) I believe that Hume's Dictum is true—at least under the most obvious interpretation—and that its truth provides a difficult challenge for the orthodox view.

In fact, I think it is an analytic truth. Others have thought so too. For example A. J. Ayer writes:

> What Hume is pointing out is that if two events are distinct, they are distinct: from a statement which does no more than assert the existence of one of them it is impossible to deduce anything concerning the existence of the other. This is, indeed, a plain tautology. Its importance lies in the fact that Hume's opponents denied it. They wished to maintain both that the events which were coupled by the laws of nature were logically distinct from one another, and that they were united by a logical relation. But this is a manifest contradiction (Ayer, 1956, p. 811).[2]

However, Hume's Dictum has come under attack by Wilson (2010) and Stoljar (2008) who argue that Hume's Dictum is not plausible except when understood in such a way as to make it trivial and useless.

The key issue, highlighted by both Stoljar and Wilson, is how to interpret "distinct" in the definition above. The most obvious answer, and the one I endorse, is that "distinct" should be taken to mean *numerically distinct*. Stoljar and Wilson both argue that on such a reading the principle is obviously false. Stoljar, for instance, writes:

[2] I borrow this quotation from Wilson (2010, p. 11), who in my view misinterprets Ayer. As a result I think she too quickly rules out the possibility that Hume's Dictum is analytic.

> [T]he notion of distinctness that is at issue in Hume's dictum just cannot be numerical distinctness, for if it were the dictum is obviously false (Stoljar, 2008, p. 9).

And Wilson (writing of "strong versions" of Hume's Dictum which include one on which "distinct" is read as "numerically distinct"):

> [T]here is not even a *prima facie* case to be made that strong versions of [Hume's Dictum] are analytic, on any live interpretation of the constituent notions. Nor is there even a *prima facie* case to be made that strong versions of [Hume's Dictum] are intuitively motivated, either by negative intuitions of the unintelligibility of such necessary connections, or by positive intuitions of the contingency of the connections at issue. On the contrary, what is intuitively unintelligible is how such constitutional connections could be contingent: how could a set exist without each of its members existing? how could a fusion exist without each of its parts existing? how could an instance of a determinate exist without instances of its determinables existing? And so on (Wilson, 2010, p. 801).

Both Stoljar and Wilson cite properties as counterexamples to this reading of Hume's Dictum. Nothing can be red without being coloured, for example; yet the property *being red* is (seemingly) distinct from the property *being coloured*. Wilson adds other examples including the fact that a fusion cannot exist without each of its proper parts.

Quite right. However, it is important to note that these are clear cases of *non-identical* objects or properties. If composition as identity is true, then non-identity and numerical distinctness are not the same. After all, for any x and any Ys greater than one in number, if x is one of the Ys, then x is not-identical to the

Ys. Yet clearly, x is not numerically distinct from the Ys. To count the Ys and then x would be to count x twice. Furthermore, the fact that the Ys exist entails that x exists—but there is nothing strange about this entailment since x is one of the Ys.[3] We do not need to appeal to brute necessary connections to explain it.

If composition as identity is true the same holds for an object and its proper parts. Suppose that z is identical to the Ys. Then the fact that z exists entails that x exists, without any breach of Hume's Dictum. Thus, there is a window through which we can in principle escape the objections.

But is there any motivation to escape them? I think there is. It can be demonstrated that a principle very close to Hume's Dictum is analytically true. Given a certain view of modality, Hume's Dictum follows (and is also analytic). In fact, we will see that even without that view of modality, and hence without Hume's Dictum, the related principle poses serious problems for the orthodox view.

The connection to our puzzles should be getting clearer. If Hume's Dictum, understood in terms of numerical distinctness, is true, then there can't be any necessary connections between distinct entities. It cannot be true that the existence of a chair entails the existence of some atoms arranged chair-wise if these are numerically distinct. And it cannot be true that an object's being grey entails that its proper parts are collectively grey if these facts are numerically distinct. Given that there clearly *are* such necessary connections, we have little choice but to deny the orthodox view.

[3] We discussed this point in more detail in Chapter 3.

III. Hume's Argument

Why think that Hume's Dictum is true? Let us look at Hume's argument for it.[4] In a famous passage, Hume writes:

> It is easy to observe, that in tracing this relation, the inference we draw from cause to effect, is not derived merely from a survey of these particular objects, and from such a penetration into their essences as may discover the dependance of the one upon the other. There is no object, which implies the existence of any other if we consider these objects in themselves, and never look beyond the ideas which we form of them. Such an inference would amount to knowledge, and would imply the absolute contradiction and impossibility of conceiving any thing different. But as all distinct ideas are separable, it is evident there can be no impossibility of that kind (Hume, 1739, Part I, Section VI).

As the passage makes clear, Hume has in mind cause and effect. The discussion itself is, however, quite general, although his argument is about objects and not properties: "There is no object, which implies the existence of any other..." The passage also makes it clear that Hume has in mind *numerical* distinctness. "Any other" refers to any other object—i.e., any object besides the first.

He also appears to assume a connection between conceivability and entailment. The argument, as I read it, goes like this:[5] If Hume's Dictum were false—that is, if there were an object which implied the existence of another, when both

[4]Oddly, neither Stoljar nor Wilson discusses Hume's full argument for his dictum. Perhaps if they had they would have seen that the argument is a good one.

[5]I am no Hume scholar, and am interpreting this paragraph on its own merits. It may be that my reading does not accurately reflect the view actually held by Hume. However, for our purposes the question of what Hume in fact thought is less important that the question of whether there is a view in the vicinity which is true. I claim only to answer the latter.

are intrinsically typed—then this would imply that anything else is inconceivable. However, such a thing cannot be inconceivable because distinct ideas are independent of one another.

This will need further spelling out and clarification, but it gives us the general structure of the argument, which is a *reductio ad absurdum*:

(P1) Suppose that there is an object which logically implies the existence of another (when we consider these objects in terms of their intrinsic properties alone).

(P2) If (P1) is true, then it is inconceivable that the first object exists without the second also existing (when we consider these objects in terms of their intrinsic properties alone).

(P3) For any object, it is not inconceivable for that object to exist without any other existing (when we consider these objects in terms of their intrinsic properties alone).

Therefore, (P1) is false.

(I have modified the argument slightly. Hume claims that if the existence of A implies the existence of B then anything else is inconceivable. This is not quite right, however, even if he is right about the connection between conceivability and entailment. Even on that view, if the existence of A implies the existence of B, it is conceivable that B exists without A. Only the inverse is inconceivable. Thus, in premises (P2) and (P3), rather than "anything other than both objects existing is inconceivable" I have "it is inconceivable that the first object exists without the second also existing". Note also that I use "another" and "any other" to signify numerically distinct objects, rather than merely non-identical objects.)

The first premise, (P1), is assumed for *reductio*. The argument appears to be valid. The conclusion, (C), follows from the second and third premises, (P3) and

(P2) by *modus tollens*.

We have not yet said what it means to consider objects in terms of their intrinsic properties alone, or for objects to be intrinsically typed. However, let us set this aside for the moment. It will only prove important in special cases.

It will be helpful in what follows to consider the sort of case that Hume has in mind. Think of any two numerically distinct objects which are mereologically disjoint (i.e., share no parts). (We will add mereologically overlapping objects to our discussion once we are more certain how the argument is supposed to work.) I am thinking of my desk and the chair I am sitting on, but any two such objects will do.

In premise (P2), Hume draws a connection between implication and inconceivability. Specifically, he takes it to be the case that if a sentence or proposition A implies a sentence or proposition B, then A & ¬B is inconceivable.

If A logically implies B then A & ¬B is metaphysically impossible. On contemporary accounts of implication, logical entailment is often analysed in terms of possible worlds. For instance, it is relatively common to think that A logically implies B if and only if there is no metaphysically possible world in which A is true and B false. That is, A implies B if and only if it is metaphysically impossible for A to be true and B false. Such a view, however, has some unintuitive consequences, including the fact that any sentence whatsoever implies every necessary truth. Hume may well have rejected such a view, and I myself find it objectionable. Luckily we can settle for just the left-to-right reading of the biconditional:

(3) If A implies B then it is impossible for A to be true and B false

which should be uncontroversial. (It is only the right-to-left reading which is objectionable. It doesn't seem true, for instance, that "Grass is green" entails "2 +

2 = 4".)

Returning to our imagined case, then: suppose that my chair logically implied my table's existence. Hume claims that if this were true it would follow that it is inconceivable that my chair exist without my desk also existing.

It is evident that it is not inconceivable that my chair exist without my desk existing. In fact, I could bring it about that such a state of affairs actually obtained if I wished: I could destroy my desk. From this we can see that Hume's (P1) and (P2) *by themselves* give us ground to deny many necessary connections between distinct objects. Whenever we can conceive of some thing existing without another we can conclude that the existence of the first thing does not entail the existence of the second. But Hume's argument is more ambitious than this. His goal is to argue that *no* distinct object (intrinsically typed) implies the existence of any other (intrinsically typed) object. (P3) is quite general.

Before we discuss (P3), however, we need to say what it means for an object to be intrinsically typed. We cannot get away with ignoring it any longer. In fact, even the previous argument about my chair and desk fails if we ignore it. Suppose that I conceive of my chair and *all* of its properties. That includes both its intrinsic properties and its extrinsic properties. One of its extrinsic properties is the property of *being next to my desk*. If I conceive of my chair, and I conceive of it as having this property, then I must also—in some sense—conceive of my table. The world I have imagined is one in which a chair exists and is next to the desk. I cannot then claim that the world I have imagined does not contain my desk. This, I take it, is what Hume has in mind when he adds the proviso "if we consider these objects in themselves, and never look beyond the ideas which we form of them" (Hume, 1739, Part I, Section VI).

One qualification is in order here. If we are to apply this idea to objects and their proper parts, then the notion we want is *strong intrinsicality*, as defined in

Chapter 2. Recall that a strongly intrinsic property is a property that an object has in virtue of the way that it itself is and nothing numerically distinct from it is. It is a property we can ascribe to an object without mentioning any other object. Insofar as we are considering "objects in themselves" we should be considering them in terms of their strongly intrinsic properties only.

It is clear that, if we focus only on the strongly intrinsic properties of my chair and my desk, Hume's argument goes through. He has given us a test for the presence of necessary connections. If it is not inconceivable that an object x exist without y, then we can conclude that the existence of x does not entail the existence of y. Even opponents of Hume's Dictum should find there to be something appealing about this. After all, even they wish to say that there are no necessary connections between my chair and my desk. Hume has given us a story to back this up. Opponents of Hume's Dictum will have to find some other story.

Importantly, Hume's account is also consistent with the way we think about composite objects and their proper parts. It is inconceivable that my chair exist and have the strongly intrinsic properties it has, without the leg of my chair also existing. Thus, we can say that the existence of my chair entails the existence of the leg of my chair, as seems correct.

This brings us to the most important premise of the argument, (P3):

(P3) For any object, it is not inconceivable for that object to exist without any other object existing (when we consider these objects in terms of their intrinsic properties alone).

Here Hume claims that it is never inconceivable for an object to exist without an object which is numerically distinct also existing. This is the key premise for our purposes. If he is right then it should not be inconceivable for my chair to exist without any of its proper parts. Yet it is inconceivable for my chair to exist

without any of its proper parts. (Of course, it is conceivable that the chair exists without something that was, will, or could be a proper part of it. But that is not the claim. So long as something is a proper part of the chair, one cannot conceive of the chair without it.[6]

More clearly, (P3) corresponds to the following principle:

Distinct Conceivability For any x and any y, if x and y are numerically distinct, then it is not inconceivable that only x exists or that only y exists.[7]

In a slogan: "If x and y are distinct then x and y can be independently conceived of." (I am assuming here that if something is not inconceivable then it is conceivable.[8])

This, I think, nicely captures what Hume means when he says in the quoted passage that "all distinct ideas are separable". If there are distinct ideas for distinct objects then ideas for distinct objects are separable.

Was Hume Right?

That completes our overview of Hume's argument (as I understand it). The question now is: "Was Hume right?"

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[6]It may be tempting to respond that so long as we know an object is a proper part of the chair then we know that it exists and therefore cannot help but conceive of it. However, if we conceive of an object in terms of its strongly intrinsic properties only, this is not the case.

[7]The inverse seems true as well: If it is not inconceivable that only x exists and that only y exists then x and y are numerically distinct.

It is also noteworthy that we can drop the parenthetical "when we consider these objects in terms of their intrinsic properties alone". All it takes for the consequent to be true is for it to be conceivable that only x exists. If it is conceivable that x exists when we consider only x's intrinsic properties then it is conceivable that x exists, simpliciter. The same applies to (P2). I have left the parenthetical clauses in to make the logical form of the argument as clear as possible.

[8]This would seem to hold so long as we keep fixed the notion of conceivability throughout. Some philosophers hold that there are different types of conceivability (e.g., Chalmers, 2002), and there may be cases in which one is tempted to slide from one notion to another. (Thanks to Kristie Miller for pointing this out.)

I find the argument fairly compelling. The second and third premises are, however, quite contentious. First, (P2). Hume claims that A implies B only if A and ¬B is inconceivable. It is possible to resist this move. For instance, many philosophers hold that what it is for A to imply B is for there to be no possible world in which A is true and B false. Thus, they will understand Hume's claim as:

(4) There is no possible world in which A & ¬B is true only if A & ¬B is inconceivable.

It is open to these philosophers to deny that facts about possible worlds are related to conceivability in the way that Hume thought.

Of course, there is some reason to think that Hume is right. The most obvious objection to (4) is that there are conceivable impossibilities. It is conceivable that water is something other than H_2O, one might argue, but it is necessarily true that water identical H_2O (assuming that water is in fact H_2O). We can, however, respond by appealing to a distinction between scenarios which *seem* conceivable and scenarios which are genuinely conceivable (following Kripke, 1980), or to a distinction between different types of conceivability such as *prima facie* conceivability and ideal conceivability (Chalmers, 2002). Kripke's (1980) view is that water which is not H_2O is inconceivable, because to conceive of water just is to conceive of H_2O. He argue that when we seem to be conceiving of water which is not H_2O we are in fact conceiving of something which is a lot *like* water and which is not H_2O. And it is of course conceivable that there exist a substance *like* water which has some other chemical composition. Hume, it seems, was unaware of this sort of objection, but this does not prevent him from being right.

Still, one might wish to reject (4) on other grounds. Perhaps there are brute impossibilities which, though impossible, are perfectly conceivable. I have already

alluded to a reason to be sceptical of such a view earlier in this chapter. Anyone who claims that there are things which are (genuinely, ideally) conceivable but impossible faces the challenge of saying how they, or any of us, can know that such things are impossible if that is the case. What is our guide to possibility and impossibility if not conceivability and inconceivability?[9]

We are now in difficult territory. Luckily, there is a way to bypass this debate entirely by defending Hume's Dictum on alternative, though related, grounds. I will attempt to do so shortly; however, first let us finish our discussion of Hume's own argument.

(P2), I think, is quite defensible, though open to reasonable criticism. What of (P3)? (P3) seems to me to be more difficult to defend, at least in the present context. Hume takes it to be obvious that (P3) is true. That is, he takes it to be obvious that distinct objects can be conceived of independently of one another. This claim does in fact appear very plausible; however, as soon as we try to use Hume's Dictum to argue against the orthodox view of composition it becomes clear that our opponents, or at least those among them who accept (P2), will simply deny it.

Suppose that one accepts (P2) together with orthodox realism. Then one must either say that the existence of a composite does not imply the existence of its proper parts (or vice versa), or say that one does imply the other and therefore that it is inconceivable that one exists without the other. Suppose one claims that the existence of a chair implies the existence of some objects arranged chair-wise. Then, if one accepts that (P2) is true, one must accept that it is inconceivable that the chair exists and that there do not exist any objects which are arranged chair-wise. Anyone who accepts the orthodox view of composition is therefore committed to saying that there are distinct objects—in this case, the chair and

[9]This is quite close to Bøhn's (2014) defence of Hume's Dictum. He argues that impossibility implies some sort of incoherence, if not an outright contradiction.

some other objects—which cannot be conceived of independently of one another. In fact, Wilson (2010) and Stoljar (2008) essentially make this move.

Thus, without some general argument for (P3) I think Hume's argument will not be enough to convince opponents that the Hume's Dictum is true. I think there is such an argument, though it is not as strong as I would like. (Luckily for us, we will not need it because, as I said earlier, there is another way entirely to defend Hume's Dictum.) The argument is as follows.

If x and y are numerically distinct objects then conceiving of them is, by definition, to conceive of two objects. It is possible to conceive of just one object existing,[10] and that this object be any kind of object whatsoever. Thus, it is possible to conceive of any kind of object existing without conceiving of any other object existing (for that would be to conceive of two objects existing). It seems like a only small step from being able to conceive of any kind of object existing in isolation to being able to conceive of any particular object of a certain kind existing in isolation. After all, it seems that we should be able to just stipulate that the object—a chair, say—is a particular chair (Kripke, 1980, p. 44). If this is right, I see no reason to think that we cannot conceive of a particular chair existing in isolation.

The best responses to this argument I think is to deny that it is possible to conceive of just one object if that object is something we normally take to be a composite object. For example, if one conceives of a chair as existing one cannot help but conceive of chair-parts existing as well. I think that this is quite true, but the critic must explain *why* we cannot conceive of just the chair. She claims that there exist several things: the chair, and the chair-parts. If we can separate these things in our minds enough to distinguish the chair from the chair-parts why can't we conceive of *just* the chair existing? This counter-argument is not decisive, but

[10]Markosian (1998b) uses a similar argument to argue for the possibility of extended simples.

I think it poses a serious challenge to those who wish to deny (P3).

IV. Another Argument for Hume's Dictum

It seems to me then that Hume's argument is quite strong, though perhaps not strong enough. I think that we can do better if we follow Ayer in his approach to Hume's argument. Recall that Ayer claims that Hume's point is that,

> from a statement which does no more than assert the existence of one of [the two events] it is impossible to deduce anything concerning the existence of the other (Ayer, 1956, p. 811).

In the next sentence Ayer claims that this is a "plain tautology". That is an exaggeration. And nor is what he says exactly what Hume seems to be saying. It is, however, close, and Hume's claim is close to plain tautology. If we think of conceiving of a state of affairs as entertaining the truth of the proposition that that state of affairs obtains then we can forge a clear link between Hume's claim and Ayer's. When one conceives of an object existing it seems plausible to think that one is entertaining the idea that the proposition that that object exists is true. And if one can conceive of just the object existing then one can conceive of that object existing without conceiving of any other object also existing. If our supposition is correct then one can only conceive of an object existing in isolation if there is a proposition that asserts the existence of that object without asserting the existence of any other object. From such a proposition, as Ayer notes, it is impossible to deduce anything concerning the existence of any other object. After all, the proposition asserts *nothing but* the existence of the first object.

We can now also see why Ayer takes his statement to be a tautology. "For any x, if a statement asserts the existence of x and nothing more, then the statement does not assert the existence of any object other than x," seems to be a plain

tautology. For if the statement in question "does nothing more" than assert the existence of one of the objects it does not assert that the other object exists. Thus we get:

(5) For any x, if a statement asserts the existence of x and does not assert the existence of any object other than x, then that statement does not assert the existence of any object other than x.

Certainly, *this* is a plain tautology. We can use it to fashion an alternative argument for Hume's Dictum. The trouble we had with conceivability was that our opponents are likely to deny Hume's claim that any object can be conceived of without conceiving of anything else. It is harder to deny that one can assert the existence of any object without asserting the existence of any other. We also found that some of our opponents are likely to deny that any impossibility is also inconceivable (even in a strict sense). It is more difficult to deny that there are impossibilities that are not described by contradictory statements. But, given the argument I am about to present, they must do exactly this. The question they then face is, "How do we figure out what is impossible and what is not if not by testing against inconceivability or contradiction?" I can see no easy answer.

The argument I want to give for Hume's Dictum which makes use of Ayer's tautology is the following:

(A1) Suppose there is an object whose existence logically implies the existence of another (when we consider these objects in terms of their intrinsic properties alone).

(A2) If (A1) is true, then it is impossible to assert that the first object exists without also asserting that the second does (when we consider these objects in terms of their intrinsic properties alone).

(A3) For any object, it is possible to assert that that object exists without asserting that any other object exists (when we consider these objects in terms of their intrinsic properties alone).

Therefore, (A1) is false.

The first premise, again, we assume for *reductio*. The second premise, (A2), draws a connection between logical implication and assertability. The third premise, (A3), states that it is always possible to assert that an object exists without asserting that any other object exists. Unlike (P3), (A3) is extremely plausible. If one can assert that x and y exist then surely one can assert that x exists without asserting that y exists. Of course, if one asserts that x exists *and* bears some relation to y then one has indirectly asserted that y exists as well. Hence the parenthetical proviso.

I think that (A2) is also quite plausible, though I expect many will disagree, at least initially. The idea behind (A2) is that logical entailment concerns what can be *deduced*, in some sense, from a claim. If A implies B then, in some sense, B can be deduced from A. This, I think, is implicit in Ayer's description of Hume's view. I say "in some sense" because there are clearly entailments that cannot be deduced in the usual sense. For instance, before the discovery

that water is identical to H_2O "there exists H_2O" could not be deduced from "there exists water." Yet, the former entails the latter. Still, there is a sense in which one *can* be deduced from the other. The proposition expressed by "there exists water" is deducible from the proposition expressed by "there exists H_2O". (After all, they are the same proposition, and any proposition follows from itself.) The problem arises because in many cases we do not know which proposition a sentence expresses.

Setting aside the point about deduction, the idea is simply that, if A implies B, B follows from A. We can make better sense of this point if we look at the notion of an inconsistent statement. If A implies B, then A & ¬B is inconsistent. And what is an inconsistent statement but a statement that both asserts and denies the same proposition? If I say the world is one way, and in the next breath say it is another way, then I say something inconsistent—I contradict myself. Importantly, inconsistency is not just a formal feature of sentences. A & ¬A is inconsistent, but so too is "There exists water and it is not the case that there exists H_2O". Thus, if A & ¬B is inconsistent it is because A asserts a proposition that ¬B denies. Given that ¬B denies the proposition asserted by B, we can also conclude that there is some proposition *p* that both A and B assert. (We cannot, of course, conclude that this is the *only* proposition that A and B assert.)

It follows from these facts that, whenever A and B are contradictory, it is impossible to assert the proposition expressed by A without denying the proposition expressed by B. This gives us the following principle:

Inconsistency If A & ¬B is inconsistent, then it is impossible to assert the proposition expressed by A without denying the proposition expressed by B.

Given that, if A implies B, then A & ¬B is inconsistent, (A2) becomes

a consequence of *Inconsistency*. If the existence of an object, x, implies the existence of another object, y, then the sentence,

(6) x exists and y does not exist,

is inconsistent. From *Inconsistency* it follows that it is impossible to assert,

(7) x exists,

without denying,

(8) y does not exist.

Of course, to claim that a sentence is false is just to assert that its negation of true. Thus, denying (8) is equivalent to asserting (9) below.

(9) y exists.

Thus, if the existence of x implies the existence of y it is impossible to assert that x exists without also asserting that y exists.

This seems to me to be quite correct. And it is incompatible with (A3), which states that, for any numerically distinct x and y, it is always possible to assert that x exists without asserting that y exists. Hence, if (A2) and (A3) are true (A1) must be false.

The only plausible way to deny (A2) seems to be to deny the link between implication and contradiction, or to deny that contradiction works as I have claimed. These amount to essentially the same response. And it is a response which is quite defensible. If one holds that logical entailment is to be understood in terms of possible worlds in the usual way, then it is plausible to hold that it does not follow from the fact that A implies B that A asserts a proposition which ¬B denies. There is, for example, no possible world in which "grass is green"

is true and "$2 + 2 = 4$" false. But it seems false that "grass is green" asserts a proposition which "It is not the case that $2 + 2 = 4$" denies.

Although such a response is quite defensible, it fails to undermine the argument in any way that should worry us. All we need to do is insist that there is another way to understand logical entailment and that "logically implies" in (A1) should be read in this way. I claim that there is such a way—the way outlined above.

Of course, one might think that taking this path will cause us some difficulty in that it may block the link between our argument and the contemporary statement of Hume's Dictum:

Hume's Dictum (Contemporary) There are no metaphysically necessary connections between distinct, intrinsically typed, entities (Wilson, 2010, p. 595).

After all, Hume's Dictum in its contemporary form speaks of "necessary connections" and not "logical implication". One might argue that necessary connections are to be understood in terms of possible worlds. Understood in this way Hume's Dictum asserts that, for any two numerically distinct, intrinsically typed, entities there is a possible world in which both exist, and there are possible worlds in which just one or the other exists.

We have two options here. The first is to simply deny that "necessary connections" in the above statement is to be understood in such a way. The second is to give an argument linking logical entailment and facts about possible worlds. The latter option seems preferable, given that we will need some account of what grounds truths about possible worlds anyway. If logical entailment can do the job, then why say anything more?

I do think that logical entailment, understood in the natural way (i.e., as a relation of *following from*), can do the job. Suppose that someone said otherwise—that there are impossibilities such that the sentences expressing them are not inconsistent (or such that they are not inconceivable). Then they would face the challenge of explaining *why* such things are impossible.[11] The only answer would seem to be "They just are." Even if we accepted that there are brute modal facts, it would still need to be explained why we should believe in those particular brute facts. For instance, suppose we are told that there is no possible world in which my chair exists and my desk does not. If the sentence "Chair exists and Desk does not" (where "Chair" is a name for my chair, and "Desk" a name for my desk) is not inconsistent, and if it is not inconceivable that just my chair exists, then what reason could we possibly have for believing what we have been told?

Thus, there does seem to be a plausible link between logical entailment, as we have been understanding it, and possibility/impossibility. Without conceivability or consistency as a guide we seem to lose all grip on what is possible and impossible. This gives us reason to think that these are the only means to get to the modal facts. Even if there are modal facts which are not settled by facts about conceivability and consistency, what hope do we have of discovering them? It is one thing to say that there are additional modal facts like this, but it is quite another to claim to know what they are.

I think, therefore, that the argument I have given for Hume's Dictum is successful. There is no object whose existence logically implies the existence of any other, when we consider these objects in terms of their intrinsic properties alone. In fact, we will soon see that even if we grant that the argument does not

[11] Bøhn (2014a) makes essentially the same argument for Hume's Dictum. He also uses Hume's Dictum to argue for composition as identity, though his argument is somewhat different than the one presented here. I also think that my own argument for composition as identity is stronger, given that it doesn't depend on the claim that all impossible states correspond to inconsistent sentences/propositions. (See below.)

establish the truth of the contemporary version of Hume's Dictum, we still have a powerful argument against orthodox realism.

The Counterexamples Revisited

The problem of the counterexamples raised by Stoljar (2008) and Wilson (2010) still stands. They argue that there are cases in which Hume's Dictum obviously fails to apply. For instance, a composite object cannot exist, with the strongly intrinsic properties it has, without each of its proper parts also existing. And an object cannot instantiate certain properties (e.g., *being red*) without also instantiating certain different properties (e.g., *being coloured*).

Both counterexamples are problematic in the present context because they assume a particular view of numerical distinctness that the defender of composition as identity will reject:

Non-identity Principle For any x and any y, x and y are numerically distinct if and only if x and y are not identical.

Given that a composite object is not identical to any of its proper parts by definition, the truth of this principle guarantees that a composite object is numerically distinct from each of its proper parts. If composition as identity is true, however, that is false.

We have already seen why. Neither x nor y is numerically distinct from x and y together (the Zs). The existence of x and y (the Zs) implies the existence of x, even though x and y together are not identical to x. Thus, the non-identity principle is false for plural quantification. It is also false if composition as identity is true since composition as identity is based upon plural quantification. I will not reiterate the point here. We do need to say, however, what the relation between an object and each of its proper parts is.

Following Armstrong (1978) and Lewis (1991), let us say that x is *partially identical* to the Zs, whereas anything that is not one of the Zs is numerically distinct from them. The same goes for an object and its proper parts if composition as identity is true. Let v = the Zs. Then x is partially identical to v. Any y which does not overlap v is numerically distinct from v. Thus, whenever "two" objects mereologically overlap, they are partially identical. Whenever they are mereologically disjoint, they are numerically distinct. (Alternatively, we could make a distinction between two kinds of numerical distinctness, but this approach seems both more likely to cause confusion, and is also one which fails to respect the connection between numerical distinctness and counting. If we were to go down this route we would also have to reformulate Hume's Dictum to specify which type of numerical distinctness is involved.)

Now we can respond to the counterexamples by simply denying the non-identity principle. A composite object is not numerically distinct from each of its proper parts, and an object's being red is not distinct from its being coloured. Thus, these are not counterexamples to Hume's Dictum at all. If we assume that composition as identity is false then we have reason to reject Hume's Dictum; but, as I have argued earlier in the thesis, composition as identity is far from obviously false. Furthermore, I have just shown that Hume's Dictum is extremely plausible on independent grounds. Anyone wishing to block the argument from Hume's Dictum to composition as identity cannot do so by assuming that composition as identity is false.

The case of properties requires further discussion. Bøhn (2014a) recommends restricting Hume's Dictum to objects, thus rendering the property counterexample irrelevant. This is certainly one option. As he argues, the intuitions that make Hume's Dictum seem plausible concern objects and not their properties. However, I prefer to respond by saying that the property *being red* is not distinct from

the property *being coloured*.[12] The argument I have given for Hume's Dictum suggests that a sentence does not entail that a certain state of affairs holds unless it asserts that such a state of affairs holds. The point is quite general, and would seem to apply equally to the existence *and* properties of objects. If a sentence asserts that an object has property F and nothing more, then it entails nothing more than the fact that the object is F.[13] Thus, if the sentence "*a* is red" entails the sentence "*a* is coloured" it must be that "*a* is red" asserts the proposition that *a* is coloured. At very least we can conclude from this that the states of affairs of *a* being red and that of *a* being coloured are not distinct. And I see no way for this to be the case unless the properties *red* and *coloured* are themselves not distinct. That is, when we say "*a* is red" or "*a* is coloured" it seems to me that we must be describing the same state of affairs, but to different degrees of detail. (The difference being that former claim is more specific than the latter.)

Regardless of the correct solution it is clear that *some* solution is required. It will not do to simply take for granted, as Stoljar (2008), Wilson (2010), and others do, that there are necessary connections between distinct existences. After all, as metaphysicians we should ask *why* it is that anything which is red is coloured. When one thinks about it more closely, it becomes clear that one simply cannot imagine a red thing which is not coloured, and this is because being red is one way in which something can be coloured. But that suggests that being coloured is just a matter of being red, or being blue, or being green, and so on. It is not some further property which is mysteriously linked to these others. Hence, we have at our disposal a promising response. Our opponents can reject it, but then they must offer their own solution. Simply assuming that there are necessary connections of the kind in question begs the question against the defender of

[12] Bøhn (2014a) is aware of this response too.

[13] One might think that this is false, given that "*a* is F" entails "*a* is F or *a* is G". However, the latter is a weaker claim: it asserts nothing more than the original. It is consistent with what I said that the sentence entails *less* than the fact that the object is F.

composition as identity.

V. An Argument for Composition as Identity

If Hume's Dictum is true then we have more rigorous grounds on which to base the arguments given earlier in this chapter. Recall, the large square of paper, divided into two rectangular halves. If Hume's Dictum and the orthodox view are true then it seems that it should be possible for the large square of paper to (a) exist without either of its halves existing, and (b) be grey without either of its halves being grey.

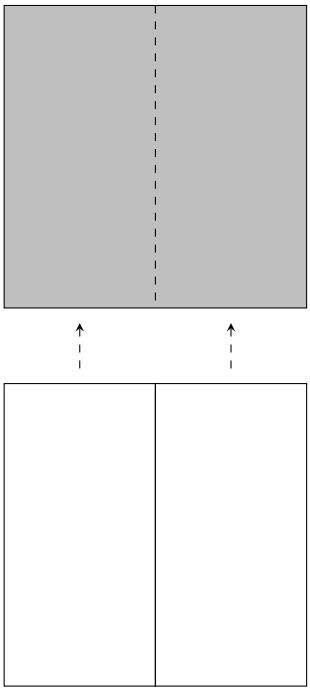


Figure 16: A large square of paper (top), divided into two rectangular halves (bottom), under the orthodox view of composition.

Figure 15, (shown again here as 16) provided intuitive support for this claim. We can now see more clearly why. What is possible and impossible is closely tied to logical entailment, and logical entailment is explained in terms of shared

propositional content. Any statement which is about the square alone, expresses a proposition about the square *alone*, and therefore does not express a proposition about any other object or objects, including the rectangles. This, according to our account of logical entailment, means that such a statement does not entail any fact about the rectangles. For nothing about the rectangles follows from a statement about the square alone.

This will likely to arouse suspicion, so it is worth going through the reasoning one more time. It is possible to make a claim about the square and only the square. For instance, the sentence,

(10) There exists a square which is grey

expresses a proposition about the square and about no other object.

If possibility and necessity are to be explained in terms of logical entailment and there is no possible world in which (10) is true and (11) below is false,[14] then plausibly (10) entails (11).[15]

(11) There exist two rectangles arranged square-wise which are (collectively) grey.

It is clear, however, that (11) does not follow from (10) given the orthodox view. We can see this very clearly if we consider the negation of (11):

(11′) It is not the case that there exist two rectangles arranged square-wise which are (collectively) grey.

[14] If you think that there is such a possible world, then choose a different example in which what I say here holds. (Even if it is possible for the square to exist without the rectangles, perhaps it is impossible for the rectangles to exist, and be arranged the way they are, without the square existing. This, in fact, is a common view as we have seen.)

[15] The only other explanation would be that (10) and (11) are necessary truths, which is clearly not the case.

If (10) entails (11) then (10) and the negation of (11) should be inconsistent. That is, (10) should assert a proposition which (11′) denies. But we agreed that (10) expresses a proposition about the square only. Thus, (10) does not assert a proposition about anything other than the square, including the rectangles. (That is, if the orthodox view is true, of course.) It follows that (10) and (11′) cannot be inconsistent with one another.

The argument should be quite worrying for proponents of the orthodox view. If it is sound, then it cannot be the case that there are necessary connections between the square and the rectangles, even though the rectangles compose the square. More generally, if the argument is sound then all of the principles of composition discussed at the beginning of the chapter are false. This is extremely difficult to believe. Thus, if the argument is sound we have good reason to reject the orthodox view of composition.

The solution if we accept composition as identity is simple. (10) entails (11) because (10) and (11) express the same proposition. (10) and (11′) are inconsistent with one another because (10) asserts a proposition which (11′) denies (namely, the proposition that a square exists).

Defenders of the orthodox view may be tempted to respond by rejecting the account of possibility and entailment we have been working with. For instance, they may wish to deny that all sentences expressing impossibilities are inconsistent. I have already given reasons to think that such a response is unappealing, but let us set these aside. The orthodox view still faces serious problems.

As we saw at the beginning of this chapter, not only does it seem impossible that the rectangles be any colour but grey, but it also seems that anyone who claims that the square is grey and the rectangles are red *contradicts* themselves. If this is right, the fact that there are impossibilities which are not associated with inconsistent sentences does not help the defender of the orthodox view. For our

case does not appear to be one of those impossibilities. And in fact most, if not all, of the principles of composition appear to be like this. So the defender of the orthodox view must explain how (10) and (11′), for instance, can be inconsistent (or deny that they are).

I can see no alternative to the account I have offered. To contradict oneself is to both assert and deny a proposition. If I say that an object is square and that it is not square I contradict myself because I say that the square is one way and also that it is not that way. In what sense does (11′) say that the square is not grey? If the orthodox view is true and (11′) says something about the rectangles alone, then it quite simply cannot say this. If, on the other hand, composition as identity is true, it is perfectly compatible with (11′) saying something about the rectangles only that it also says something about the square. After all, to say something about only the rectangles on this view is to say something only about the square. For the rectangles and the square are identical.

The orthodox view also faces the problem of explaining how *knowledge* of the square amounts to knowledge of the rectangle. If one knows that (10) is true, for instance, then one also knows that (11) is true. But how could this be if (10) and (11) express propositions about different things? How can knowing something about the square amount to knowledge of any other object or objects? The point is closely related to our account of logical entailment. My claim is that if A entails B, then B *follows from* A. Similarly, if A entails B, then knowing that A is true may be enough to know that B is true.

(I say that it *may* be enough because even if one knows the proposition expressed by B one may not know that the sentence B is true. We have already seen cases like this. Someone can know that "water exists" is true without knowing that "H_2O exists" is true. Someone can know that water exists without knowing that H_2O exists, too, but only taken in a certain way. Someone cannot

know that water, *the very stuff*, exists without knowing that H_2O, *the very stuff*, exists.[16] The key point is that, whenever A entails B, we can say that B expresses information which A also expresses (perhaps among other things). Whether someone knows *what* information the sentences express is another matter.)

Proponents of the orthodox view face the challenge of explaining how knowledge of the truth of one sentence can lead to knowledge of the truth a different sentence about a completely different subject. If composition as identity is true, the challenge is easily met. Anyone who knows that (10) is true, and knows what it means, knows that the proposition that (10) expresses is true. Given that (10) and (11) express the same proposition if composition as identity is true, they also know that the proposition expressed by (11) is true. Of course, one may not know that the *sentence* (11) is true. I would suggest that we do have such knowledge. When we imagine a scenario in which (10) is true, we then test this scenario against (11) to see if (11) is also true. We find that it is. This accounts for why we take it to be impossible for (10) to be true and (11) false, for why we take (10) and (11′) to be inconsistent, and also for why we take ourselves to have knowledge of (11) when we are told (10).

The question is, "Can the proponent of the orthodox view vindicate this behaviour?" I think the answer is "no". If (10) says something *only* about the square it follows from the truth of the orthodox view that (10) does not say anything about the rectangles. Thus, advocates of the orthodox view should say that anyone who, in imagining a scenario in which a square exists and is grey, and nothing more, also imagines two rectangles which are grey, has made a mistake. Such a person must be allowing additional information not expressed by (10) to slip into the picture. That, however, does not seem to be the case.

[16] The difference is between a *de re* and *de dicto* reading of the sentence.

VI. RESPONSES

The orthodox view is in trouble. How might opponents of composition as identity respond? The most straightforward response is to simply deny the phenomena. This is consistent with two views. The first is nihilism. If nihilism is true then all of the principles of composition are false. I want to set this response aside until the next chapter. I will argue there that we have good reason to think that nihilism is false. The second is contingentism. On this view the principles of composition may be true, but they are not necessarily true. The contingentist will also have to deny that it is contradictory that the square is grey and the rectangles that compose it red. Furthermore, she will also have to deny that our knowledge of the colour of the rectangles, if we have any at all, is not as strong as it seems. We will discuss this view at the end of the section. For now, let us consider responses which are available to those who wish to accept the intimacy of parthood and accept all or most of the principles of composition we have discussed as well as their necessary truth.

I do not know what kind of view about necessary connections most orthodox realists have in mind. This in itself is another mark against orthodox realism, another way in which it is incomplete. Perhaps many orthodox realists think that these connections are just brute modal facts, or modal facts which supervene upon facts about external metaphysical laws which work much like nomological laws. However, we have seen that neither view is appealing. First, it is not at all clear why we should believe there are any impossibilities which can be consistently expressed. (For that must be the claim. If all sentences which express impossibilities are inconsistent, then my argument demonstrates that the principles of composition are not necessarily true under the orthodox view.) And even if we grant that there are such impossibilities, what reason do we have to think that the negations of the principles of composition are among them? What

reason is there to think that the, on this view, consistent sentence "The square is grey and the rectangles that compose it are (collectively) red" expresses a necessary falsehood?

Second, even if we ignore these problems, such an account cannot explain the fact that "The square is grey and the rectangles that compose it are (collectively) red" *is* contradictory, nor how we can know the rectangles are grey just by knowing that the square is. One possible explanation is that when we conceive of the grey square of paper we also implicitly assume the existence of a metaphysical law which guarantees the existence and properties of the two rectangles. There are, however, problems with such a response. One problem is that it simply doesn't seem to be true that we implicitly assume anything like metaphysical laws when we conceive of possible states of affairs. Compare how we treat nomological laws: I can conceive of things both as they must be according to the laws as I take them to be, and I can also conceive of things as they could be if the laws were different. Nothing like this seems true in the present case. In fact, if I am assuming metaphysical laws when I conceive of the paper square, then I cannot fail to assume them. I simply cannot conceive of a situation in which they do not hold. In what sense, then, am I assuming them to be true?

Another reason to doubt this response is that it merely pushes the problem back; for now we need to be told how people come to know the metaphysical laws. Insofar as we know there are any nomological laws at all, we know what they are based upon repeated observation of the world. But it is implausible that we could know necessary metaphysical laws in this way. The problem is as above: we cannot even countenance, for instance, the principles of composition not holding. But if we cannot even countenance a law *not* holding, in what sense can we be said to know it holds on the basis of experience? Rather, principles of composition seem to be known a priori. If this is right, the question is: "How

do we know them to be true a priori?" I cannot think of any plausible answer available to proponents of the orthodox view. "Intuition" is a poor answer which, at best, can only be the start of an explanation.

Are there any other responses available to the orthodox realist? There are; though I will argue that they are not particularly attractive either.

The arguments I have put forward rest on two key claims:

(i) It is possible to assert something about an object without asserting anything about any other object.

(ii) A sentence which asserts something about an object without asserting anything about any other does not entail any sentence which asserts something about of any other object.

The second of these claims I take to be analytic given the way we have been understanding entailment. My opponents cannot therefore claim that it is false (though they may claim that it is wrongly applied in my arguments). The first seems like the best place to attack. Although it seems clearly true, one might deny that the cases we have been discussing are cases in which this possibility arises. In fact, we have already discussed a view along these lines in Chapter 2. The view was that the property *black-and-white*, had by a composite, is really the property of having proper parts, some of which are black and some of which are white. We can say the same thing about the square. That is, we can say that the sentence "The square is grey" is equivalent to the sentence "The rectangles are grey" because the property *being grey* had by the square is really the property of having proper parts which are grey. On this view it is impossible to say something about the colour of the square without saying something about the colour of the rectangles. If this view is correct then my argument fails. For my argument to be successful, it must be that the existence of the square, when intrinsically typed,

entails the existence of the rectangles. This response says that my examples do not involve (strongly) intrinsically typed entities, and therefore that Hume's Dictum does not apply.

One advantage of this response is that it allows for a pleasing consistency in how we treat cases. We can adopt this view both to account for heterogeneous and homogeneous properties of composites, and to explain why the properties of composites and their proper parts are often necessarily connected. It is worth noting, however, that it works only for cases in which there are necessary connections between the *properties* of objects. It seems that not only does the greyness of the square imply the greyness of the rectangles, but the *existence* of the square implies the *existence* of the rectangles. One can't say that what it means to say the square exists is just that the rectangles exist—at least not without becoming a nihilist.

Even setting this point aside, the response is not at all plausible. For, as we have seen in Chapter 2, adopting such a view means denying that composites themselves have colour properties at all. It is also practically incompatible with heterogeneous extended simples, and with the possibility of gunk. Finally, and perhaps most importantly, the statement "The square is grey" appears to be about the square and its properties, not about the properties of any other objects. These seem to me to be serious costs.

There is, however, a similar but more sophisticated response available, which I take to be the best response available to the orthodox realist: she can appeal to the idea of a *superinternal relation* (Bennett, 2011; Cameron, 2014). According to Cameron (2014), an internal relation is one which holds whenever the relata exist (and holds in virtue of that fact). More precisely,

Internal Relation A relation R is *internal* iff$_{df}$ necessarily, for all x and y, if Rxy then necessarily, if x and y exist then Rxy obtains in virtue of the existence

of x and y. R is *external* otherwise (Cameron, 2014, p. 4).[17]

A *superinternal* relation is then one which obtains in virtue of just one of the relata existing:

Superinternal Relation A relation is *superinternal* iff$_{df}$ necessarily, for all x and y, if Rxy then necessarily, if x exists then y exists in virtue of the existence of x and Rxy obtains in virtue of the existence of x (Cameron, 2014, p. 6).

The idea is that there may be cases in which, given one object, we get another "for free". In other words, there may be circumstances in which objects, simply by existing "generate" other objects. Cameron suggests that composition is just such a case.

Clearly, the definitions given by Cameron (and cited above) only apply directly to relations which hold between *one* object and another, but it is easy enough to extend them to apply to many-one cases also.

Cameron also wants his account to cover the relations between the properties of composites and the properties of their parts. The definition of "superinternal relation" does not cover this case either. Cameron does not say so explicitly, but he appears to take principles of composition to hold in virtue of the existence of what he calls *superintrinsic* relations:

Superintrinsic Relation A relation R is *superintrinsic* iff$_{df}$ necessarily, for all x and y, if Rxy then necessarily, if there is a duplicate s of x, then y exists in virtue of s having the intrinsic nature it has, and Rsy obtains in virtue of s having the intrinsic nature it has (Cameron, 2014, p. 6).

[17]Note that this is not the standard way of characterising an internal relation (Cameron, 2014). For our purposes it makes sense to follow Cameron given that we will be discussing his view. One might also prefer his definition for the reasons he cites in his paper (Cameron, 2014, p. 5).

This covers the sort of case he has in mind. For instance, he writes:

> [I]n general, a derivative object inherits its properties from what gives ground to it, in that the properties of the derivative thing supervene on the properties of the things that ground its existence. And this is true because the derivative object has its properties in virtue of the features of its grounds (Cameron, 2014, p. 8).

Cameron thinks this allows us to explain the intimacy of parthood. He argues that all one needs to do to create a composite object, fo example, is to create the proper parts and arrange them in the right way. The composite object is then had for free—it is "generated" by the proper parts, in virtue of the way they themselves are. To illustrate this point he deals with a problem which is similar to ours: Why must a thing which has a red proper part be partly red? His explanation is that a composite object has its colour in virtue of the colour of the objects that compose it.

Can we apply this solution to our case, and, if so, is it a good solution? We can certainly apply the solution to our case, although it requires reversing the direction of dependence. In our case we want to explain why the proper parts have a certain property given that the composite object has this property. So let us say that the rectangles have their colour in virtue of the colour of the square. Does this solve the problem? Not immediately. The answer given only tells us that there is *some* relation between the colour of the whole and the colour of the proper parts—it does not tell us what that relation is. It looks like Cameron will need to appeal to various principles of composition (and decomposition) to get the desired result. These themselves will either need to be explained, or left as brute facts. We will discuss the costs and benefits of this shortly. Before doing so we need to see what Cameron's view implies regarding Hume's Dictum.

It seems that Cameron's strategy is essentially to deny that objects like the square of paper can be intrinsically typed. For Cameron (or rather, for someone who holds an inverted version of Cameron's view on which the whole generates the parts) the mere existence of the square of paper guarantees the existence of the rectangles, because the square "generates" the rectangles. Thus, it seems that on this view to say that the square exists is to say that something which generates two rectangles (arranged square-wise) exists. That is, it is in the nature of the square to generate the rectangles. Although it is difficult to say exactly what Cameron has in mind, it seems to me that the claim is, at its core, that objects like the square have *extrinsic* essences, or at least essences which are not strongly intrinsic. To say "There exists a square of paper", is to commit oneself to the existence of two rectangles of paper, whether one knows it or not.[18] Thus, claims which seem to be about a particular object *only* are really about other objects too. In much the same way that a claim like "There exists a person who is a sister" implies the existence of at least two people, so too do claims like "There exists a person" imply the existence of more than one object on Cameron's view.

If this is right then Cameron's view is one way to accept Hume's Dictum without also accepting composition as identity. Not only does it purport to explain the necessary connections between composites and their proper parts, but it also explains why "There exists a paper square which is grey" and "It is not the case that there exist two paper rectangles arranged square-wise which are grey" seem inconsistent. If a square of paper is something which by its very nature "generates" smaller pieces of paper, it is inconsistent to assert that such a square exists while denying that any smaller pieces of paper do.

Still, there seem to me to be several reasons to judge it to be an inferior option.

[18]Of course, one might object to the details of the case. I do not mean to suggest that Cameron, or others who hold this view, need to accept that it applies in this particular case. Cameron could argue, for instance, that extended simples are possible, and that it is therefore possible for the square to exist without the rectangles.

First, it is not clear that the superinternalist response can account for all necessary connections between part and wholes. Cameron, for instance, thinks that the properties of the proper parts explain the properties of the whole. But in that case, how are we to explain the fact that the properties of the proper parts seem to depend on the properties of the whole also? Cameron's claim is that something like the following is true. If there exist objects arranged chair-wise, then there exists a chair (which exists in virtue of this fact). This explains why there exists a chair whenever there exist objects arranged chair-wise. But how can we explain the fact that there exist objects arranged chair-wise whenever there exists a chair? If we say that the chair exists in virtue of the objects then we contradict our earlier claim. The existence of the chair cannot explain the existence of the objects if the existence of the objects explains the existence of the chair. Not, at least, if the explanation in question relies on the fact that the one "*generates*" the other. This relationship is asymmetrical. The necessary connections we are trying to explain, on the other hand, appear to be symmetrical.[19]

Second, even if the superinternalist view can account for all of the necessary connections between composites and their proper parts, and for the apparent contradictions we have discussed, it does not as easily account for the knowledge we have of the colour of the rectangles. The superinternalist can argue that when we are told the colour of the square we can deduce the colour of the rectangles because we know that grey paper squares "generate" proper parts which are also (collectively) grey. However, this seems quite fanciful. As with our criticism

[19]One might argue that the necessary connections between part and whole are not symmetrical on the ground that extended simples are possible. But consider the reasons why some philosophers take extended simples to be possible. They think this because they take extended simples to be conceivable, or because they think the notion is perfectly consistent (*cf.* Markosian, 1998b). Not only is this to endorse the very position that I am defending, but it also undermines the claim that there are necessary connections in the other direction as well. The resulting view is one on which parts and wholes are not necessarily connected at all. That view, I think, is correct given the orthodox view. My claim, however, is that there *are* necessary connections between objects and their proper parts. Since the orthodox view entails that there are not, the orthodox view is false.

of the metaphysical laws view earlier in the section, it appears to be impossible for anyone to know such a thing. How could we know that a composite's proper parts must have the same colour as the composite on such a view? How could we know that a composite's proper parts must be located where the composite is located? And even if the square in fact has a generative property like this, why should we think it is an essential property? Certainly, I seem to able to imagine a paper square which does not generate any other objects, and many philosophers including orthodox realists seem to agree. (See, Markosian, 1998b, and others who argue for the possibility of extended simples. Markosian, for example, claims that a world with just one object, extended in space, is possible, and therefore is committed to denying that such an object necessarily "generates" any others.)

Third, it looks as though the superinternalist has to accept that facts like this are brute facts. Why is it that the rectangles must be *grey*? Because a composite object and the objects that it "generates" share their colour properties. This answer is not particularly satisfying. Certain facts are quite naturally taken as brute, and other are not. For instance, it seems fairly natural to think that the answer to the question "Why can't anything be red all over and blue all over?" is going to be, more or less, "It just can't; *being red all over* and *being blue all over* are incompatible properties." The same sort of answer doesn't seem nearly as satisfactory when we ask, "Why can't this object be grey and those objects red?"

I do think that the question, put in terms of parts, is more plausibly given such an answer, but I think this is because composition as identity is true. That is, I agree that the only good answer to "Why can't the square be grey and each half of the square be red?" may well be "It just can't." (Just as this is the only answer to "Why can't the square be (entirely) grey and (entirely) red?") But this is because I believe that composition as identity is true. Anyone who shares the same intuition here should ask themselves whether it is really plausible that it is a

brute fact that the rectangles, taken to be *numerically distinct* from the square as shown in Figure 16, must be grey. As the figure makes abundantly clear, that fact is veritably calling out for explanation.

Cameron (2014), however, argues that these facts are good candidates to be brute facts and that composition as identity cannot explain them either. He points out, following Sider (2007), that while composition as identity explains why the rectangles are the colour of the square it does not explain why *each* of the rectangles is grey.[20] There are at least two things to be said in response. First, it is not implausible that the property of being grey, had by the rectangles collectively, is the same property, had by the rectangles collectively, of being such that every one of them (the rectangles) is grey. That is, it could well be that to say that the rectangles are collectively grey is just to say that each of them is grey. (See Chapter 2 for discussion of this point.) Second, it is not clear that each proper part of a grey object must necessarily be grey in the first place. In fact, if the object is composed of elementary particles, then this is certainly not the case. After all, an elementary particle is not grey (or any other colour).

It seems to me, then, that either each of the proper parts in question must necessarily be grey, and this is because to say they are collectively grey is to say that each of them is, or it is not true that each must be grey. It may be objected that the rectangles' being collectively grey is not the same as their being such that each of them is grey, and that nevertheless there is a necessary connection between the greyness of the square and the greyness of each rectangle in this case. I am sympathetic to this thought; however, it seems to me that the necessity in question is nomological, not metaphysical. The reason why it seems that any visible part of the square must be grey is that such objects cannot be collectively grey without each being individually grey, due to the way that objects (visibly)

[20] Cameron uses a different example (see p. 8), but the point is the same.

reflect light. That is, it turns out that objects which individually reflect light in the right way to qualify as being grey (or any other colour) also *collectively* reflect light in the that way.

On top of this, many other cases are more straightforward. Take, for example, Cameron's own problem case (here he is assuming that composition as identity is true):

> Why does my arm come with me when I leave the house? Because it is amongst the things that are me. But what explains why the collection of parts that is me is in the union of the regions that each thing that is amongst that collection occupies? Why is it that the location some things collectively have is intimately related to the location each of those things has? (Cameron, 2014, p. 8).

The answer is quite simple. Suppose we have two objects, A and B. Why does A go wherever A and B go? Because A goes wherever A goes. I do not find this at all puzzling. Perhaps what Cameron has in mind is that A and B are located not at two regions of space, s_1 and s_2, say, but at the region, S, which is composed of s_1 and s_2. (That would explain why he says "location" rather than "location*s*" in the final sentence.) But even this has a straightforward answer. If composition as identity is true then it is also true for regions of space. Thus, if composition as identity is true then S is identical to s_1 and s_2 together. If this is right it is completely unsurprising that s_1 and S are intimately related, just as it is unsurprising that s_1 and s_1 and s_2 together are intimately related.

Thus, I think that so long as the necessary connections do in fact hold, composition as identity can explain them. Finally, even if composition as identity cannot explain these connections in the ways I have suggested, it nevertheless does better than the alternatives. For composition as identity can explain why

composite objects share their properties with their proper parts collectively—the alternatives cannot. Cameron seems to be aware of this response, for he goes on to say:

> The non-distributive properties that some things collectively have supervene on the properties that each of those things singularly has. But supervenience claims are never explanations, they always call out for explanation, so what explains this? Plausibly, it is that when there are some things, they collectively have the properties they do *in virtue of* the things each having the properties they have. This *in virtue of* claim, I think, is of the same status as that concerning derivative objects having their properties in virtue of how their grounds are: both claims are massively plausible, and resist further explanation (Cameron, 2014, p. 8).

He concludes that composition as identity does not explain the phenomena any better than his own view.

The argument seems to be that the claim that composite objects have their properties in virtue of the properties of each of their proper parts does not require explanation, just as the claim that some things collectively have the properties they do in virtue of the properties of each of their proper parts requires no explanation.

I see no reason to think this is true in general. We have just seen that, in at least some cases, the collective properties of a plurality of objects can be explained with reference to the properties of the individuals. Thus, if composition as identity is true, there are at least some cases in which we can explain the properties of composites in terms of the properties of their individual proper parts. The same cannot be said of Cameron's view. In addition to this, it seems likely that many of the explanations in question will be nomological rather than metaphysical. Why

are individually invisible atoms collectively visible in many cases?[21] That seems to be a question for scientists to answer. Surely it would be a mistake to pass this question off as one which does not have an interesting answer.

And, again, even if composition as identity does not give us explanations of an object's properties in terms of the properties of its individual proper parts, it does give us explanations of an object's properties in terms of the properties of its proper parts *collectively*. The alternatives cannot seem to even do this much. Cameron's account at best gives us explanations of specific principles of composition in terms of more general ones. But these more general principles themselves go unexplained.

Sider (2007) makes essentially the same point as Cameron, but in a different way. It is worth examining his argument as well. Sider's claim is that composition as identity does not entail what he calls the *inheritance of location*, or Principle 5 from Chapter 1, section III:

5. If x is a part of y, then y is located wherever x is located.

Sider's claim, I think, is false. However, before we discuss his argument there is a small issue with the meaning of "located" in Principle 5. Clearly, if x is a part of y then y may not be *exactly* located where x is. Rather, what Sider seems to have in mind is *weak locatedness* (Gilmore, 2014). Following Gilmore (2014) we may characterise this notion as follows:

Weak Locatedness For any object x and region R, x is weakly located at R iff$_{df}$ R mereologically overlaps the region at which x is exactly located.[22]

[21] This example is inspired by Wallace (2011a).

[22] This is adapted from Gilmore's (2014): "[I]f r is the one and only region at which I am exactly located, then I am weakly located at just those regions that overlap r," which seems to me to capture the notion quite nicely.

Exact locateness, I take to be straightforward enough.[23] For reasons which will become clear I will avoid the terminology "weakly located at R" and instead use the more cumbersome "exactly located at a region which overlaps R." We can now reformulate Principle 5 more clearly as:

5′. If x is a part of y, then the region at which y is exactly located overlaps the region at which x is exactly located.

(Or: If x is a part of y, then y is weakly located at the region at which x is exactly located.)

It is clear enough that Principle 5 is true when understood in this way. If x is a part of y then the region at which y is exactly located overlaps the region at which x is exactly located.

If we wanted we could instead say that, if x is a part of y, the region at which x is exactly located is a part of the region at which y is exactly located, but let us stick more closely to Sider's principle.

If composition as identity is true then Sider's principle is equivalent to a claim about the relation between the exact location of many things and the exact location of one of those things. We need to be careful when talking about the location of many things, however, for it is not obvious that they occupy a single location.[24] The less controversial thesis is that many things occupy many locations: for any Xs, the Xs are not located at a single region of space, but at the regions at which the individuals amongst the Xs are located. If this is right, and composition as identity true, then Sider's principle is equivalent to:

[23] Though see Gilmore (2014) for discussion of which of the two notions should be taken to be primitive.

[24] I owe this point to Antony Eagle who raised it at a talk I gave at the 2014 AAP Conference in Canberra. (Of course, many things have a single location if composition as identity is true of spatial locations as well as objects, but we cannot assume that when arguing for composition as identity.)

5″. If x is one of the Ys, then the regions at which the Ys are exactly located overlap the region at which x is exactly located.

(Recall our proof that if x is part of y then there are some Zs such that x is one of the Zs and the Zs are identical to y.)

Of course, we will need to understand "overlap" in terms of our plural mereology from Chapter 1; for strictly speaking mereological overlap is a relation between two single things, not between one thing and many things. We defined the plural version of overlap as:

Quasi- Overlap The Xs and the Ys share members iff$_{df}$ some of the Xs are identical to some of the Ys.

(Remembering that "the Xs" and "the Ys" refer to one or more things.). Because we have a case of many-one overlap this simplifies to:

> For any x and any Ys, x shares members with the Ys if and only if x is one of the Ys.

So understood, principle 5″ is clearly true. If x is one of the Ys then x is exactly located at one of the regions at which the Ys are exactly located. And if the region at which x is exactly located is one of the regions at which the Ys are exactly located, then the region at which x is exactly located overlaps (in the relevant sense) the regions at which the Ys are exactly located.

It seems then that Sider was wrong to conclude that the inheritance of location does not follow from the truth of composition as identity. However, Sider (2007, p. 29) considers a similar response and rejects it. The response Sider considers is that, given an auxiliary principle, the inheritance of location is entailed by composition as identity. The auxiliary principle is:

Plural Inheritance of Location If the Xs are among the Ys, then the Ys are located wherever the Xs are located.

Sider accepts that plural inheritance of location, together with composition as identity, entails the inheritance of location. However, he argues that "the needed auxiliary principle, the plural inheritance of location, amounts to what we are trying to prove: the inheritance of location" (Sider, 2007, p. 29). This is because, if composition as identity is true, then the relation *being among* is the same as the relation *being part of*. Hence, if composition as identity is true then the plural inheritance of location and the inheritance of location are equivalent.

All of this seems right; however, all it shows is that the proponent of composition as identity cannot simply *assume* that the plural inheritance of location is true and then use it to derive the inheritance of location. For that would be question-begging. We can, however, use the plural inheritance of location to deduce the inheritance of location if we can justify the former on independent grounds. And we can do exactly that.

The Xs are among the Ys if and only if every one of the Xs is identical to one of the Ys. This, I take it, is uncontroversial. Thus, if the Xs are among the Ys, every one of the Xs is exactly located where one of the Ys is exactly located (by Leibniz's Law). Now, presumably what Sider means by "the Ys are located wherever the Xs are located" is that one of the Ys is exactly located at every location at which one of the Xs is exactly located. If this is indeed what he has in mind, then we have shown that plural inheritance of location is true without assuming either composition as identity or the inheritance of location. As it turns out, the plural inheritance of location is a purely logical principle.

Therefore, composition as identity together with the plural inheritance of location does entail the inheritance of location (and does so without building that principle in from the beginning). In fact, an even simpler demonstration is

available for the more specific principle we came across earlier:

> For any x and any y, if x is part of y then the exact location of x is a part of the exact location of y.

If composition as identity is true, we may read "part of" as "one of"; for if x is a part of y then there are some Zs such that x is one of the Zs and the Zs are identical to y. (See Chapter 7, section II for discussion of this point. It is worth noting that Sider, 2007 accepts it.) This gives us:

> For any x and any Zs, if x is one of the Zs then the exact location of x is one of the exact locations of the Zs.

This is quite obviously true. If x is identical to one of the Zs then x's exact location is identical to the exact location of one of the Zs (namely, x itself).

On the basis of this discussion I think it is reasonable to conclude that composition as identity provides the best account of the necessary connections between properties of composites and properties of their proper parts out of the views discussed. Even more importantly, it appears to provide as good an account of these facts as we are likely to get.

I have argued that Hume's Dictum is true, and that if it is then it follows from the orthodox view that there should be no necessary connections between composite objects and the objects that compose them. Given that there clearly are necessary connections between composite objects and their proper parts, I think we should reject the orthodox view.

I have also argued that although Cameron's superinternalist account allows us to hold on to both Hume's Dictum and the orthodox view, it does so at a price. The price is that the superinternalist account, though consistent with Hume's Dictum, nonetheless accepts the existence of brute necessities, this time built into

the intrinsic natures of objects. Cameron can maintain that a composite object "generates" its proper parts, or vice versa, but he cannot explain why this is the case, or explain why the resulting parts have the properties they do. Since there do seem to be explanations for these facts I think this is reason to reject Cameron's view as well.

In the next chapter I will press this point further by showing how composition as identity can account for most, if not all, of the other principles of composition outlined in Chapter 1.

6

THE PRINCIPLES OF COMPOSITION

This chapter continues our discussion of the intimacy of parthood. It deals with the remaining principles of composition. I will argue that composition as identity together with other provable principles, entails most, if not all, of these principles. This places it at an advantage over its rivals, including the superinternalist account just discussed.

We have seen in Chapter 1 that mereology and the logic of plurals are extremely similar, with the latter being more powerful. Given this additional power, it is worth exploring the logical entailments of a quasi-mereological system and its links to composition as identity. Sider (2007) does this, pointing out that if composition as identity can explain the intimacy of parthood this is a significant mark in its favour. However, he concludes that composition as identity cannot explain everything that we want explained regarding the intimacy of parthood. We have already discussed one of his arguments for this and found it wanting. In this section we will explore what can be deduced from composition as identity. I will argue that the answer is "a great deal".

In Chapter 1 I claimed that if composition as identity is true then mereology

is essentially a version of plural logic. I did not defend that claim there, and I should do so now. The links between plural logic and composition as identity are important and worth spelling out in detail.

To get the most out of composition as identity I will follow Sider (2007) and start out by assuming superstrong composition as identity:

Superstrong Composition as Identity For any Xs and any y, the Xs compose y if and only if the Xs are (collectively) identical to y.

The arguments I have given up until now hold even if superstrong composition as identity is true. Thus I am happy to accept it.

We can immediately arrive at an informal proof that mereology under composition as identity reduces to plural logic. Whenever any objects x and y are mereologically related—i.e., overlap—they share at least one proper part. (By definition, it is impossible for two mereological simples to overlap.) And that is just to say that one of x's proper parts is identical to one of y's proper parts. Thus, whenever there are mereological relations there are pluralities of objects that share members. Given composition as identity, x and y are identical to those pluralities, which means that the mereological relation that x has to y is just the relation that the objects that compose x have to the objects that compose y.

Therefore, if x overlaps y, then there exist some Vs and some Ws, such that some of the Vs are identical to some of the Ws, and x is identical to the Vs and y identical to the Ws. (As with before, the Vs and the Ws are here taken to be one or more objects, and "some of" should be read as "at least one of".)

What about parthood and other mereological relations? We can prove a correspondence between the relation *part of* and the relation *one of* given the basic principle that x is a part of y if and only if there exist some objects, the Vs, which compose y, and x is one of the Vs. The principle is straightforward

enough if we continue to allow that everything composes itself (as is standard). Then, whenever an object is part of another it is one of the objects that compose the other (either it is identical to it, or it is a proper part of it). From this we can derive,

(6) x is part of y if and only if there exist some Zs such that the Zs = y, and x is one of the Zs,

which is basically Sider's (2007) *Parts↔one-of* principle:

Parts↔One-of x is part of the fusion of the Ys if and only if x is one of the Ys.[1]

In fact, it is tempting to say that, according to composition as identity, *one of* and *part of* are the very same relation. However, we should not be too quick to say this. If x is one of the Ys, there is no guarantee that there is a fusion of the Ys for x to be a part of (as we saw in Chapter 3). Thus, the *one of* relation may hold in cases where the *part of* relation does not. Still, whenever the *part of* relation holds it can be said that it is a relation between one thing and many. Thus, we may conclude that the *part of* relation is at least a special case of the *one of* relation.[2] Therefore, parthood is a relation which obeys the laws of plural logic.

The same goes for all mereological relations. We can generalise *Parts↔one-of* by appealing to the transitivity of parthood. If x is a part of y then all of x's parts are part of y. Thus, every one of x's parts is one of the Zs. As before, we shall refer to this as "being among" and say that x's parts are *among* the Zs.

[1] I have changed the variables for the sake of continuity. See Sider (2007, p. 7) for an alternative proof of this principle.

[2] I do not mean to suggest that it is always admissible to *use* the predicate "is one of" in place of the predicate "is part of". I mean only that the underlying relation is the same. See Chapter 7, section II, for discussion.

Parts↔Among The fusion of the Xs is part of the fusion of the Ys if and only if the Xs are among the Ys.[3]

From this we can derive a correspondence between other mereological relations. For example, it follows from both definitions of proper parthood that the fusion of the Xs is a proper part of the fusion of the Ys if and only if the Xs are among the Ys and the Ys are not among the Xs. (Or: the Ys are not identical to the Xs, which implies that at least one of the Ys is not also one of the Xs.) Whenever some Xs are among some Ys, but not vice versa, we will say (as in Chapter 1) that the Xs are "strictly among" the Ys. (That is, if every one of the Xs is one of the Ys, but not vice versa, the Xs are strictly among the Ys.) We then get a correspondence between proper parthood and the relation of being strictly among:

Proper Parts↔Strictly Among The fusion of the Xs is a proper part of the fusion of the Ys if and only if the Xs are strictly among the Ys.

Again, it does not follow from this that any Xs which are strictly among some Ys are proper parts of the Ys, for there is no guarantee that the Xs and Ys compose anything. Rather, what the principle tells us is that proper parthood is a special case of the *strictly among* relation.

We can derive a similar principle for overlap. If objects overlap then they have a part in common. Hence, we can say that the fusion of Xs and the fusion of Ys overlap if and only if one of the Xs is also one of the Ys. (This follows from *Parts↔one-of*.) Let us say in such cases that the Xs and the Ys "share members". Then,

[3]Note that a mereological simple will count as the fusion of the Xs or Ys, because the Xs may be a single object and, by our definition of "fusion" in Chapter 1, every object composes itself.

Overlap↔Member Sharing The fusion of the Xs and the fusion of the Ys overlap if and only the Xs and the Ys share members.

Basically, what we have just shown is that the mereological relations are all instances of the plural logical relations discussed in Chapter 1. It follows that all of the results from that chapter carry over for our mereological notions. We saw that plural analogues of *Proper Supplementation* and *Extensionality* can be proven within plural logic. If composition as identity is true and mereological relations are a special case of plural logical relations, then these proofs carry over to mereology. If composition as identity is true then so too are *Proper Supplementation* and *Extensionality*.

This is a nice result, but we gain so much more. If composition as identity is true we can show that most, if not all, of our principles of composition hold, and make many additional predictions about the properties of composites based upon the properties of the objects that compose them. Some of the principles are similar to one another so let us deal with them in groups.

I. Principles 1 & 6: The Inheritance of Size and Shape

The first category concerns the size and shape of composites:

1. If each of the Xs has a surface and the Xs compose y, then y has a surface area and the surface area of y is less than or equal to the sum of the surface areas of the Xs.

6. If each of the Xs has a volume and the Xs compose y, then y has a volume equal to sum of the volumes of the Xs.

Given our correspondence principles we can prove any of the principles of composition by proving the corresponding principle. The corresponding principle

in each case will be about the Xs collectively, rather than y (for they are the same if composition as identity is true). Thus, we need only substitute the name for the compositing objects for the name of the composite to arrive at the relevant principle.

Let's start with Principle 1. To prove it we need to show that Principle 1* is true:

1*. If each of the Xs has a surface, then the Xs (together) have a surface area and the surface area of the Xs (together) is less than or equal to the sum of the surface areas of the individual Xs.[4]

To prove Principle 6, we need to show that Principle 6* is true:

6*. If each of the Xs has a volume, then the Xs (together) have a volume equal to sum of the volumes of the Xs (individually).

Principles 1 and 6 should not to be confused with:

1†. If the Xs (together) have a surface and the Xs compose y, then y has a surface area and the surface area of y is less than or equal to the surface area of the Xs (together).

6†. If the Xs (together) have volume and the Xs compose y, then y has a volume equal to the volume of the Xs (together),

These principles are obviously true if composition as identity is true. (Taking just the second: if the Xs are identical to y, then y and the Xs (collectively) have equal volume.) Principles 1 and 6 are more difficult to prove. To do so we need to show that there is a necessary correspondence between the surface area and

[4] I have added the words "together" and "individual" to avoid ambiguity.

volume had by the Xs collectively and the sum of the surface areas and volumes of the individual Xs.

It seems obvious that there is such a correspondence. If we take the simpler case of length, and suppose that the Xs are lines, it is clear that the length of two lines together is equal to the sum of the lengths of each line. The reason for this seems to me to be that the meaning of "the sum of the lengths of each line" is the same as the meaning of "the length of the lines together".

One might think that this is incorrect. Rather, one might think that summing the lengths is not a geometrical process but an arithmetic one—summing the lengths of each line amounts to summing together the numerical values which are their lengths. This, however, leads to the same result.

No elaborate proof is needed. It is a simple fact that a standard ruler is such that n units together have a length which is the sum of n units: i.e., n units. This means that any things we measure with a standard ruler which have a collective length of n units have a length which is the sum of n units. Thus, n units together have a length of n units: the length of a standard ruler provides us with a definition of both at once. A 10 unit ruler tells us the collective length of ten units along a plane (as well as the collective lengths of units less than 10 in number). This is obvious enough, even if composition as identity is not true. No matter how we understand "the sum of ten 1 units" it is clear that the sum of ten 1 units is 10 units. Therefore, even if summing in this case is an arithmetic notion, the sum of ten 1 units must be 10 units, which is equivalent to the collective length of ten units. This is a straightforward consequence of the way that 10 units of length is defined. A standard 10 unit ruler provides us with a definition of "the collective length of ten units" and also guarantees that the sum of ten units is 10 units.

In summary, there seem to be two candidate meanings for "sum of the lengths of the lines". The first is that the sum of the lengths of the lines is just the length

of the lines together. In this case, it is analytic that the length of the lines together equals the sum of the lengths of the individual lines. The second is that the sum of the lengths of the Xs is obtained by summing the numerical values obtained by measuring each of the lines. In this case, so long as we are consistent in our measuring process, there will be a necessary correspondence between the sum of the lines' lengths and the length of the Xs together.

Things may well be even simpler than this. Suppose someone told you that they had two cups, each of which can carry 1 unit of water, but that they were carrying 3 units of water in the cups (collectively). It strikes me that the appropriate response is bafflement. If they are carrying 3 units of water where is the additional 1 unit of water? This suggests that even if we set aside considerations of measurement what we mean by "the amount of water that the cups can hold collectively" is just the total amount of water the cups can hold—i.e., the sum of the volumes of water that each cup can hold.

The general point is that the collective volume of some objects seems to be essentially connected to the volumes of the individuals just as we saw that the property *black-and-white*, had by a composite object, is essentially connected to the properties *black* and *white* had by the composite's proper parts. If the objects collectively have volume v then this volume is explained by the individual volumes of the objects.

It is worth reiterating a point made in the previous chapter. Even if it turned out that Principles 1* and 6* could not be proven in either of the above ways, or in any other, composition as identity would still have a distinct advantage over its rivals. If composition as identity is true then we can easily see why Principles $1^{\dagger}$ and $6^{\dagger}$ are necessarily true. That is, we can easily see why the surface area and volume of a composite object must be the same as the surface area and volume of the objects that compose it (collectively). Rival accounts cannot explain even

this fact, except by some general metaphysical principle like "a composite object has its properties in virtue of the collective properties of the objects that compose it". But this principle is itself in need of explanation. To appeal to it is just to introduce a new, unexplained, principle of composition.

Some, like Cameron, may be happy to accept this. However, it seems to me that if we failed to find an explanation for the necessary truth of Principles 1 and 6 (or any other) we would be in an excellent position to reject them as principles of composition (or perhaps to insist that they are only nomologically necessary). It is not just a matter of pure intuition that we know these principles to be true—there must be some reason for this belief if it is justified. There must be some reason why Cameron thinks a composite object has its properties in virtue of the properties of its proper parts. What is it? We should not accept groundless claims about possibility and impossibility.

II. Principle 2: The Inheritance of Mass

Our next principle concerns the masses of composites and their proper parts.

2. If each of the Xs has a mass and the Xs compose y, then y has a mass and the mass of y is the sum of the masses of the Xs.

Principle 2 is the most difficult principle to prove. Its corresponding principle is:

2*. If each of the Xs has a mass then the Xs (together) have a mass and the mass of the Xs (together) is the sum of the masses of the Xs (individually).

As before, this should not be confused with a similar principle which is quite obviously true given composition as identity:

2†. If the Xs (together) have mass and the Xs compose y then y has a mass and the mass of y is equal to the mass of the Xs (together).

Principle 2† is analytic if composition as identity is true. (Just substitute "the Xs" for "y".) But Principle 2* (and therefore 2) does not seem to be. How could composition as identity explain why an object has a mass which is the sum of the individual masses of the objects that compose it?

In fact, at first glance this appears to be just the sort of case that Sider (2007) and Cameron (2014) were alluding to. I am not sure how to prove that this principle is true, or even if it *is* true. It is worth pointing out, however, that even if we cannot prove it given composition as identity, this is not such a bad thing. I have made this point before, but I will make it one more time. Suppose that Principle 2* cannot be shown to be necessary because of the meanings of the phrases "mass of the Xs (together)" and "sum of the masses of the Xs (individually)". Then why should we think that it is a necessary truth at all? As I argued in Chapter 5, it can only be inconceivable or contradictory that the mass of the Xs (together) be different to the sum of the masses of the individual Xs if these notions are not distinct. If that is right, then the principle either has an explanation under composition as identity, or it is false or merely nomologically necessary.

And if Principle 2* is not a necessary truth then it would be bizarre if 2 was. (Try to imagine a composite object with a mass which is the sum of the masses of its individual parts, but which has a mass less than the mass of the parts collectively.) So unless the notions *collective mass of the Xs* and *sum of the masses of the individual Xs* can be shown to be closely related then we have no grounds to suggest that Principle 2* or Principle 2 are necessary truths.

Thus, I think it fairly safe to assume that either Principle 2* is a metaphysically necessary truth which can be explained in a similar way to the other principles of

composition, or we have no reason to think it is a necessary truth at all. I do not know how to do the former, but I find it quite plausible that it can be done.

And, again, even if none of this is right composition as identity has an advantage over its rivals; for it, and not they, can explain the truth of Principle 2†.

That said, I think there may be good reason to think that this principle is true given composition as identity. On the face of it, it may seem to be false. For surely it is possible for two objects, each of which has a mass of m, to measure greater or less than 2m when placed on a scale together. But there is a flaw in this reasoning. The result relies upon an ambiguity in "together" or "collectively". The two objects have a collective mass even when not placed on a scale together. It is true that it is metaphysically possible that they measure say 3m when placed on a scale together. But this does not entail that they have a collective mass of 3m when *not* placed on the scale together. The above thought seems to be driven by the intuition that objects may fail to behave in the same way when interacting with one another. An object's mass is its propensity to resist changes in acceleration. It could well be that two objects which are causally interrelated have a different potential of this sort than two intrinsic duplicates of them which are not causally interrelated.

Under those circumstances, however, it seems correct to say that the *individual* masses of the objects are different as well. Suppose our objects are placed on a scale together. Their joint mass is measured as 3m. Now imagine being told that each has mass 1m at that very moment. That seems absurd. What is accounting for the additional 1m of mass?

Admittedly, it is not entirely clear that such a scenario is metaphysically impossible, though it certainly seems to be nomologically impossible. If it is, however, then this can surely be explained, and that will amount to another reason to accept composition as identity. If it is not, then composition as identity is still

better off than its rivals due to its ability to explain Principle 2†, which surely *is* a metaphysical necessity.

III. Principles 3 & 5: The Inheritance of Location

The next category concerns the location of composites given the locations of their parts:

3. If each of the Xs occupies a region of space and the Xs compose y, then y occupies the sum of the regions occupied by the Xs.

5. If x is a part of y, then y is located wherever x is located.

We have already discussed Principle 5. Principle 3 is the more specific principle given that it is clearly intended to specify the *exact* location of a composite given the exact locations of the objects that compose it.

Principle 3 is easy to prove. If composition as identity is true then we need to prove:

3*. If each of the Xs occupies a region of space, then the Xs (together) occupy the sum of the regions occupied by the Xs (together).

Given composition as identity, the sum (i.e., fusion) of the regions occupied by the Xs is identical to the regions occupied by the Xs. This gives us Principle 3† which is analytic.

3†. If each of the Xs occupies a region of space, then the Xs (together) occupy the regions occupied by the Xs (together).

Thus, if composition as identity is true then so too is Principle 3. Besides the ease with which we were able to prove Principle 3, composition as identity has a

further advantage over its rivals here. Composition as identity can also explain why Principle 3* is true. Without composition as identity it is difficult to see why the Xs (together) should occupy the fusion of the regions occupied by the Xs (individually). Yet it seems that they do. After all, they occupy every proper part of the fusion—what else does it take to occupy a region?

IV. Principle 4: The Inheritance of Intrinsicality

We have seen that composition as identity, together with an analytic principle, implies the inheritance of location, contrary to what Sider claims. Sider also claims that composition as identity does not imply his other inheritance thesis: the *inheritance of intrinsicality*, or our Principle 4.

4. If property P is intrinsic, then the property *having a part that has P* is also intrinsic.

This claim, too, appears to be false. Again, we may appeal to facts about pluralities to demonstrate this. The equivalent principle, if composition as identity is true, is:

4′. If property P is intrinsic, then the property *being such that one of them [the Xs] has P* is also intrinsic.

Returning to an example we used in Chapter 2, suppose we have two squares, one of which is black and one of which is white. If the property *being black* is intrinsic, then by Principle 4′ the property *being such that one of them [the squares] is black* had by the squares is also intrinsic. Now, it is not entirely obvious how to translate talk about intrinsicality to pluralities, but it seems quite reasonable to take this to be an intrinsic property. After all, it is a property had by

the squares in virtue of the way they themselves are, and nothing other than them is. And this holds for *any* such property.

Hence, it seems that the inheritance of intrinsicality follows from composition as identity together with independent facts about pluralities. And, as before, we can use Principle 4′ to derive Principle 4 without begging the question because we have independent grounds to accept the former.

Still, it is not completely clear that composition as identity has an advantage here. I suspect that proponents of the orthodox view will insist on a definition of intrinsicality which implies Principle 4. Specifically, they will likely insist that intrisicality is to be understood as what I called "weak intrinsicality" in Chapter 2.

Weak Intrinsicality Being F is a weakly intrinsic property if and only if, necessarily, nothing that is F is F in virtue of the way anything mereologically disjoint from it is.[5]

According to this definition, the property of *having a proper part* is weakly intrinsic, given that it is not a property an object has in virtue of anything mereologically disjoint from it. Thus, if an object has a proper part which is F, and F is a weakly intrinsic property, then the object's property *having a proper part which is F* is also weakly intrinsic.

I am not sure whether this captures the intuition that led Sider to claim that Principle 4 is a principle of composition or not. It seems to me that it probably fails to do so. My own intuition is that *being half red* or *having a proper part which is red* is a property that an object *itself* has in virtue of nothing else. That is, it appears to be a strongly intrinsic property. Our discussion in Chapter 2 supports

[5]This is adapted from (3) in Weatherson and Marshall (2014). Note that Weatherson and Marshall (2014) characterise this as one type of property among many which might be understood to be intrinsic properties. This particular kind they call *interior properties*.

this. It seems to me that when we take a composite object to be black and white we take it to *itself* have a certain colour property. If this is right, then Principle 4 should be understood as a claim about strongly intrinsic properties. Not only can orthodox theories of theories not explain why Principle 4 would be true when understood in this way, but they are not even consistent with Principle 4. If the orthodox view is true, then Principle 4, understood this way, is necessarily false.

Thus, if I am right composition as identity alone can accommodate Principle 4. Given that Principle 4 seems true, we have reason to accept composition as identity.

V. Principle 7: The Inheritance of Kind

This brings us to principle 7:

7. If the Xs compose y and y is of kind K, then the Xs are arranged K-wise.

(For instance, if the Xs compose y and y is a chair, then the Xs are arranged chair-wise.)

Principle 7 is interesting for a number reasons. If we adopt the understanding of "being arranged K-wise" suggested by Merricks (2001, p. 4) then it is true by definition, and regardless of which view of composition is correct. Merrick's suggestion is roughly that "the Xs are arranged K-wise" is equivalent to "the Xs are arranged in such a way that, if there were composite objects of kind K, the Xs would compose an object of kind K."

This seems good enough for our purposes (though see Tallant, 2014, and Chapter 4, section II). What is interesting is that if composition as identity is true a composite object being of kind K just is its being composed of some objects arranged K-wise. This is a clear benefit. Suppose we figure out what it takes for some Xs to be arranged chair-wise—that is, we figure out what shape to arrange

the Xs in, what type of objects the Xs need to be, and so on. (Recall that Tallant, 2014 calls this an answer to the *special arrangement question*.) On the orthodox view we are left without an explanation for why arranging things in this way results in them composing a chair. Why not a table?

Given composition as identity the answer is simple: objects arranged in that way compose a chair because *all it takes to be a chair* is to be objects arranged in that way. Of course, defenders of the orthodox view can say that all it takes to be a chair is to be *composed of* objects arranged in that way; but this is not nearly as helpful. We might wonder, for instance, why objects arranged in that way compose an object with all of the properties associated with chairs. There can be no useful answer to this question. Or, at least there cannot be unless we accept composition as identity. If we do then we can say that the properties *being a chair* and *being arranged chair-wise* are the same, or at least that being arranged chair-wise is one way of being a chair.

VI. Principle 8: The Dependence of Whole on Part

Principle 8 also follows if composition as identity is true.

8. If the Xs compose y, then y ontologically depends on the Xs, or the Xs ontologically depend on y.

If composition as identity is true then principle 8 is equivalent to:

8*. If the Xs compose y, then the Xs ontologically depend on the Xs, or the Xs ontologically depend on the Xs.

The notion of ontological dependence I have in mind is something like the following:

Ontological Dependence For all x and all y, x ontologically depends on y iff$_{df}$, necessarily, x exists only if y exists (Lowe, 2010).[6]

(Of course, the definition applies only to single objects, but it is easy enough to generalise it to accommodate cases of the sort we are interested in.)

Understood in this way Principle 8* is trivially true. Any thing (or things) exist only if it (or they) exist.

(Note that Principle 8 is only plausible if we take it to apply at a given time. You exist now only if the atoms that compose you now exist, but it is not true that you exist now only if the atoms that composed you a week ago exist. Those atoms could be destroyed and you would live on.)

Defenders of the orthodox view can also explain this principle if they appeal to the notion grounding. For instance, on a view like Cameron's, a composite object ontologically depends on its proper parts (or vice versa, depending on the direction of dependence). But grounding is controversial—accepting it comes at a cost. There may also be other ways to achieve this end, but they will likely be controversial too. By endorsing composition as identity one can accept Principle 8 without picking up any metaphysical baggage. I think this is a good thing; others may disagree.

VII. Principle 9: The General Inheritance of Properties

This brings us to the final principle:

[6]One may wish to restrict this principle to objects which exist contingently, otherwise it has the consequence that everything ontologically depends upon numbers, for example. (Thanks to Chad Carmichael for pointing this out to me.) I myself prefer to understand "only if" in such a way that most objects do not exist only if numbers exist. The ordinary usage of terms like "if", "only if", "entails" and "entailed by" does not seem to me to have the consequence that you exist only if the number 3 exists. The existence of the number 3 is completely irrelevant.

9. If the Xs compose y and y is F, then the Xs are collectively F (for any non-mereological property F).

Again, this principle is trivial if composition as identity is true. If y is F and y is identical to the Xs collectively, then the Xs, collectively, are F, for any property whatsoever. Principle 9 is extremely powerful. First, it implies many of the others. Second, it tells us exactly what properties a composite object will have given the collective properties of its proper parts (and vice versa).

Opponents of composition as identity will not accept this principle, as they think that the Xs and y have, at very least, different temporal and modal properties. They will not see it as much of an advantage that the advocate of composition as identity can accept it. There is, however, an advantage to accepting the principle. Anyone who rejects it needs some story about why the Xs and y share some but not all of their properties. (Why, for example, do they share all of their physical properties but not their temporal and modal properties?) This may be a small advantage, but it is an advantage nonetheless.[7]

[7]Note that it may be more than just a small advantage. Many find it plausible that modal properties supervene upon physical properties. If the Xs and y share all of their physical properties, why do they have different modal properties? What accounts for the difference? (See Chapter 8, section IV, for an argument along these lines.)

7

OBJECTIONS

In the last three chapters we have been looking at arguments for composition as identity. This chapter deals with objections. I will discuss the four main kinds of objection to composition as identity. These are the best arguments that have been raised against the view. My goal is to show than they are ultimately ineffective. In doing so I hope to allay any remaining worries the reader may have. Combined with the arguments I have given so far, and those I will present in Chapter 8, this completes what I think is quite a strong case for composition as identity.

I. DISCERNIBILITY ARGUMENTS

We have already indirectly dealt with the most common arguments against composition as identity in Chapter 3. These arguments seek to demonstrate that composition as identity is false by showing that composite objects have different properties to the objects that compose them. If this can be established, it follows given Leibniz's Law that composite objects are not identical to their proper parts.

The arguments have the following form:

1. *a* instantiates property F.
2. The Ps, which compose *a*, do not (collectively) instantiate F.

Therefore, *a* is not identical to the Ps (collectively).

(The conclusion follows from 1 and 2 given Leibniz's Law. If *a* instantiates F and the Ps are identical to *a*, then the Ps must also (collectively) instantiate F. Since, the Ps do not (collectively) instantiate F, it follows that the Ps are not identical to *a*.)

I will call these argument *discernibility arguments*, given that they purport to show that there are discernible differences between wholes and their parts. There are at least four kinds of discernibility arguments against composition as identity. We will discuss each in turn. But first some general comments.

Discernibility arguments are powerful. There are, however, two considerations that suggest that we should treat them with caution. First, arguments from Leibniz's Law are notoriously slippery. Here are three clearly bad arguments adapted from well known examples:

Argument 1:

1. George IV wanted to know if Scott was the author of *Waverly*.
2. George IV did not want to know if Scott was Scott.

Therefore, Scott was not the author of *Waverly*.[1]

And, using two proper names (instead of a proper name and a definite description as above):

[1]The example is essentially Russell's (1905), although, obviously, he does not use it to argue for the conclusion that Scott was not the author of *Waverly*. (Scott was, of course, the author of *Waverly*.)

Argument 2:

1. Astronomers were unsure whether Hesperus is Phosphorus.
2. Astronomers were not unsure whether Hesperus is Hesperus.

Therefore, Hesperus is not Phosphorus.[2]

Finally, one adapted from Quine (1953):

Argument 3:

1. Giorgione was so called because of his size.
2. Barbarelli was not so called because of his size.

Therefore, Giorgione was not Barbarelli.

Each of these arguments has true premises and a false conclusion. And each conclusion is derived using Leibniz's Law. Common explanations of the failure in each argument are as follows.

Argument 1: "the author of *Waverly*" is a definite description. It does not, therefore, refer to the same individual in all possible worlds. "Scott", on the other hand, does apply to the same individual in all possible worlds—it is a *rigid designator*. (Compare: "Scott might not have been the author of Waverly," and "Scott might not have been Scott.") For this reason, the two cannot be substituted *salva veritate*.

Argument 2: names that appear in reports of propositional attitudes (e.g., "Fred believes that *p*") do not refer to their usual referents. Instead they refer to their senses. Hesperus and Phosphorus have the same referent (i.e., Venus) but

[2]This is adapted from Frege's (1980) example. However, as with Russell, Frege does not use the example in this way. (Hesperus and Phosphorus *are* identical. "Hesperus" and "Phosphorus" are two different names for the planet Venus.)

different senses. (Perhaps, they are associated with different descriptions.) The only conclusion that can be drawn from the argument is that "Hesperus" and "Phosphorus" have different senses.

Argument 3: "was so called" is an Aberlardian predicate: it changes meaning depending on the subject to which is attached. In the first premise of the argument it is attached to the subject term "Giorgione" and means "was called 'Giorgione"'. In the second premise the subject term is "Barbarelli" and the meaning of "was so called" is "was called 'Barbarelli". The argument is therefore invalid as it contains an equivocation.

We have already seen some of these responses at work, particularly in Chapter 3. If the critic of composition as identity wants to appeal to this kind of argument then she must also argue that the appeal to Leibniz's Law is legitimate here.

There is a second reason why discernibility arguments are not so powerful in this context. What the critic of composition as identity overlooks is that she herself faces a similar challenge, assuming that she is a realist about composite objects. For although the realist critic denies that an object is identical to its proper parts, she must accept that an object is identical to the *fusion* of its proper parts. But the fusion of the proper parts could possibly exist when the object in question does not. This is just another version the problem facing the identity theorist.[3] Of course, the critic of composition as identity has a number of ways to avoid the argument—but so too does the defender of composition as identity. Composition as identity simply makes the problem more salient.

Thus, it is clear that the discernibility argument is not nearly as decisive as opponents of composition as identity often make out. We will draw upon these points in the discussion of the three variants of the argument below.

Responses fall into two categories: (i) responses which deny that an object and

[3]It should be noted that the opponent of composition as identity does have the advantage of avoiding the numerical discernibility argument.

its proper parts have different properties (of the relevant type) and (ii) responses which modify or reject Leibniz's Law. We will not be discussing responses which modify or reject Leibniz's Law. There are respectable theories that do just this (see especially Gallois, 1998), but they are not widely endorsed and covering them would require extensive discussion.

The Temporal Discernibility Argument

One of the most common arguments against composition as identity is a temporal version of the discernibility argument. Many composite objects exist at different times to the objects that compose them. It seems that these composite objects cannot therefore be identical to their proper parts. For instance, the atoms that compose you at this very moment existed many years before you did. Therefore, you are not them. Or so, at least, the objection goes.

We already have a response to this objection. If we accept either temporal parts theory or stage theory the problem dissolves. For when we say that some particular atoms compose you what we mean is that either (i) the present temporal parts of the atoms compose the present temporal part of you, or (ii) the present stages of the atoms compose the present stage of you. For this argument to be effective, then, opponents of composition as identity need to show that both perdurantism and stage theory are false, or at least significantly worse than the alternatives. And that is no easy task. I know of no decisive argument against either view, or even any argument which pushes us towards endurantism.

Another way to make the point (or a similar one) is as follows. The critic of composition as identity appeals to a discernibility argument, but we know that such arguments are unsound when non-rigid designators are involved. (See *Argument 1* above.) The critic is therefore tacitly assuming that the names for composite objects and their parts are rigid across time—that is, that the object

that they refer to at one time is identical to the object that they refer to at another.

However, while "the Xs" is plausibly rigid, there is no reason to think "the chair" is as well. This holds even if we give the chair a proper name like "Chair". It is my view that "Chair" refers not to a particular object but to the presently existing object which plays the appropriate functional role, if there is one. (Roughly, it will refer to the present temporal chair-counterpart of the object originally given the name "Chair".) The discernibility argument is therefore a lot like *Argument 1* above. But nobody thinks that Leibniz's Law holds in that case. So why here?

I defended this view (briefly) in Chapter 3. I admit that it sounds somewhat strange. However, I think there are clear cases in which such a view is true. Imagine, for instance, that there are numerous people outside your house chatting away. Individuals come and go but at no time are there less than (say) ten people outside. Now, one might well say something like,

(10) The people outside are making more noise than they were a minute ago.

It seems that in doing so one would be attributing a temporal property to the people (collectively). Yet the people outside now are not the identical to the people who were outside a minute ago. In fact, the people outside now were not, strictly speaking, outside your house a minute ago—only some of them were. So how is it that (10) is true?

The stage theoretic account sketched above explains how. My claim is that objects persist in just this way.

The Modal Discernibility Argument

A second version of the discernibility argument appeals to modal properties. This, too, is a common objection to composition as identity. The modal version of

the discernibility argument is stronger than the temporal version. Whereas the latter rules out identity only in most cases, the former is supposed to show that no object is ever identical to its proper parts. Regardless of what *actually* happens to an object, the argument goes, it nevertheless has different modal properties than its proper parts. What properties are these? Here is one example: my chair cannot survive being set on fire and left to burn; the atoms that compose it, on the other hand, presumably can.

From this it is tempting to conclude that the chair is not identical to the atoms that compose it. Namely, it is tempting to argue:

1. The chair cannot survive being set on fire.
2. The atoms can survive being set on fire.

Therefore, the chair is not identical to the atoms.

But we should not accept this conclusion too quickly. The same problem arises in the case of constitution, yet many philosophers maintain that a statue is identical to the clay that makes it up despite apparent differences in their modal properties. We need only appeal to the same solutions to solve our current problem. We have already come across those solutions in Chapter 3. For the most part, they are analogous to responses to the temporal discernibility argument. We have a choice between five-dimensionalism, counterpart theory, and eliminating *de re* modal properties altogether. The modal discernibility argument is only as strong as the arguments against these views. As I said in Chapter 3, my view is that there is no good reason to think any of those views is false. In fact, they seem as good as or better than the alternatives.

Before we go on we should discuss a closely related argument against composition as identity given by Merricks (1999). In my experience, it too is a popular objection. Merricks argues that composition as identity entails mereological

essentialism—the view that an object has its parts necessarily—and therefore should be rejected. His argument is simple. If the Xs compose y (for any Xs and y), and if composition as identity is true, then the Xs are identical to y. Given that everything is necessarily identical to itself, it follows that the Xs are necessarily identical to y, and therefore that y is necessarily composed of the Xs.[4]

This is, in essence, just a different version of the argument we have been discussing. One version of the modal discernibility argument is based upon the claim that a composite object could have had different proper parts than it does. You, for instance, could have been composed of different particles. But if you are identical to the particles that actually compose you this amounts to saying that the particles could have been some different particles, and that's false given the necessity of identity. Merricks instead takes the fact that the particles could not be identical to any other particles as a premise and deduces that you could not have been composed of any other particles.

Our response should be the same as before. Adopting counterpart theory or five-dimensionalism allows us to say that you indeed could have been composed of other particles. Again, I think this response is quite plausible, and it is certainly effective.

The Numerical Discernibility Argument

Perhaps the most serious argument against composition as identity is the numerical discernibility argument. We have already discussed this in some detail in Chapter 3. The argument goes as follows. A composite object is one, its proper

[4]Note that this argument only works if *superstrong* composition as identity is true. (Recall that superstrong composition as identity says that the Xs compose y if and only if the Xs are identical to y.) If we define composition as identity as the view that the Xs compose y only if the Xs are identical to y, Merricks' inference from the Xs being necessarily identical to y to the Xs necessarily composing y does not go through. I am happy to accept the argument as is because I endorse superstrong composition as identity, but the defender of composition as identity is not forced to do so.

parts many. To be many is to not be one; therefore, a composite object is not identical to its proper parts.

There are at least three strategies available to us: relative counting, plural counting, and partial quantification. It remains to be seen whether one or more of these are viable or not. In my view this, along with issues of understanding the ontology of composition as identity, is the biggest weakness of the view. Although there does not seem to be any overwhelming reason to reject any of the accounts of number and counting mentioned above, there is still much work to be done. That makes this issue one of great interest for future work. Unfortunately, I have little to add at present to what other defenders of composition as identity such as Wallace (2009, 2011b) have said on the matter. For this reason, I have settled for a different approach: I have offered independent arguments in favour of composition as identity. I think that these arguments give us reason to think that some account of number consistent with composition as identity must be true. The (exciting) implication of this is that there may be new and interesting views about quantification out there waiting to be uncovered. Given the great popularity of the orthodox view, and of the view of quantification that goes with it, it may well be that important factors have been overlooked.

The Actual Discernibility Argument

As well as taking composite objects to differ from their parts in terms of temporal, modal, and numerical properties, one might also take them to differ in terms of ordinary (non-temporal, non-modal, non-numerical) properties. I am not sure if any philosopher has explicitly made such a claim with respect to composition, but Kit Fine (2003) says something similar about constitution. He argues that a statue and the alloy that constitutes it differ with respect to many properties other than their modal and temporal properties:

> [T]he statue may be *defective*, *substandard*, *well* or *badly made*, *valuable*, *ugly*, *Romanesque*, *exchanged*, *insured*, or *admired* even though the alloy which makes it up it is not (Fine, 2003, Section 3).

The same thought can naturally be generalised to apply to composite objects and their proper parts. It is a statue and not the atoms that compose it which we value, which is well made, insured, and so on. If this is right then the statue and the atoms cannot be identical. In fact, if Fine is right in the constitution case, then he is probably right in the composition case too.

I do not, however, think he is right. The response I will offer should not be surprising. The statue but not the atoms can be said to be well made, valuable, and admired, for instance, because these predicates are Aberlardian. Both the statue and the atoms are well made *qua* statue and not well made *qua* atoms.

Although this response is effective in blocking the objection one might think that it is nevertheless incorrect. Luckily there is more to be said. One thing to note is that there is a perfectly good explanation of why we would apply certain predicates when talking about the statue and not apply them when talking about the alloy. When we say that the statue is valuable, but the alloy is not, we merely emphasise the fact that what is valuable is the alloy *in a certain form*, and *under certain conditions*. This, I think shows that the response is not merely effective, but plausible too.

Of course, my opponents may have different intuitions. The real test of Fine's claim is whether or not one would be able to tell the difference between a mere piece of alloy shaped like a statue (and with the right history etc.) and a statue; or between some atoms arranged statue-wise and a statue. Fine seems committed to saying that there is an *empirical* difference between the two, at least insofar as he claims that the statue may be well made, ugly, or Romanesque. Yet it is not at all plausible to me that a statue could be ugly, but the alloy that constitutes it,

and looks exactly like it, not be. What difference in the two objects could account for that fact? There is none. For the same reason, it is not plausible that a statue be ugly, but that the same not be true of the atoms arranged statue-wise which compose it. If it were then there would have to be some observable difference between the statue and the atoms. Given that physics seems to tell us that the atoms fully account for our experience, this looks highly unlikely.

In fact, I think that Fine's argument here undermines his whole position. He draws upon intuitions to support his claim that the statue and the alloy are distinct from one another, but our best science tells us that those intuitions must either be faulty or not mean where Fine thinks they mean. If it is true that the statue is well made and the alloy is not, *and* it is true that our best science tells us that the statue has no causal effects beyond those of the alloy, then we have little choice but to explain away the fact that the statue is well made and the alloy is not. Either we have no empirical grounds for claiming that the statue is well made at all, or the grounds we do have equally support the claim that the alloy has the same property. There is no reason to think there is a physical difference between the two objects that accounts for our views, so we must explain away those views. The Aberlardian account I have just appealed to does exactly that.

This is where Fine's overall argument starts to crumble. If the Aberlardian account is correct for predicates like "is well made", "is valuable", and "is admired", then this makes an Aberlardian account of temporal and modal predicates appear much less *ad hoc*, and therefore much more appealing. If we need to appeal to Aberlardian predicates to explain the apparent differences that Fine cites, then it begins to look quite plausible that temporal and modal predicates might also be Aberlardian.

That concludes our discussion of the various discernibility arguments against composition as identity. The defender of composition as identity has perfectly

good responses to each. If critics of composition as identity want to appeal to discernibility arguments they must show why we should accept those arguments in this context given that they themselves reject very similar arguments elsewhere. It is not enough to present an argument that *seems* to tell against composition as identity, particularly given that there are well known cases in which discernibility arguments lead us into error.

II. "Part of", "One of", and Collapse

We have spent a considerable amount of time thus far making comparisons between composition as identity and plural quantification. An important consequence of composition as identity is that the *part of* relation is a special case of the *one of* relation. Although this connection to plural quantification has certain benefits (see Chapter 1, section IV), Byeong-uk Yi (1999b) and Theodore Sider (2007) argue that it also leads to problems.

Yi's argument is simple. Consider two objects, Tom and Jerry, which compose Genie. Suppose we also have another object, Cicero. Genie is then one of Genie and Cicero. If composition as identity is true, Genie is identical to Tom and Jerry together. Thus, if composition as identity is true Genie is one of Tom and Jerry and Cicero. But this is false; or so Yi argues. He suggests that the reason why it is false is that Genie is one of Tom, Jerry, and Cicero if and only if Genie is identical to Tom, or identical to Jerry, or identical to Cicero. Since Genie is identical to none of those things, it follows that Genie is not one of Tom, Jerry, and Cicero. Following Sider (2007, p. 7), let us call this rule governing the meaning of "is one of", *Lists*:

Lists x is one of y_1,..., y_n if and only if (x = y_1 or, ..., or x = y_n) (Sider, 2007, p. 7).

More formally, Yi's argument is:

(Y1)	Genie is one of Genie and Cicero.	(*Lists*)
(Y2)	If composition as identity is true then Genie is identical to Tom and Jerry.	(Premise)
(Y3)	If composition as identity is true then Genie is one of Tom and Jerry and Cicero.	(Y1, Y2, LL)
(Y4)	Genie is not one of Tom and Jerry and Cicero.	(*Lists*)
	Therefore, composition as identity is false.	(Y3, Y4)

The role that *Lists* plays is in defending (Y1) and (Y4), though of course (Y1) is obvious enough. The move from (Y1) and (Y2) to (Y3) is based upon Leibniz's Law (LL). If Genie is one of Genie and Cicero, and Genie and Cicero are identical to Tom and Jerry and Cicero, then Genie is one of Tom and Jerry and Cicero.

It is important that we are clear about the nature of Yi's objection. At its heart it is a version of the actual discernibility argument discussed in the previous section. The argument is supposed to show that Genie and Cicero are not the same objects as Tom, Jerry, and Cicero by demonstrating that they have different properties. Genie and Cicero stand in a relation to Genie, which Tom, Jerry, and Cicero do not. It can also be seen as an instance of a general argument against the view of counting entailed by composition as identity: something can be a (proper) *part of* some other thing, but it cannot (it seems) be *one of* that thing. Thus, the argument is also closely related to the numerical discernibility argument.[5]

There are at least two ways to respond, each of which have been endorsed by defenders of composition as identity. One is to deny that *Lists* is true (e.g.,

[5]Thanks to Einar Bøhn for bringing this to my attention. The connection is this: whether some things are joined by the *one of* relation depends upon the numerical properties of those things.

Wallace, 2009). Doing so allows one to deny (Y4). If composition as identity is true, then Genie *does* stand in the same relation to Genie and Cicero as to Tom, Jerry, and Cicero. This is shown in Figure 17 below.

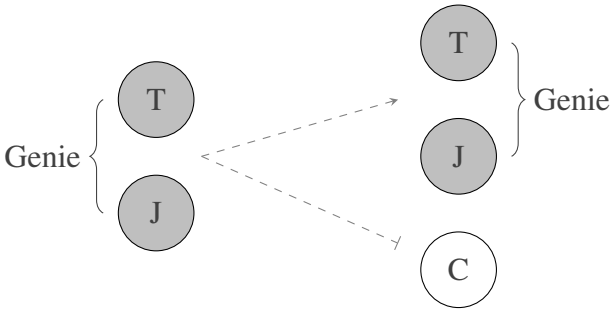


Figure 17: The relation between Genie/Tom & Jerry and Genie/Tom & Jerry and Cicero if composition as identity is true. (Dashed arrows represent identity, terminating dashed lines represent distinctness.)

The other way is to reject the inference from (Y1) and (Y2) to (Y3). For instance, one might argue that the meaning of "is one of" varies depending on context, and that the terms "Genie" and "Tom and Jerry" create different contexts (e.g., Bøhn, 2014b; Cotnoir, 2013). This allows one to say that, although the premises of the argument are all true, the conclusion does not follow because Yi equivocates in his use of "is one of".

These responses are not mutually exclusive. The first response takes the meaning of "is one of" to be fixed, and denies that *Lists* is the right way to understand the predicate. The second response takes the meaning of "is one of" to vary, and accepts *Lists*. But one could also maintain that there are two possible readings of "is one of" in (Y4). On one reading, the argument is valid, but *Lists* and (Y4) is false; on the other, (Y4) is true, but the argument is invalid.

I think that all this is in fact correct; but the problem with the entire strategy is that it only succeeds in showing that the defender of composition as identity can consistently resist the argument. It does not show that she is right to do so. Yi,

for instance, will argue that each of his premises is true and the argument valid. His opponents will argue that he equivocates or that one of the premises is false.

For this reason, I will adopt a slightly different approach. Rather than outlining the ways in which advocates of composition as identity can say that Yi's conclusion doesn't follow, I will try to show that *in fact* Yi is wrong.

The key claims made by Yi are (i) that composition as identity together with

(11) Genie is one of Genie and Cicero

and the fact that Genie is composed of Tom and Jerry, entails

(12) Genie is one of Tom and Jerry and Cicero,

and (ii) that this is false. Defenders of composition as identity deny one or the other of Yi's claims. My argument will be that we have good reason to favour the latter option. Importantly, Yi's claim is that *if* composition as identity is true, then (12) is true. If we can show this to be false, then we can show that Yi's conclusion doesn't follow. Alternatively, if we could show that (12) is true, then we could achieve the same result. The first of these tasks is easier because the only way to rescue (12) is by denying *Lists* which crucially entails that (12) is equivalent to:

(12*) Genie is identical to Tom or Jerry or Cicero.

If we did this, however, we would have to provide an alternative to *Lists*.[6] Thus, I will take the first option.

Let us grant, then, that *Lists* is true, as it seems to be. Then (12) entails (12*) which is false. We then need to show that composition as identity does not entail (12). Again, pointing out that we can consistently *maintain* that the entailment

[6]See Wallace, 2009, p. 140 for a suggestion of a replacement principle.

doesn't hold is not really enough. It would be good if we could also show that this is true. For otherwise Yi can reasonably insist that "is one of" means the same thing in both (11) and in (12), even if composition as identity is true.

Luckily, there are good reasons to think that Yi would be wrong if he did so. First, if composition as identity is true we would *expect* "is one of" to change meaning depending on which subject terms we use. Composition as identity says that there are different ways to count the number of things in the world. It follows that the meaning of "one" will vary depending on which method of counting one adopts. Tacitly moving from one way of counting to another will therefore result in ambiguity. In fact, this is arguably just what Yi's argument shows.

Perhaps the simplest way to see this, and to see why it is plausible to think that composition as identity does not entail (12) and (12*), is by looking at super-plural quantification. The idea of super-plural quantification is, of course, somewhat contentious; but there is no reason to think that we cannot make sense of it. For (as we have seen) even if there are no natural language cases, it does not follow the notion is incoherent. (See Rayo, 2006 for a defence of the idea.) Suppose, then, that we introduce a plural analogue of the predicate "is one of" by way of an analogue of *Lists*. Instead of having a single thing which is one of a plurality of things, we have a plurality of things which is one plurality among a plurality of pluralities. (Unfortunately, these ideas are difficult to express without using the misleading term "plurality". This is no reason to think them any less coherent, however.) The principle I have in mind is:

Plural Lists xx are one plurality of yy_1,..., yy_n if and only if (xx = yy_1 or, ..., or xx = yy_n).

The idea is exactly the same as before. Some Xs are one plurality among some Ys and some Zs if and only if the Xs are identical to the Ys or identical to

the Zs. I can see nothing objectionable about the idea.

We can now construct a parody of Yi's argument. Suppose we have some objects, the Gs, and some other objects, the Cs. Suppose also that both the Gs and the Cs are more than two in number. The Gs are one plurality among the Gs and the Cs. Now suppose that the Gs are identical to some objects, the Ts, and some other objects, the Js, together.[7] (It may be helpful to think of the Gs as the atoms that compose Genie, the Cs as the atoms that compose Cicero, and so on.) It then seems to follow that the Gs are one plurality among the Ts and the Js and the Cs. But, *Plural Lists* entails that the Gs are one plurality among the Ts and the Js and the Cs if and only if the Gs are identical to the Ts, or the Js, or the Cs. And that is not the case.

Hence, we have a clear analogue of Yi's argument, but with one crucial difference: here it is simply not an option to deny that the Gs are identical to the Ts and the Js. After all, we stipulated that this was the case, and there was nothing stopping us from doing so. (Imagine that you have some blue marbles and some red marbles. Necessarily, there are some marbles which are identical to the blue marbles and the red marbles together—namely, all of the marbles. This holds of any pluralities.) We cannot therefore deny that the Gs are identical to the Ts and the Js together. The only options are to deny *Plural Lists* or deny that the Gs are one plurality among the Ts, the Js, and the Cs. But since we got this result by substituting co-referential terms it follows that doing so must have changed the meaning of the sentence. And, given that this case is almost exactly analogous to Yi's, we have good reason to think the same is true when we substitute "Tom and Jerry" for "Genie". That is exactly what we would expect if composition as identity were true.

There is also a more direct way to show that the meaning of "is one of" is

[7] If the Gs are greater than two in number, then by the rules of plural logic there are some Xs and Ys such that the Xs and Ys together are identical to the Gs.

context sensitive in this way if composition as identity is true. Yi claims that substituting what the identity theorist thinks are co-referential terms shows that the terms are not in fact co-referential. But if we are free to substitute co-referential terms without changing the meaning of the sentences we should get the same sentences—true or false—no matter which way we go about substituting co-referential terms. (After all, he claims that it is the different properties of Genie and Tom and Jerry (together) that cause the change in truth value.) However, we do not.

Yi claims that

(11) Genie is one of Genie and Cicero

entails

(12) Genie is one of Tom and Jerry and Cicero.

He then argues that (12) entails (12*):

(12*) Genie is identical to Tom or Jerry or Cicero.

But there is another way to substitute "Tom and Jerry" for "Genie". *Lists* entails that (11) is equivalent to (11*):

(11*) Genie is identical to Genie or Cicero.

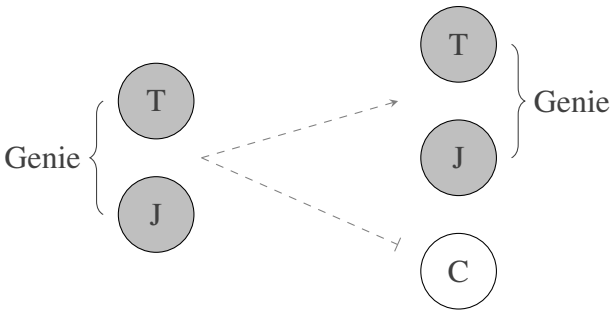
Let us then substitute "Tom and Jerry" for the second instance of "Genie". This gives us:

(12′) Genie is identical to Tom and Jerry or Cicero.

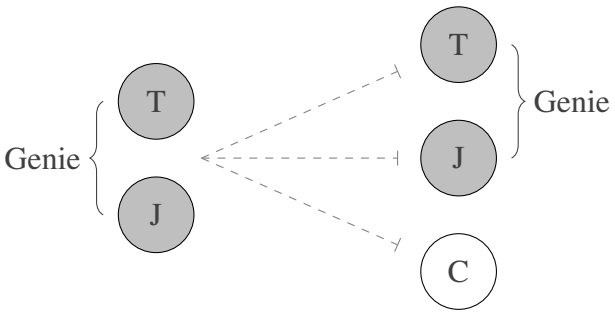
Now this sentence should be equivalent to (12*) on Yi's view; for (11*) is just another way of saying what (11) says, and (11) entails (12*) according to Yi.

Clearly, though, these two sentences are not equivalent. Furthermore, (12′) is true by the identity theorist's lights, and (12*) is false.

This strongly suggests that there is some failure of substitutivity. Certainly, we cannot explain these different entailments by the supposed fact that Genie is not identical to Tom and Jerry. After all, we made the same substitution in both cases. Substituting "Tom and Jerry" for "Genie" in an "is one of" context results in a falsehood; substituting these terms in a different context results in a truth. If the falsity of (12) and (12*) were explained by a difference in properties between Genie and Tom and Jerry, then we would expect that same difference to render (12′) false also. Since we see no such thing, we have good reason to conclude that it is not a difference in properties that causes the problematic entailment.



(a) "Genie is one of Genie and Cicero."



(b) "Genie is one of Tom and Jerry and Cicero."

Figure 18: Variation in meaning of the predicate "is one of" in different sentential contexts. (Dashed arrows represent identity, terminating dashed lines represent distinctness.)

Note that, if composition as identity is true, the difference in meaning between

(11) to (12) is the same as the difference in meaning between (12*) and (12′). This is shown in Figure 18 above. We thus have a good explanation for the change in truth-value. The meaning of "is one of" changes from the one sentence to the other.

Finally, it is worth pointing out that there is another way to respond to Yi's argument besides those discussed. Instead of suggesting that Yi's argument is invalid because of an ambiguity in "is one of" we could argue that it relies upon an ambiguity in "Tom and Jerry and Cicero" in (Y4). Recall, that composition as identity is the thesis that a composite object is identical to its proper parts *collectively*. Thus Genie is identical to Tom and Jerry *together*. This suggests that we would be better of saying that composition as identity entails that "Genie is one of Tom and Jerry (together) and Cicero" (*cf.* Cotnoir, 2013). When we translate this by appealing to *Lists* the "(together)" tells us where to put the "or". Whereas the sentence,

(12) Genie is one of Tom and Jerry and Cicero

translates into,

(12*) Genie is identical to Tom or Jerry or Cicero,

the sentence,

(13) Genie is one of Tom and Jerry (together) and Cicero,

translates into,

(13*) Genie is identical to Tom and Jerry or Cicero.

And the problem does not arise. If successful, this response gives us a way to continue to substitute co-referential terms in the context of the predicate "is one

of" without changing the truth value of the sentence in question. This will prove useful in the next section.

Collapse

Sider (2007) points to similar difficulties to the one highlighted by Yi's argument. His case against composition as identity, however, is somewhat different in spirit. He argues that composition as identity breaks plural quantification. Since the resources of plural quantification are extremely useful in a number of contexts, and would be broken if composition as identity were true, he concludes (somewhat tentatively) that we should reject composition as identity.

He offers the following example of the trouble that accepting composition as identity causes (2007, p. 8):

(14) Tom, Dick, and Harry carried the casket.

If composition as identity is true, and Tom, Dick, and Harry are each composed of a head and a body, it follows that

(15) Tick, Darry, and Hom carried the casket

is also true, where Tick is Tom's head plus Dick's body, Darry is Dick's head plus Harry's body, and Hom is Harry's head plus Tom's body. Sider's reasoning is as follows. Tom, Dick, and Harry are identical to the Tom parts, the Dick parts, and the Harry parts. The Tom parts, the Dick parts, and the Harry parts, are identical to some other pluralities: the Tick parts, the Darry parts, and the Hom parts. And the Tick parts, the Darry parts, and the Hom parts are identical to Tick, Darry, and Hom (assuming universalism). Therefore, Tom, Dick, and Harry are identical to Tick, Darry, and Hom. The problem then is that (15) seems clearly false, whereas (14) is true by hypothesis.

The problem is caused by the fact that composite objects admit of (often many) different decompositions into parts. A person is composed of macro body parts, but they are also composed of atoms. Because of this we end up with a certain structure. For instance, the person's hand is one of their macro body parts, but not one of their atoms. If composition as identity is true, however, this structure collapses. The person is identical to the macro body parts, which are identical to the atoms. Thus, anything that applies to the macro body parts applies to the atoms. Sider (2014) calls this *collapse*. Collapse is responsible for a number of problems, including the one outlined by Yi.

As before, I will not try to offer a detailed solution to these problems. They are many and our space is limited. Instead, I will try to show that the problems are not caused by composition as identity *per se* and that they are, in fact, part of a general more problem facing everyone.

Sider's objection, like Yi's, is only damaging to composition as identity if it is plausible that the problem is caused by the non-identity of the relevant object and its proper parts (collectively). It is not, however, all that plausible that this is the case. Take the following sentence, which follows from (14) if composition as identity is true.

(14′) The Tom parts, the Dick parts, and the Harry parts carried the casket.

Now compare this to:

(15′) The Tick parts, the Darry parts, and the Hom parts carried the casket.

Anyone convinced of composition as identity should accept (14′), but it is not clear that they should also accept (15′). (15′) seems false, and for much the same reason that (15) does. Tick, Darry, and Hom don't seem to be the sort of things that could be involved in carrying. But nor do the Tick parts, the Darry parts, or the Hom parts.

As we saw previously, it is not possible to deny that the Tick parts, Darry parts, and Hom parts are not identical to the Tom parts, the Dick parts, and the Harry parts. So any difference in truth value between (14′) and (15′) must be due to a difference in meaning rather than a difference in properties of these pluralities. The fact that (14′) and (15′) show a similar pattern to (14) and (15) suggests that the difference in truth between (14) and (15) may be explained in the same way. Even the opponent of composition as identity has to explain why (under the assumption of universalism that we are working with) Tick, Darry, and Hom cannot be said to have carried the casket despite the fact that their proper parts were arranged in just the same way, and had the same causal effects that the proper parts of Tom, Dick, and Harry did. If the answer is that Tick, Darry, and Hom are not the right kinds of thing to be involved in carrying a casket, then the defender of composition as identity can say the same about the Tick parts, the Darry parts, and the Hom parts. If Tick cannot be involved in carrying, what stops us from saying that the Tick parts cannot be involved in carried as well?

There is nothing incoherent about the claim that pluralities can interact with each other in particular ways. It is possible for some objects to (collectively) interact with some other objects. Surely, then, it is possible for Tom parts (collectively) to interact with the Dick parts (collectively) and the Harry parts (collectively) in such a way as to meet the conditions for carrying.

Imagine two pluralities of soldiers: the Normans and the Saxons. Now suppose the following sentence is true:

(16) The Normans and the Saxons charged towards each other.

The predicate “charged towards each other” does not apply to the Normans or to the Saxons on their own; for that would imply that the individual Normans charged one another, and that the individual Saxons did the same. Thus, it applies

to the Normans and the Saxons collectively. But the term "the Normans and the Saxons" refers to some soldiers which we can also refer to in other ways. For instance, the soldiers are identical to some individuals which we would naturally refer to as "the left-handed soldiers and the right-handed soldiers". Supposing that there are right- and left-handers among both the Normans and the Saxons, the sentence,

(17) The right-handed soldiers and the left-handed soldiers charged towards each other

is false, despite the fact that the right-handed soldiers and the left-handed soldiers (together) just are the Normans and the Saxons (together). The only plausible explanation for the difference in truth-value between these sentences is that they do not have the same meaning. More specifically, it seems that the property denoted by "charged towards each other" is different in each case. In fact, we might propose a principle similar to *Plural Lists* to capture the meaning of the predicate "charged towards each other". The following seems to be a good approximation:

Charge The Xs and the Ys charge towards each other if and only if the Xs charge towards the Ys, and the Ys charge towards the Xs.

We can see then see that although a property is attributed to the Xs and the Ys collectively, at the same time a property is attributed to each plurality separately. The Xs and the Ys have the property collectively if and only if the Xs and the Ys *individually* have certain properties.

In (16) the soldiers are described as being such that the Normans among them charged towards the Saxons among them, and vice versa. In (17) the soldiers are described as being such that the left-handers among them charged towards the right-handers among them. These are, of course, very different claims.

The coffin-carrying case is more difficult, but there is no reason to think the predicate "carried the casket" cannot work in a similar way. The fact that we clearly can change the meaning of similar sentences by substituting co-referential terms gives us good reason to reject the claim that (15) is false because Tick, Darry, and Hom are not collectively identical to Tom, Dick, and Harry. (Alternatively, it may be that (15) is true. Part of the problem in this case may also come from the assumption of universalism. Most of us don't believe in objects like Tick, Darry, and Hom, so it is no surprise that we would find it strange to say that they carried anything.)

We seem, then, to have good reason to maintain that Yi and Sider's objections are not too worrying. But we are not yet out of the water. Sider seems happy to agree with this assessment,[8] and instead offers a somewhat different reason to reject composition as identity. He argues that many of the most interesting and successful applications of plural logic (e.g., Boolos, 1984; Lewis, 1991; Rayo, 2002; Uzquiano, 2006) would not be possible if composition as identity were true. Many of the responses to the problems caused by collapse that we have discussed rely on the claim that "is one of" and other predicates appearing in plural quantificational contexts change their meaning depending on which subject terms they are attached to. Sider argues that this strategy won't work in the more abstract cases in which plural quantification has proved particularly useful. For instance, considering the view that the meaning of "is one of" changes depending on which "divisional property" is selected (e.g., one *body part*, or one *person*),[9] he writes:

> This model works best when 'is one of' is flanked by constant terms. But it seems inapplicable when 'is one of' is flanked by variables

[8] See for example Sider (2007, p. 8).

[9] See Cotnoir, 2013, and Bøhn, 2014b for examples of how this approach can be put to work.

> bound to quantifiers, for lack of a mechanism to select an appropriate divisional property. And yet, such uses of 'is one of' lie at the heart of the most interesting applications of plural quantification. Boolos quantifies plurally over sets when giving his second-order formulation of set theory, without regard to which properties those sets instantiate; he expects 'is one of' to continue to behave like the predicate of set-membership (Sider, 2007, p. 18).

But this is not a very compelling argument. First, as Sider himself acknowledges, the meaning of "is one of" need only be fixed by the *context* of use and not the terms that flank it (Sider, 2007, p. 18). Thus, constant terms are not necessarily required to fix the meaning of the predicate, as he implies. Consider how we go about constructing plural referring expressions. We start with some singular variables—x, y, z...etc.—and construct our plural variables either explicitly or implicitly out of these. Thus whatever *one* is it is the kind of thing that is the value of a singular variable in our domain. And this remains fixed even if we move to super-plural variables. After all, "xx is one of yyy" is not a well formed formula in that language. For that, we use another relation such as "are some of", understood in much the same way as "is one of".

The point is that, so long as we stick to quantifying over a fixed domain of individuals, "is one of" will be well-defined. Composition as identity tells us that there are many different answers to the question "What is one?" but that does not imply that we cannot choose one such answer and work with it.

Furthermore, the context of use need not even provide us with a determinate divisional property. The meaning of "is one of" can be left up in the air so long as we don't allow substitution of co-referential variables at different levels (i.e., singular for plural, plural for super-plural, and so on). When dealing with abstract ideas, it does not actually matter what we take singular variables to be referring

to, so long as we don't allow this to change.

A second reason why the argument is not compelling is that Sider seems to have overlooked the fact that a defender of composition as identity can simply accept many of the false-sounding sentences caused by collapse. I said earlier that we can either say that substitution changes the meaning of predicates like "is one of", or we can say that the meaning stays the same and revise our understanding of how "is one of" works. Sider himself seems quite sympathetic to this kind of response (e.g., Sider, 2007, p. 9). But if we allow that there is a way to interpret sentences like "Genie is one of Tom and Jerry and Cicero" and "Tick, Darry, and Hom carried the casket" such that they are true, then collapse causes no deep problems for plural quantification at all.

Of course, there is still the problem of saying either exactly how the meaning of "is one of" is fixed by context, or exactly how we should understand the above sentences such that they come out true. But neither of these is a problem that in any way indicates that composition as identity is false. As I stressed previously, in order for problems caused by collapse to give us reason to reject composition as identity, they must suggest that the composites in question have different properties than the objects that compose them. The fact that composition as identity makes plural quantification more difficult *per se* is no reason to believe that it is false. It is only insofar as this difficulty is seen to imply that composites and their proper parts have different properties that this is the case.

To conclude, then, the problems caused by collapse seem to be of the same type as general problems related to plural and super-plural quantification. This suggests that composition as identity *itself* is not to blame. Composition as identity creates problems by making the relation between singular and plural quantification the same as the relation between plural and super-plural quantification, a scenario where collapse is ever-present. But, as we have seen, those are

problems are problems to do with substitution of co-referential terms rather than problems to do with substitution of terms which aren't co-referential. Thus, the arguments of Yi and Sider do not take us as far as they are supposed to.

Indeed, the fact that the problems we have been discussing are superficial problems could even be taken as evidence in *favour* of composition as identity. Surely, if composition as identity were false we would expect that taking composites to be identical to their proper parts would have completely disastrous results. And we would expect those results to be quite unlike problems caused by ambiguities in language.

III. EMERGENCE

Another problem facing composition as identity is emergence. The worry is quite general. If composite objects have properties which the objects composing them do not have (collectively), then composite objects cannot be identical to their proper parts. Thus, the defender of composition as identity must deny that composite objects have any properties not had by their proper parts collectively.

McDaniel (2008) argues that this entails that composition as identity is false. He reasons as follows. If composite objects cannot have properties not had by their proper parts collectively, a certain sort of emergence must be impossible. But emergence of that sort is not impossible; so composition as identity must be false.

He appeals to what he calls the *plural duplication principle* in defending this conclusion.

Plural Duplication Principle For any Xs, w, and z, if the Xs compose w, then z is a duplicate of w if and only if there are some Ys that are plural duplicates of the Xs and compose z (McDaniel, 2008, p. 129).

The idea is quite simple. If x is identical to y then any duplicate of x is a duplicate of y. Similarly, if the Xs are identical to w and z is a duplicate of w then z is a duplicate of the Xs.

I am happy to endorse the plural duplication principle, although some might not be. If one thought that it is a further fact about something whether it is many things (as well as one thing), then one would be committed to denying the plural duplication principle. Given that my view is that a thing's intrinsic properties (specifically, whether it is spatially extended or not) settle whether it is identical to many things or not, it seems that I have no reason not to accept the principle.

McDaniel thinks this leads to problems. He argues that the plural duplication principle is false because it entails that *strongly emergent properties* are impossible. Roughly speaking, strongly emergent properties are properties that do not supervene upon the relations and properties of atomic objects.[10] For example, anyone who believes in the possibility of "zombies"—i.e., microphysical duplicates of persons that have no consciousness—is committed to the possibility of strongly emergent properties. If duplicating the microphysical features of a person is not enough to guarantee consciousness, then consciousness is strongly emergent in McDaniel's sense.[11]

McDaniel claims that strongly emergent properties are possible and inconsistent with the plural duplication principle. First, possibility. McDaniel takes the conceivability of zombies as reason to think that they are possible. Furthermore, he argues, there are good reasons to think that strongly emergent properties are *actual*. For instance, quantum theory suggests that the properties of many physical systems cannot be reduced to those of their proper parts. (He cites Maudlin,

[10]McDaniel (2008) gives a more careful definition on page 131. For our purposes the additional details (e.g., details about perfectly natural properties) are not particularly important. I will argue that McDaniel's argument fails for more basic reasons.

[11]That, of course, assumes that the bearers of consciousness are material composites. One might deny this.

1998, in defence of this claim. This is the same point made by Schaffer, 2010, and mentioned in Chapter 4, section II.) Very roughly, quantum mechanics suggests that the states of the individual components of a system do not settle what the state of the system as a whole is. As with the zombie case, different systems may have components in precisely the same quantum states.

If this is right, McDaniel argues, the plural duplication principle is false, and with it composition as identity. This is straightforward enough. Suppose that zombies are possible. If x is conscious and composed of the Ys, which are its microphysical parts, then, given composition as identity, the Ys are conscious. But then any duplicates of the Ys must also be conscious (assuming that consciousness is intrinsic); so there can be no microphysical duplicate of x which is not conscious. Composition as identity entails that emergence of the sort McDaniel has in mind is impossible.

I think that McDaniel is right that composition as identity is incompatible with strongly emergent properties. However, this is no threat to composition as identity. As Bøhn (2012) has argued, the objection rests on a misunderstanding of plural properties. First, quantum mechanics makes claims about "systems" or "states" and not objects. Thus talk of the properties of systems of particles can be understood as talk about the properties the particles of the system have *collectively*. Nothing stops the defender of composition as identity from claiming that the collective properties of objects, plural, can be strongly emergent. Furthermore, it seems possible that the collective properties of some objects could be different from those of some duplicate objects. This is a form of strong emergence, but not one that poses any problem for the identity theorist. So long as objects can have properties collectively, there seems to be no reason to think they cannot have collective properties which are not strongly emergent.

Second, suppose we grant that zombies are possible. Now take the atoms

that compose a conscious person. If composition as identity is true the atoms *are* a conscious person. Thus the atoms are conscious. Thus, if composition as identity is true the claim that zombies are possible amounts to the claim that it is possible for plural duplicates of these atoms to be collectively non-conscious. This is perfectly consistent. What McDaniel seems to assume is that the atoms are non-conscious in both cases. But that is question-begging—it amounts to the assumption that composition as identity is false. Composition as identity says that the atoms that compose a conscious person are (collectively) conscious.

The intuition that zombies are possible is the intuition that some atoms could exist and be arranged in the right kind of way without any phenomenal properties being instantiated. This is perfectly consistent with composition as identity. If zombies are possible it is possible for atoms with the same physical properties to differ in whether they are collectively conscious. McDaniel is of course correct that it is impossible for atoms with *exactly* the same properties to differ in this way, but this is beside the point.

IV. Asymmetrical Dependence

This brings us to the last objection. The objection is this. Identity is a symmetrical relation. The dependence relations that hold between wholes and parts, on the other hand, seem to be asymmetrical. For instance, most philosophers believe that a whole exists and has the properties it has *in virtue of* the existence and properties of its proper parts, and not vice versa. But if the proper parts and the whole are identical then the proper parts depend just as much on the whole as the whole depends on them. Thus, one might argue, composition as identity cannot be true.

The objection can be put in a slightly different way. Some objects seem to be *fundamental*, while others seem to be non-fundamental. For instance, if there

are mereological simples then they are plausibly fundamental. Cars, on the other hand, are not plausibly fundamental in that sense. However, if composition as identity is true the world is "flat" and either everything is fundamental, or nothing is (whichever one prefers).[12]

In one sense this is a good objection; in another it is not. The objection is a poor one in that it assumes that no sense can be made of fundamentality if the world is "flat". The non-structuralist, just as much as the structuralist, can maintain that talk about higher and lower levels is useful and correct. The difference is that the non-structuralist takes such talk to reflect different ways of looking at and talking about the world, whereas the structuralist takes it to reflect a structure that is really "out there". The objection is a good one in that it challenges the non-structuralist to provide an account of how we are to make sense of asymmetric dependence and fundamentality talk if the world is "flat". I will try to show, in a general manner, that this challenge can be met (although the discussion will be very brief).

We should start by discussing how we might understand "levels" talk given composition as identity. I began the thesis by laying out a structured picture of the world. I claimed that the levels in this picture represent different ways to "carve up" the world. Furthermore, I claimed the lower levels constitute descriptions of the world which are more detailed than the higher level descriptions. Our discussion in Chapter 2 provides a nice example of this. To say that a higher level object is "black and white" is to say that some of its proper parts are black and some white. On the other hand, we might describe the lower level objects that compose it as "black" or "white". Here we specify which objects exactly are black and white. Thus, the lower level description contains more information. Similarly, the sentence "There exists a chair" is a higher level description. It tells

[12]This objection is inspired by Bennett (2011, p. 29).

us only that there are atoms arranged chair-wise. It tells us nothing about any individual atoms. The lower level description, on the other hand, does tell us this.

We can explain the asymmetrical dependence of chairs on atoms in this way. Start with the atoms. We can explain the fact that some atoms which are arranged chair-wise exist by appealing to the atoms. We cannot explain why the atoms exist by appealing to the fact that they are arranged chair-wise. After all, the atoms would exist even if they were not arranged chair-wise. An asymmetry emerges because of the fact that co-referential terms like "the chair" and "the atoms" are not *always* co-referential, or because they evoke different temporal and modal counterpart relations.

Few would think that "the atoms" and "the atoms arranged chair-wise" refer to different objects (plural) in this context. Yet the atoms arranged chair-wise depend upon the atoms and not vice versa. More precisely, the atoms' being arranged chair-wise depends on the relations between the individual atoms. But the particular relations that obtain between the atoms don't depend upon the atoms' being arranged chair-wise, because the atoms could be arranged chair-wise while standing in different (token) relations to one another. After all, *being arranged chair-wise* is a multiply realisable property.

This shows, I think, that the challenge posed at the start of the section can be met. Of course, there is a lot more to be said. I do not mean to suggest that the identity theorist has an easy job in meeting the challenge. But I do think that we need only look at how pluralities behave to understand the asymmetries in question. If there is a good explanation for the asymmetries in such cases—and one which doesn't make reference to spooky metaphysical connections—then there are good explanations for the asymmetrical relationships between wholes and parts as well.[13]

[13] I think that even if composition as identity turns out to be false, it could prove very useful to investigate asymmetries in the plural case. The Chapter 6 seems to me to support this claim.

It is also worth noting that this objection can be turned on its head. Many philosophers seem to want to say that every possible world that contains atoms arranged chair-wise also contains a chair, *and* vice versa. But, as we saw in Chapter 5, if we adopt a view on which the parts "generate" the whole, we seemingly cannot explain why every world which contains a chair also contains atoms arranged chair-wise. Furthermore, it seems true that a chair, as it is at a particular time, ontologically depends on the atoms that compose it at that time. If the atoms did not exist, or were not arranged just so, the chair would not exist, or would have different properties. But the inverse also seems true. If the chair, *that very chair, the way it actually is*, did not exist then those atoms would not exist. For suppose we could somehow zap the chair out of existence. I find it inconceivable that we could do this without also zapping the atoms out of existence. To zap an object out of existence would also be to zap its parts out of existence.

Thus, I think the structuralist faces the opposite problem to that faced by the non-structuralist. Whereas the non-structuralist has to explain apparent cases of asymmetrical dependence, the structuralist must explain apparent cases of *symmetrical* dependence. And it is not clear that she can do this.

8

FURTHER ARGUMENTS

In this chapter I will present some more arguments for composition as identity. Up until now my arguments have been targeted at metaphysicians in general. Some of the arguments presented in this chapter, on the other hand, may only be convincing to a minority of philosophers, since they have premises that not everyone will accept, and which I cannot hope to defend here. I myself find the arguments compelling so I think they are worth discussing. At very least, those who have similar commitments to my own should find them difficult to ignore.

The arguments that follow are adapted from arguments given by other philosophers, in some cases for different conclusions. In those cases, my argument will be that the premises I endorse are more plausible than those the original authors of the arguments chose to accept.

I. THE MASS OVERDETERMINATION ARGUMENT

In Chapter 4 I argued, following Merricks (2001), that there is a tension between the claim that both composite objects and their proper parts are causally efficacious and the claim that composite objects do not cause any effects beyond those

caused by their proper parts (collectively). I also argued that the issue is not really about *causation*, but rather about *explanation*. If this is right we would expect the overdetermination argument to apply to cases of dependence besides causal dependence. In fact it does.

Not only do composite objects appear to have no additional causal effects over those of their proper parts, but they also do not appear to take up additional space, or have additional mass, among other things In what follows I will focus on the case of mass, but a similar argument can be run in relation to the amount of space an object takes up.

The orthodox view of parthood faces a simple but widely ignored problem. Normally we add the masses of distinct objects to find their total mass. But we do not add the masses of a composite object and its proper parts. Doing so would give the wrong results. The question facing proponents of the orthodox view is "why?" The problem has not been taken very seriously. Mostly, the fact to be explained is simply taken as given. One does not count the mass of an object *and then* count the mass of its proper parts too. Why? Because they're its parts.

But why does *that* matter? The defender of the orthodox view needs to tell us. The only answer which is at all plausible seems to be to say that a composite shares its mass with its proper parts. I do not think this answer is satisfactory. What does it mean for objects to "share" mass? If the composite instantiates the property *having mass m*, and it "shares" this property with its proper parts, does that mean they *jointly* instantiate it? Defenders of composition as identity cannot deny that properties can be jointly instantiated, for they wish to say that the proper parts jointly instantiate many properties. However, they can say that the notion is not applicable in this case. When some objects jointly instantiate a property the fact that the property is instantiated is explained by *all* of them. None of the objects individually explains why the property is instantiated. (If not,

in what sense do they instantiate it *together*?) However, this is not true of the mass of a composite and its proper parts. It is not true that the composite and its proper parts jointly explain why the property *having mass m* is instantiated. For the composite *itself* has mass m. And so do the proper parts.

If the composite explains why the property *having mass m* is instantiated, all on its own, then it *fully explains* it. But then how can we make sense of the claim that the proper parts, all on *their* own, explain why *having mass m* is exemplified?

The problem is even worse if we consider why we do not sum the mass of a composite and the mass of any *one* of its proper parts. Even if we can make sense of the idea that a composite shares its mass with its proper parts collectively, can we make sense of the idea that the composite *partly shares* its mass with any one of its proper parts? The prospects for this don't seem very good under the orthodox view.

Composition as identity, on the other hand, offers an elegant solution. A composite and its proper parts both fully explain the fact that the property *having mass m* is instantiated because they are identical. And the fact that a composite "partly shares" its mass with any one of its proper parts is no more mysterious than the fact that part of the mass had by the proper parts collectively is accounted for by each of the proper parts (see Chapter 6).

Admittedly, the argument is not conclusive. Perhaps the defender of the orthodox view can give some other account of property sharing. Or maybe the composite and its proper parts each explain a different instance of the property's instantiation. Maybe we can make sense of the claim that the property *having mass m* is instantiated twice, but the total mass of the composite and its proper parts is only m. Still, the point is that this does not look like an easy task. Nor is it a task that proponents of the orthodox view can comfortably ignore. Without an account that explains why we do not sum the masses of a composite and its

proper parts the orthodox view is incomplete in yet another respect.

At worst, then, this argument raises an interesting challenge for the orthodox view. At best, it suggests that the orthodox view is false.

II. The Spero Argument

I call the next argument for composition as identity the *Spero argument*. It is an adaptation of an argument given by Markosian (1998b) for the possibility of extended simples. Markosian's argument goes like this:

(M1) A world containing just one object, extended in space, is possible.

(M2) If a world contains just one object then that object has no proper parts.

Therefore, a world containing just one object, extended in space with no proper parts, is possible.

The argument is presented as an argument against what Markosian calls the *pointy view* of simples. The pointy view of simples says that an object is a mereological simple if and only if it is point-sized (i.e., not spatially extended). The argument entails that extended simples—objects with no proper parts which are extended in space—are possible. The extended object Markosian asks us to consider is a homogeneous sphere called "Spero". If the argument is sound, Spero is an extended simple.

Markosian defends (M1) by pointing to the conceivability of a world containing just one object extended in space (i.e., Spero). He certainly seems right that such a world is conceivable; is he right that such a world is therefore possible? I am inclined to answer "yes". There does not seem to be anything contradictory

about the idea, and I do not believe there are any impossibilities that are coherent (see Chapter 5).

(M2) is a straightforward implication of the orthodox view. If Spero has proper parts then there exist objects which are numerically distinct from Spero. Therefore, if Spero has proper parts, then any world containing Spero contains more than object. From this and (M1) the conclusion follows.

The problem is that Spero does seem to have proper parts. Intuitively, Spero has a left-half and a right-half, for instance. (The arguments in Chapter 2 support this point, but I will not belabour them here. It is enough that many philosophers endorse this kind of view. They should find my argument hard to resist even without supplementation.) Thus, defenders of the orthodox view face a dilemma: deny that Spero has proper parts, or deny that there is a possible world containing just Spero. Because Markosian takes (M2) to be non-negotiable he focuses on showing that we need not think that Spero has proper parts. But doing so arguably comes at a price. If we accept composition as identity, however, we can deny (M2) and happily maintain both that the Spero-only world is possible, and that Spero has proper parts. For if composition as identity is true, Spero's having proper parts does not entail that anything other than Spero exists.

This suggests an argument for composition as identity—the "Spero argument":

(S1) A world containing just one object, extended in space, is possible.

(S2) Any object which is extended in space has proper parts.

Therefore, a world containing just one object which has proper parts is possible.

The conclusion is not composition as identity, but composition as identity is

the only view compatible with it. (S1) and (S2) are very compelling; so we have compelling grounds to believe in composition as identity. My view is that what we would have *liked* to say in Markosian's case is that a world with a single object is possible, and that it is possible for that object to have proper parts. Composition as identity lets us say this.

Markosian's strategy is to try to undermine (S2). As we saw in Chapter 2, his view faces problems. Suppose that Spero has a heterogeneous property one might describe as "being half black and half white". Markosian's solution is to say that the claim "Spero is black and white" is really a claim about the colour properties of the piece of matter that constitutes Spero (Markosian, 1998b, 2004). Specifically, his solution is to say that at least one proper part of the piece of matter that constitutes Spero is black and at least one is white.

This is a great cost. It is *Spero* that has the property *being black and white*. Furthermore, as we saw in Chapter 2, if Spero has no proper parts then we can make no sense of the idea that it is possible for Spero to rotate. Markosian can reply that we can make sense of the idea that the matter that constitutes Spero rotates—but this is not good enough. Surely Spero rotates too when the matter which constitutes it does. Finally, Markosian's own argument seems to undermine his position regarding matter. Consider the following argument. A world containing just one piece of matter, extended in space, is possible. If a world contains just one piece of matter then that piece of matter has no proper parts. Therefore, a world containing just one piece of matter, extended in space, is possible.

The argument is exactly analogous to Markosian's own, but this time applied to pieces of matter. If Markosian accepts its conclusion, however, he is in trouble. If the conclusion of the argument is true than there is no guarantee that the piece of matter that constitutes Spero has proper parts. Markosian can argue that the

portion of matter that constitutes Spero has proper parts whenever (it seems that) Spero has heterogeneous properties. Thus, any possible world in which Spero is black and white is one in which the matter that constitutes Spero has at least one black proper part and at least one white proper part. The problem with this response is that we can also imagine a world containing just one piece of matter which is black and white. Thus it seems that if extended simples are possible, then extended simple portions of matter with heterogeneous properties are also possible. But how can Markosian account for *these* properties? If an extended portion of matter with no proper parts is possible we cannot account for its heterogeneous properties by appealing to its proper parts. Nor can we plausibly appeal to any other account consistent with the orthodox view, for we saw in Chapter 2 that they all fail. No account consistent with the orthodox view can make sense of rotation; or if they can, they cannot differentiate rotation from other changes in properties.

Without a way to make good sense of parts talk, Markosian's rejection of (S2) looks misguided. He does offer one direct argument against (S2), however, which we should consider. The argument is that if (S2) is true then the *doctrine of arbitrary undetached parts* is true; and that principle leads to paradox.

The rough idea behind the doctrine of arbitrary undetached parts is that anything that one might reasonably take to be a proper part of an object is a proper part of an object—divide an object up any way you like and you will be right. More formally:

Doctrine of Arbitrary Undetached Parts For every material object M, if R is the region of space occupied by M at time t, and if sub-R is any occupiable sub-region of R whatever, there exists a material object that occupies the region sub-R at t. (Markosian, 1998b, p. 15).

Peter van Inwagen (1981) argues that this principle leads to paradox and should therefore be rejected. Markosian agrees.

The paradox, however, is easily avoided. The paradox of undetached parts is as follows. If a person has fingers then the person can survive the loss of a finger. Before the loss the person is composed of the finger, F, and the rest of them, O-minus. If O-minus is a proper part of the person then O-minus is not identical to the person (by the definition of proper parthood). After the loss of the finger O-minus and the person are all that remain. Now O-minus seems to be identical to the person. But O-minus cannot be identical to the person because O-minus was not identical to the person before the loss. Nor can O-minus be distinct from the person because coincident objects are impossible.

That, then, is the argument. Van Inwagen suggests that it entails that O-minus does not exist. If this is right then the doctrine of arbitrary undetached parts is false. O-minus is, after all, an arbitrary undetatched part before the finger is lost. But there are other solutions, all of which are (now) extremely popular. First, one can accept the existence of coincident objects as per the standard view of constitution. Second, one can accept that the temporal part or stage of the person after the loss is identical to the temporal part or stage of O-minus after the loss, but that the temporal part or stage of the person before the loss is not identical to the temporal part or stage of O-minus before the loss. Only the second option is compatible with a realist version of composition as identity, but that is more than enough to resist the argument. That O-minus exists seems to me to be much more obvious than Van Inwagen's premise that O-minus and the person are not identical at the later time.

Thus, the paradox of undetached parts provides no strong reason to think that (S2) is false. I think, then, that it is fair to say that Markosian's argument for

extended simples fails.[1] And once we see why it fails we see that we have a quite compelling reason—the Spero argument—to think that composition as identity is true.

III. The Problem of the Many

One strength of composition as identity which has been overlooked is the fact that it provides a solution to the *problem of the many*. As an introduction to the problem consider a case like that which we discussed in relation to the doctrine of arbitrary undetached parts. Suppose, however, that instead of losing a finger, you lose a single atom. At time t_1 you are composed of atoms a_1,..., a_n, and at time t_2 you are composed of atoms a_1,..., a_{n-1}. (Suppose also that the atoms a_1,..., a_{n-1} are arranged in exactly the same way at both t_1 and t_2.) If the atoms at t_2 compose a person, then it is plausible that the very same atoms (i.e., a_1,..., a_{n-1}) also compose a person at t_1. But if a_1,..., a_{n-1} compose a person at t_1 this person is distinct from you. For you are composed of a_1,..., a_n. You have an extra atom as a proper part. Thus, if a_1,..., a_{n-1} compose a person at t_1, then there exist two people at t_1, not one. And the same reasoning with respect to other individual atoms leads to the conclusion that thousands—nay, millions—of people are sitting more or less where you are sitting. (See Unger, 1980, and Geach, 1980 for the seminal presentations of the problem.)

The problem in this form seems fairly easily blocked. We do not need to accept that a_1,..., a_{n-1} compose a person at t_1. Instead we can maintain that they compose only *part* of a person (namely, part of you) and that *being a person* is a maximal property. (In other words, nothing which is a proper part of a person is a person.) (See Lewis, 1993, p. 166 for a more detailed discussion of this point.)

[1] I should note that I think that Markosian is quite correct that extended simples are possible *if* the orthodox view is true. If a composite object is distinct from its proper parts, why should we think that it cannot exist independently of them? (See my arguments in Chapter 5.)

There is, however, a more serious problem in the vicinity. In the case we just discussed the object composed of a_1,..., a_{n-1} at t_1 was not the best candidate for being a person, given the presence of the object composed of a_1,..., a_n. But there seem to be cases in which several objects are equally good candidates for being a person, or for exemplifying some other kind. These cases involve proper overlap rather than proper parthood.

Clouds are a common example. Imagine some water molecules, clustered together.[2] Around the edges of the cluster the molecules get further and further apart. Some are clearly not parts of a cloud, some clearly are. Some are borderline cases: it is vague whether they are parts of a cloud or not. We can conclude (given the assumption that *being a cloud* is maximal) that, if some molecules compose the cloud, then the same molecules minus one do not compose a cloud. But which molecules compose the cloud? We know that *if* it is m_1,..., m_{1000}, then m_1,..., m_{999} do not compose a cloud, but this does not help. m_1,..., m_{1000} and m_1,..., m_{999} seem to be equally good candidates. True, if both compose something, then presumably the object composed of the latter molecules is a proper part of the object composed of former. However, that does not tell us that the object composed of m_1,..., m_{1000} is a cloud and the object composed of m_1,..., m_{999} is not.

Think of a cloud. Now consider the object composed of the same molecules minus one. The resulting object is not a cloud if *being a cloud* is maximal. But now consider the object composed of *that* object's molecules plus one molecule—a different one this time. This object is not a proper part of the first cloud. Thus, we cannot rule it out based upon maximality. Furthermore, this object and the first object may be equally good candidates to be *the* cloud. They differ by only one molecule, and there is no reason why the odd molecules could not be just as

[2]This example is inspired by the examples given by Lewis (1993).

close (or whatever it takes) to the others as each other.

The implication of this is clear. If there are multiple equally good candidates for being a cloud, we cannot rule some out on the basis of non-maximality. So which is *the* cloud? Any choice is arbitrary, so we seem forced to say there are many clouds, not one. (Hence, the "problem of the many".) There are many solutions, most of which are unappealing. Peter Unger (1980), who first introduced the problem, concluded that there are no clouds. Others argue that the solution is to accept ontic vagueness (e.g., Van Inwagen, 1990b). On this view there is only one cloud, which has genuinely indeterminate boundaries. And Ned Markosian (1998a) claims that it is a brute fact that exactly one plurality of molecules (m_1,..., m_{1000}) compose a cloud and that very similar pluralities do not (and do not compose anything at all). Suffice to say, none of these responses is popular. Most philosophers are unwilling to deny that ordinary objects exist, or to accept that there is genuine vagueness in the world, or to say that there is no explanation for why m_1,..., m_{1000} and not m_1,..., m_{999} compose a cloud.

A more popular line of response is to explain the problem by appealing to linguistic or epistemic accounts of vagueness. *Epistemicists* like Hudson (2000) claim that there are multiple objects which are cloud-candidates, but that only one of them is a cloud. They claim that the reason why it seems indeterminate which of the cloud candidates is a cloud is that we do not, and cannot, know which is the cloud. The indeterminacy is epistemic. *Supervaluationists* like Lewis (1993), on the other hand, claim that there is no fact about which cloud-candidate is a cloud. For there to be such a fact, as the epistemicist claims, our linguistic practices would have to settle precisely how the term "cloud" applies in these cases (see Lewis, 1993, pp. 171–172). Yet it is implausible that this is so, and even more implausible that we would not know it if it were. Thus, the referent of "the cloud" is indeterminate—"the cloud" is ambiguous. But, importantly, it is

not problematically so: no matter which cloud-candidate "the cloud" refers to, there is only one.

Neither of these solutions is satisfactory. The epistemicist solution is quite implausible. As Lewis argues, and the epistemicist agrees, the meaning of "cloud" is determined by use. But it is very hard to believe that somehow conventions about the use of the term "cloud" dictate that m_1,..., m_{1000} rather than m_1,..., m_{999} is a cloud. Nor is it plausible that the meaning of "cloud" is fixed by some "joint" in nature which falls between the object composed of the latter plurality of molecules and the object composed of the former (*cf.* Lewis, 1993, p. 172, fn. 6.)

The supervaluationist response is perhaps even worse off. It is not clear that it solves the puzzle at all. For although the response ensures that, on any precisification of "the cloud", "the cloud" refers to just one object, it nevertheless seems true that there are other clouds. Consider Lewis' example of Tibbles the cat (on the mat) (Lewis, 1993). Lewis' solution lets us say that "Tibbles" determinately refers to just one cat (although it is indeterminate which cat Tibbles is, *cf.* López de Sa, 2014, p. 1110). But that does not change the fact that the cat called "Tibbles" on any precisification is only one of many cats sitting on the mat.

Perhaps Lewis would reply that the meaning of "cat" is fixed in the same way that "the cloud" and "Tibbles" are. It is not, however, clear how this would work given that all of the cat-candidates appear to have the same property. If the predicate "is a cat" applies to one on a given precisification, surely it should apply to the others too. It is plausible that our indecision regarding the referent of "Tibbles" is indecision regarding which cat out of many candidates "Tibbles" refers to. It is not nearly as plausible that our indecision regarding the meaning of "is a cat" is indecision regarding which out of many objects—which *share* their properties—have the property picked out by "cat".

It is possible that I have misunderstood Lewis here.[3] And philosophers like Williamson (1994), Hudson (2000), and Sorensen (2001) argue that, despite its flaws, epistemicism is the best theory of vagueness available. Thus, we should not reject either view too easily. But, even setting aside the problems I have outlined, neither solution seems to me to truly resolve the puzzle. Both solutions accept that whenever there exists a cat there exist many cat-shaped objects in more or less the same location. Thus, even if both solutions allow us to say that there is only one cat on the mat, they do not allow us to say that there is only one cat-shaped thing on the mat. That seems to me to be the wrong result. Not only is there only one cat on the mat, there is only one cat-shaped thing on the mat as well. This is true, even if we ignore large proper parts of the cat (which would also be cat-shaped). That is, I take the following claim to be true:

(18) Ignoring Tibbles' proper parts, there is only one cat-shaped object on the mat.

Neither the epistemicist nor the supervaluationist solution allows us to accept (18). But (18) is true; so those solutions fail.

One might object that, although we typically take (18) to be true, thinking deeply about cats reveals that, for any cat that exists, there do in fact exist countless cat-shaped objects, none of which are proper parts of that cat. Perhaps that is right, but I am reluctant to accept it for the following reason. I have thought deeply about cats and I still wish to deny that (18) is false. (18) does not seem to me to be merely loosely true, a convenient but false way of talking—it seems to be true, period.

[3] I don't think I have. I suspect that Lewis has in mind cat-candidates which stand in proper parthood relations to one another. Thus, on any precisification there is only one cat, for no cat is a proper part of a cat or has a cat as a proper part. But if there are cat-candidates which properly overlap one another—that is, share proper parts without either being part of the other—then any given precisification will yield multiple cats. Thus, if there are cat-candidates which properly overlap, my objection stands.

Lewis (1993) offers a second solution which I think is closer to the truth. His response avoids my objection. Lewis claims that although, strictly speaking, there *are* numerous cats on the mat, we can count them as one because they are "almost identical". Non-identity, he claims, is not the opposite of identity; rather mereological disjointness is. Non-identical objects that mereologically overlap are importantly different from non-identical objects which do not. The former type are *almost* the same. Lewis' solution is then to say that we typically do not "count by identity". Instead, we count by almost-identity. When somebody asks how many objects there are they usually do not mean to ask how many non-identical objects there are, on this view. They mean to ask how many disjoint objects there are. Given that all of the cat-candidates mereologically overlap one another it follows, if Lewis is right, that there is only one (disjoint) cat on the mat. Of course, it is not settled *which* cat-candidate the cat is, but this does not stop use from safely saying that there is only one.

Usefully, the solution applies to cat-shaped things as well as cats. For the number of cat-shaped things on the mat, when we count by almost-identity, is one. Thus, Lewis' solution avoids an objection that the others cannot not.

Nevertheless, it suffers from other problems. First, Lewis appears to reject composition as identity (Lewis, 1991). This makes it hard to know what he means when he says that overlapping objects are "almost the same". In what sense is one cat-candidate almost the same as the other? True, they share almost all of their proper parts; but why does that matter? Lewis follows Armstrong (1978) in calling such overlap "partial identity" (Lewis, 1993, p. 177), but if he rejects composition as identity that name is misleading. If composition as identity is false then two cat-candidates are numerically distinct just as much as Tibbles is numerically distinct from you or me. There are, after all, two of them.

Second, rather than solving the problem Lewis essentially *embraces* it. When

it comes down to it, he accepts that there *are* many cats, many clouds, and many people. His solution amounts to saying that claims like "There is only one cat on the mat" are only loosely true. But that seems wrong. "There is only one cat on the mat" seems to be literally and strictly speaking true. Although it seems true that we *can* count by almost-identity, it is also true that we can count by identity. And when we do it seems true that there is only one cat on the mat (Hudson, 2001).

Third, there are cases in which counting by almost-identity gives the wrong result. For instance, López de Sa (2014) asks us to imagine two very narrow semi-detached houses which share a very thick wall. The idea is that the two houses almost completely overlap in virtue of having this wall in common. Thus on Lewis' view the houses are almost identical and should be counted as one house. Yet it is clear that they are two houses.[4]

For these reasons I believe that Lewis' almost-identity solution fails. However, a view quite close to it provides a much better solution. No doubt, you can see where this is going. If we accept composition as identity and say that almost-identity is literally partial identity, we can accept both that each of the cat-candidates is a cat, and that there is only one cat on the mat. As with Lewis' solution I take it that "Tibbles" does not determinately refer to any one cat-candidate. Different precisifications yield different referents. Suppose the cat-candidates are c_1,..., c_{1000}. Under one precisification, "Tibbles" refers to c_1. This represents one appropriate way to "carve up" reality. If Tibbles is c_1, then Tibbles is the only cat on the mat, for there is no cat on the mat which is numerically distinct from Tibbles. (There are, of course, some left-over atoms "on" the mat, but these are not cats.)

[4]In response, López de Sa (2014) suggests (roughly) that it is not mereologically disjoint objects that we count, but mereologically disjoint objects with non-overlapping functional roles. The houses are mereologically disjoint, but they are not almost-identical because their functional roles do not overlap. (After all, they provide separate living spaces.)

Lewis notes that the standard paraphrase of "There is one cat on the mat" is,

(19) For some x, x is a cat on the mat, and every cat on the mat is identical to x (Lewis, 1993, p. 178).

We will need to reject (19). It is not true that every cat on the mat is identical to Tibbles. However, we can offer another paraphrase that the proponent of the orthodox view should find acceptable:

(20) For some x, x is a cat on the mat, and there is no cat on the mat which is numerically distinct from x.

(19) and (20) are equivalent under the orthodox view, but not under composition as identity.

(21) It is not the case that x is numerically distinct from y

does not imply,

(22) x is numerically identical to y

if composition as identity is true. After all, x could be partially identical to y. To see this, consider a case of plural identity. If we want to say "There are ten cats on the mat" we cannot simply say,

(23) For some Xs, the Xs are ten cats on the mat, and all cats (plural) on the mat are identical to the Xs.

That is false. Take just two of the ten cats. The two cats are not identical to the ten cats, so it is false that all cats (plural) on the mat are identical to the Xs. Instead, we need to say,

(24) For some Xs, the Xs are ten cats on the mat, and there are no cats (plural) on the mat which are numerically distinct from the Xs.

The two cats may not be identical to the ten cats, but nor are they numerically distinct from them. (If they were we would have twelve cats, not ten.) Thus, we should analyse "There is one cat on the mat" as (20) rather than (19).

With this in mind we can see that composition as identity provides an elegant solution to the problem of the many. It avoids all of the problems with Lewis' almost-identity view. First, any two cat-candidates are almost the same because they are almost identical. Second, it is true—even strictly speaking—that there is only one cat on the mat. And third, there are two houses in López de Sa's case. This is because once we have accounted for one house the other still remains. Consider Figure 19 below.

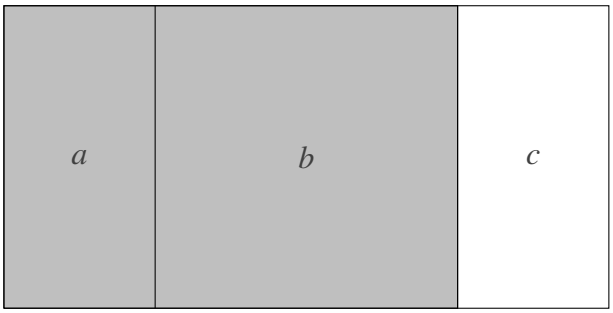


Figure 19: An illustration of López de Sa's (2014) counter-example to Lewis. *a* and *c* are the living spaces; *b* is the wall dividing the houses. The shaded area represents one of the houses.

The shaded area represents one of the houses. Each house includes its four walls. The houses have the dividing wall *b* as a shared part, though let us suppose that each house has a further wall between it and *b*. That way, the house on the left could be completely destroyed and the house on the right would survive. (Without the qualification, the house on the right would have only three walls. The left-most wall would be destroyed with the other house.)

López de Sa claims that it is not true that the houses (a+b and b+c) should not be treated as almost-identical since they have distinct functional roles. I think there is another reason why they should not be treated as almost-identical. Once we have accounted for the house on the left (represented by the shaded area) the house on the right remains to be accounted for. This is true not only with respect to the functional role it plays but with respect to the fact that it is a house. Imagine for a moment that a+b and b+c are cat-candidates. (Ignore their shape.) If "Tibbles" refers to a+b then there is nothing left over which could be a cat. c exists of course, in addition to Tibbles, but c is not a cat-candidate. (In our example, c would be an atom, some atoms, or a very small object composed of some atoms.) Each precisification partitions the world up in a different way. But on every partition there is only one cat.

Thus we have a choice. Either it is true that we count mereologically disjoint objects which play separate functional roles while *thinking* that we are counting by identity, or it is true that we in fact *do* count by identity, and composition as identity is true. Needless to say, I favour the latter possibility.

IV. The Grounding Argument

My last argument draws from an argument in the literature on constitution. There are at least two compelling reasons to think that constitution is identity—that is, that a statue is identical to the lump of material that makes it up. First, if we can explain strange phenomena in terms of how we see the world or think about it, rather than in terms of the way the world is, we should. A straight stick placed in water, for example, appears to be bent. We can explain this in terms of the refraction of light, so we should not explain it by saying that the stick is in fact bent. Similarly, if we can explain the differences between the statue and the lump (which certainly appear to be identical at first glance) as differences in the way

we think about the world, rather than differences in the objects themselves, then we should.

Second, the statue and the lump are (plausibly) composed of the same atoms. (If they are not then we cannot explain why their masses do not sum together.[5]) And they are composed of *exactly* the same atoms, arranged in exactly the same way. What, then, explains the difference between the statue and the lump if it is a genuine difference in the world? How could there be a difference without a difference-maker? This objection to the view that constitution is not identity is known as the *grounding objection*.[6]

Each of these arguments for the identity of a statue and the lump that constitutes it is also an argument for composition as identity. The first argument carries over straightforwardly. If we can explain apparent differences between a composite object and its proper parts in terms of the way that we view the world, rather than the way the world is, we should. This is especially true when the alleged differences are not immediately obvious. Critics of composition as identity claim that a chair is distinct from its proper parts because the chair has different temporal, modal, and numerical properties. But when I look at the chair I am sitting on, I can detect no temporal properties, no modal properties, and no numerical properties. In fact, as far as I can tell, all I am looking at are some atoms arranged chair-wise. We can explain everything that is puzzling here with ease if we turn to composition as identity. All I *am* looking at are atoms arranged chair-wise, and the atoms arranged chair-wise have temporal, modal, and numerical properties in virtue of the way we think and talk about them.[7]

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[5] See Wasserman (2002) for a detailed argument along these lines.

[6] See Johnston (1992), Zimmerman (1995), Rea (1997), Wasserman (2002), and Bennett (2004) for discussion.

[7] This is not quite right. If objects have temporal, modal, and numerical properties, then they have them independently of how we think and talk about them. Rather, it is the differences in which *predicates* apply that is to be explained by features of language and thought.

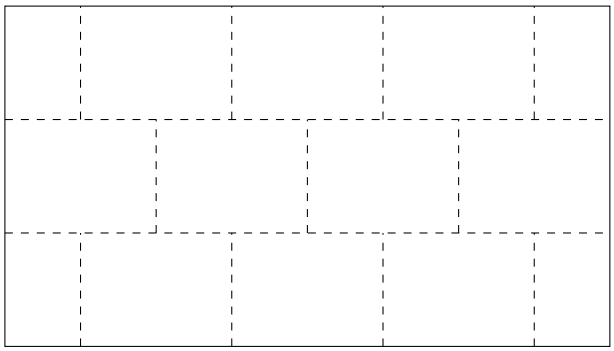
The grounding objection also carries over to the composition case, though not so straightforwardly. Many philosophers seem to find it convincing in the constitution case. They should find it convincing here too. Consider some atoms arranged brick-wall-wise. The atoms compose some bricks, which compose a wall. The bricks and the wall are composed of exactly the same atoms, arranged in exactly the same way. But, we are told, the bricks and the wall are distinct. How can the same atoms compose different things? Why do the atoms, in one case, compose a wall, and, in another, some bricks? At very least there is something deeply puzzling here that needs to be explained.

One might argue that it is misleading to say that the atoms compose the bricks. Rather, it is some atomses (superplural), each plurality of which are arranged brick-wise, which compose the bricks. Meanwhile, the atoms (plural) do compose the wall. This is right, but it doesn't help. Take all of the pluralities of atoms arranged brick-wise. These are identical to the atoms arranged wall-wise. Both "the atoms" and "the atomses" refer to the same objects. Superplural quantification, like plural quantification, does not multiply entities. Suppose there exist some Xs and some Ys. Then there exist some Zses (superplural) which are identical to the Xs and the Ys together. But the Xs and the Ys together are also identical to some Ws (plural), such that every one of the Ws is one of the Xs or one of the Ys, and no one of the Xs or Ys is not one of the Ws.

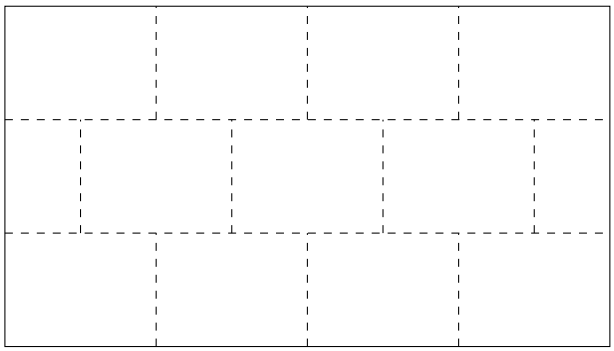
The very same atoms, then, compose some bricks and a wall. How? Because of the intuition behind the grounding objection, many believe the (mereological) principle of extensionality is true. That is, they believe that any objects which have the same proper parts are identical. But the grounding objection also gives us reason to accept a plural version of extensionality:

Plural Extensionality For any Xs and any Ys, the Xs and the Ys share all of their proper parts if and only if the Xs and the Ys are identical.

The wall case is a special case of *Plural Extensionality* since plural variables can range over single objects. However, if one is uncomfortable with allowing plural referring terms to refer to single objects, we can easily construct a different example. Suppose we have a concrete wall composed of atoms. Most philosophers are happy to accept that the concrete wall has a proper part (a concrete block) corresponding to every large spatial subregion of the region occupied by the wall. If this is right each of the following pictures in Figure 20 below represents one way of decomposing the wall into proper parts.



(a) Decomposition 1



(b) Decomposition 2

Figure 20: Two different decompositions of a wall into block-shaped proper parts.

Call the concrete blocks in subfigure (a) "the As". Call the blocks in subfigure (b) "the Bs". The As and the Bs are composed of the same proper parts. Yet according to the orthodox view they are distinct. If the fact that the atoms exist

and are arranged in the way they are explains the fact that both the As and the Bs exist, how can we account for the differences between the As and the Bs?

This question is not easy to answer. A common strategy in the constitution literature is to try to argue that certain features of the micro-physical grounds of the statue and the clay account for the statue's existence and properties, while certain other features account for the existence and properties of the lump (e.g., Rea, 1997). This strategy will not work here. This is because we seem to require *all* of the features of the atoms to account for both the As and the Bs. The puzzle seems to be the inverse of the overdetermination problem discussed earlier. All of the properties of the atoms explain why both the As and the Bs exist. But how could the very same properties give rise to different objects?

One might try to argue as follows:

> Some of the atoms are arranged block-wise at location r_1. Others are arranged block-wise at location r_2. And so on. It is because of this fact about the atoms that there exists a block at r_1 and a block at r_2. This accounts for the As. A different set of facts explains why there exist blocks at the locations where the Bs are found. These facts account for the Bs. Therefore, there is nothing mysterious about how the atoms can compose both that As and the Bs.

The argument says that the atoms instantiate two different properties which explain the As and the Bs respectively. For instance, the atoms are such that:

(25) Some of the atoms are arranged block-wise at r_1, some others are arranged block-wise at r_2, ...

(26) Some of the atoms are arranged block-wise at $r_{1.5}$, some others are arranged block-wise at $r_{2.5}$, ...

The first fact explains why the As exist and have the locations they do. The second explains why the Bs exist and are located where they are.

But the argument is flawed. The locations of the individual atoms explain both why the atoms have each of these properties and why the As and Bs exist. For instance, it is also true that the atoms are such that:

(27) One of the atoms is located at micro-region m_1, another is located at m_2, another is located at m_3...

This fact explains why it is true that there are some atoms arranged block-wise at r_1 and why there are some atoms arranged black-wise at $r_{1.5}$. Thus, it explains why *both* the As and the Bs exist. A description of the atoms in terms of their individual locations just is a description of them in terms of the locations of sub-pluralities of them. If I tell you where w, x, y, and z, are located, I also tell you where w and x are located, and where y and z are located. Therefore, one cannot claim that it is the locations of w and x, and y and z, which explain the existence of some objects, and not the locations of w, x, y, and z. For any Xs and any Ys, there exist some Zs which are identical to the Xs and Ys together. The properties of the Zs are thus the same as the properties of the Xs and the Ys together.

Again, it will not do to protest that the atoms do not collectively explain either the As or the Bs. It is true that what we have are multiple pluralities which individually explain each of the As or each of the Bs. But consider these individual pluralities. Suppose the Xs explain why $Brick_1$ exists, the Ys explain why $Brick_2$ exists, and so on. Then the Xs and the Ys, and so on, collectively explain why $Brick_1$, $Brick_2$, and so on exist. And given that the Xs and the Ys and so on are identical to the atoms (by hypothesis), the *atoms* collectively explain why $Brick_1$, $Brick_2$, and so on exist. There is no way to avoid this conclusion.

CONCLUSION

That concludes my case for composition as identity. Due to the fact that composition as identity is so closely related to other difficult and important debates in metaphysics (see Chapter 3) I regret that I have not been able to give a comprehensive defence. Nonetheless, I hope that I have made some points that will bring readers a bit closer to accepting composition as identity (or even all the way). Those convinced of the truth of endurantism or the constancy of modal predication *de re* will most likely not be swayed. It is, after all, hard to accept a view which is founded upon a metaphysic that one takes to be fundamentally false.

I think that these philosophers would be best to follow Van Inwagen (1990b) and Merricks (2001) in embracing quasi-nihilism, or, better yet, nihilism. Even the truth of endurantism and the modal view in question is no protection against the fact that structuralism is completely unmotivated.[8]

The strongest of all the arguments I have given for composition as identity seems to me to be the empirical argument (Chapter 4). It is puzzling to me how most philosophers interested in composition can apparently believe that (i) composite objects have no additional effects on the world over and above the

[8]The best version of structuralism seems to be a very minimal version like that which is endorsed by Merricks (2001) (see Chapter 4). To make this kind of view work, however, it will have to be shown that persons have properties which are emergent upon the properties of the things that compose them. Evidence for this is lacking.

effects of their proper parts, while also holding that (ii) we have good reason to believe that there are composite objects (and that these are distinct from their proper parts).

The only way I can think to explain this is that these philosophers believe we can infer the existence of some things from the existence of others. But, as we have seen in Chapter 5, the existence of one thing cannot be inferred from the existence of another. Suppose that we have the information that an object *a* exists, and no other information. Then it follows that we do not have information about the existence of any other object besides *a*. The philosopher who wishes to claim that we can infer the existence of some other object, *b*, must therefore claim that we do not have information of *a* only. In Ayer's words, this is a plain tautology. If information to the effect that *a* exists amounts to information that *b* exists (as well), then that information is not *only* information to the effect that *a* exists.

But now something like the original argument can be made again. If *a* and *b* are distinct, then information that *a* exists is distinct from information that *b* exists. If so, there is no reason why, *in principle*, we could not have information that *a* exists, and no other information. The philosophers in question must therefore insist that, *in actual fact*, we never have such limited information. This, however, seems completely unmotivated. If the sentence "*a* exists" does not convey the information that *a* exists and nothing more, then I suspect I do not understand it.

One could insist that we infer the existence of *b* from information about *a* and knowledge of some metaphysical law. But where does knowledge of that law come from? Certainly, those who are inclined towards nihilism do not have such knowledge. What mistake have they made?

At very least, I hope that I have convinced the reader of the truth of non-structuralism. The further claim that composition as identity is true admittedly depends on a particular sort of view in the philosophy of language—a view which

I have not defended in detail here. However, even setting that argument aside, I think that some philosophers may find other reasons to endorse realism in conjunction with a non-structuralist world view. After all, some philosophers seem to think that the intuition that ordinary objects exist alone gives us good reason to believe in them. My claim has been that the intuition is a semantic one, however even those who disagree may still take such intuitions as justification for our realist beliefs. If so—and if they find the case I have made for non-structuralism compelling—they should accept that composition as identity is true.

I also hope that the reader has found some value in the comparisons between composition as identity and the orthodox view throughout. I believe that such comparisons are important since they force us to look more closely at the particular commitments of each view (*cf.* Chapter 2), and because doing so encourages us to pay more attention to plurals and plural properties (*cf.* Chapter 6). Even those who are committed to the view that composite objects are distinct from their proper parts should be interested in the collective properties of the proper parts of things. Not enough has been said in this regard (with the exception of Wallace, 2009, 2011a, 2011b, and Bøhn, 2014b) and I think it may prove extremely useful to investigate matters further. Anyone who is convinced of the intimacy of parthood, is committed to there being a close correspondence between the properties of a composite and the properties of the things that compose it. Studying the latter may provide us with insights into the former, and into the connection between the two, even if the orthodox view is true.

Of course, I do not believe that the orthodox view *is* true. This does not mean I cannot be convinced otherwise. However, I do think that the orthodox view should be subjected to greater scrutiny than has been common. I believe that I have shown (in Chapters 2, 5, 6) that most accounts of composition in

the literature are quite badly incomplete in a number of important respects. I also think I have shown that the prospects for making them complete do not look particularly good. That said, I do not mind being proven wrong if it means learning something important about composition. And surely it would.

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