Constituent solutions to relational problems: Applying the tools of constituent ontologies to problems of coincidence and persistence

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Abstract

This thesis takes a closer look at one of the main divisions within contemporary metaphysics. According to constituent ontologies, material objects are fundamentally made of properties, while according to relational ontologies, material objects can only be made of other material objects. Thus, constituent ontologies ascribe a structure to material objects comprising their property parts which is called an ontological structure.

In the first part of the thesis, I examine the consequences of ascribing both ontological structure and ordinary common-sense structure to material objects. Constituent ontologists tell us that ontological structure is basic, while ordinary mereological structure is grounded in or derived from it. However, they rarely lay out the details of how this derivation is supposed to proceed. I examine and criticise various ways this might be done and propose a picture according to which there are two distinct (though related) parthood relations, one relating properties to material objects, and the other relating material objects to material objects.

In the second half of the thesis, I examine the attempts of constituent ontologists to tackle problems related to material coincidence. In particular, I examine the problem of how materially coincident objects could differ qualitatively despite being made of the same matter. Many constituent ontologists have suggested that these problems could be solved by postulating a more fine-grained ontological structure to material objects. I argue that these attempts are not succesful. I also examine if constituent ontologies could help us deal with issues related to persistence.

The tentative conclusion of the thesis is that even if there are coherent versions of constituent ontologies that can succesfully accommodate both ontological and common-sense structure within a single material object, the recent attempts at constituent-style solutions to problems that have previously preoccupied relational ontologists do not give us much reason to prefer constituent ontologies.

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1. Introduction

In this thesis, I discuss two different lines of thinking about properties and their relation to concrete particulars in contemporary analytic metaphysics, namely, so-called relational and constituent ontologies.[1] In particular, my emphasis is on constituent ontologies. Roughly speaking, according to constituent ontologies, ordinary objects like organisms and tables have properties as parts or constituents. In other words, just as my table has its legs as parts, it also has its mass and colour as parts (or something like parts). Constituent ontologists believe that my table is made of its top and its legs, but they also want to say that at the more fundamental level, my table is (at least partly) made of its properties. On the other hand, relational ontologies are ontologies according to which objects instantiate, have or exemplify properties, but do not have properties as parts.

Proponents of these two approaches usually take them as obvious starting points and then try to work out the best versions of their theories within the chosen framework. When it comes to constituent ontologists, for example, we rarely see explicitly stated reasons for thinking that properties are parts or constituents of ordinary objects.[2] Similarly, relational ontologists think that there is something strange or incoherent about the idea that massive and coloured objects have masses and colours as parts.[3]

Those who think that properties are parts of ordinary objects usually turn their attention to questions like the following. Are the properties that are parts of ordinary objects universals, or particulars? In other words, if my table is white and your table is white, does it mean that there is a property, namely whiteness, that is both a part of my table and a part of your table (so that they literally overlap, like two roads that share a patch at their crossing)? Or is it rather the case that the whiteness my table has as a part is not numerically the same entity as the whiteness your table has as a part? Furthermore, if ordinary objects are made of properties, could two objects, for example two tables, be made of the same properties? Also, if we could subtract all the properties out of my table, would there be a remainder, something which is not a property, but that together with the subtracted properties makes up the table? As constituent ontologists, we might also wonder which properties ordinary objects have as parts. Most constituent ontologists would say that my table has

[1] Nicholas Wolterstorff is often credited with introducing this terminology (Wolterstorff 1970).
[2] There are exceptions, for example, Kathrin Koslicki gives an argument for taking at least one property to be a part of ordinary objects based on some fairly week mereological principles (Koslicki 2008, 167-179).
[3] Peter van Inwagen writes: 'I do not understand the idea of ontological structure [the structure that involves property-parts] or, indeed, any of the ideas with which one finds it entwined in the various constituent ontologies.' (van Inwagen 2011, 393) Even though van Inwagen offers some reasons for preferring relational ontology, he admits his reasons will not appeal to someone who doesn't already accept relational ontology. See also van Inwagen (2015).

whiteness as a part. However, it is also true of my table that it is white or made of rubber. Is it then the case that my table has the property *being white or made of rubber* as a part? Constituent ontologists are often reluctant to accept that properties like the last one are parts of my table (Armstrong 1978, 1997). If this is so, the question arises where the difference lies. Of course, even relational ontologists might wonder if there is such a property like *being white or made of rubber.* However, I think it is fair to say that this question usually plays a more marginal role in working out the details of relational ontology.

The above questions are of utter importance in developing a plausible variant of constituent ontology. However, some of these questions make sense only after we have agreed that properties really are parts of ordinary objects – they are usually of no interest to relational ontologists. But why should we believe that ordinary objects have properties as parts? As I have already mentioned, those who accept constituent ontology usually accept it as something like an obvious starting point. It seems to me, however, that the theory according to which properties are parts of ordinary objects is far from obviously true. It looks more like a speculative metaphysical thesis, rather than an attempt to further articulate something we are already inclined to believe at a pre-theoretical level.

Constituent ontologies might seem puzzling in a way in which some other metaphysical that seemingly go against what we are usually inclined to believe do not. Take for example mereological universalism with respect to material objects, the idea that for any set of material objects whatsoever, there is something made of those objects.[4] According to this thesis, for example, there is something made of my table and all the physical copies of *On the Plurality of Worlds.* Even if this goes somewhat against the grain of common sense, many people readily go along with this idea once they are presented with it. The reason for this, it seems to me, is that accepting mereological universalism does not require of us to accept the existence of objects whose nature is mysterious to us.[5] Mereological universalism populates the world with unexpected objects, but these objects are in a sense just like the objects whose existence we already accept. If there is a thing made of my table and all of the paper copies of *On the Plurality of Worlds,* we could know many facts about it, for example, we could know where it is located, and what its mass is. The picture that mereological

[4] David Lewis is the most prominent defender of this view (Lewis 1986a). See also Rea (1998) and van Cleve (2008).
[5] It seems to me at least that there is no metaphysical mystery in admitting the existence of a sum of my table and all of the copies of *On the Plurality of Worlds,* and in general in admitting the whole plenitude that comes with mereological universalism. This is not to say that there could not be some other mysteries arising from this. For example, there could be a (meta)semantic mystery of how we manage to single out and refer to some particular object given the existence of many other objects that only minutely differ from it.

universalists propose is still in a sense a familiar picture, despite the fact that it comprises many objects that we do not recognise in the ordinary course of life.

While mereological universalists admit the existence of unexpected sums of ordinary objects, constituent ontologists take it that ordinary objects have unexpected parts. However, unlike mereological universalism, the shift induced with this picture raises many questions. Property parts of ordinary objects behave nothing like their ordinary parts. For example, we do not make objects by arranging or manipulating properties, nor can we detach a property from something in the way that we can detach a common-sense part of something. I can detach a leg from my table, without replacing it with anything, but I cannot 'detach' its mass property without it being replaced by a different mass property. The property parts of my table, it seems, behave nothing like the ordinary, common-sense parts of my table (its legs, top, etc.).

Here is one more puzzle. If I arrange some legs and a top into a table, the table will have a property part which is its shape, say. But why is this shape a part of the table? It is not a part of any of the legs or of the top (they have different shapes), and so we are not pressured by the transitivity of parthood to say that it is now a part of the table itself. Somebody might suggest that even if the shape in question is not a part of any of the table's common-sense parts, the shape is made of property parts distributed across the common-sense parts of the table (and perhaps the relations between them), and that is how it gets to be a part of the table after the table is assembled from the top, legs, etc. But why do the property parts of the table's common-sense parts make a certain shape after these common-sense parts are arranged into a table? What can explain this necessity? Why should it not be possible that, when the legs and the top are arranged into a table, no new shape comes into existence and so there is no shape which is a part of the table (even if the table has shape)? But if we think that properties are parts of ordinary objects, we will probably think that it is necessary that any shaped thing have a corresponding shape as a part. However, as this example suggests, this introduces a mysterious necessary connection between the facts concerning when some common-sense parts make an object, and the facts concerning when some properties make a further property.

Another example can make this more vivid. Suppose that a table top weighing 4 kg has two halves, each weighing 2 kg. We bring the table top into existence by joining two halves. The table top has the property *weighing 4 kg.* But whence does this property come from? It is not a part of either of the halves, because they weigh 2 kg each. It could be suggested that it is made of the mass property

of the first half and the mass property of the second half. But then we might wonder why it is the case that, when we put together two halves to make up the table top, their respective mass properties make up the property *weighing 4 kg* that is a part of the top. If there is a connection here, it has to be a necessary connection. But how can we account for this necessary connection? How can we explain that it is necessary that when the two halves make up the table, their masses make up the table top's mass? No mysteries like this arise for those who believe in mereological universalism concerning material objects, making constituent ontologies particularly puzzling.

It is of no help to account for the above discussed necessary connection by saying that part of what it is for the two halves to make up the table top is that their masses make up the mass of the table top. Even if this is the case, it still represents a departure from how we usually think of situations in which some objects make up a further object. For example, the above claim is analogous to the claim that part of what it is for the two halves to make up the table top is that some atom from the first half makes up something together with some atom from the second half. But when two halves make up a table top, there does not need to be anything made (entirely) of a certain atom in the first half, and a certain atom in the second half. If it was necessary that whenever two halves make a table top, some atom from the first half and some atom from the second make up something, this sort of necessary connection would stand in need of explanation. But it is obvious that there is no such necessary connection.

Puzzles like these that arise for constituent ontologists will be the topic of the second chapter of this thesis. In the remainder of this introductory chapter, I will set out the structure of the thesis and clarify some of the terminology I will use in my discussion.

1.1. Structure of the thesis

In the second chapter of the thesis, I will discuss how the fact that ordinary objects have other ordinary objects as parts (or what I will call common-sense parts) can go hand in hand with the fact that ordinary objects have properties as parts. I will argue that constituent ontologists should take it that the property structure of ordinary objects grounds their common-sense mereological structure, and so has a certain priority over it.

In the third chapter I address what seems to me to be the best motivation for the idea that objects have properties as parts. One prominent recent argument for adopting a constituent ontology is that

it can help us solve the so-called *grounding problem* concerning materially coincident objects (that is, objects made of the same material parts). If there could be materially coincident objects, such as a clay statue and the lump of clay of which it is made, then the question arises of how such things could differ in their properties (those used to establish the difference between them, like their modal and kind properties) given that they are made of the same material parts arranged in the same way. In other words, the question arises what can ground qualitative differences between material objects that have the same microphysical structure. The answer proposed by many prominent constituent ontologists is that the respective property structures of, for example, the lump of clay and the statue it makes, are the best and perhaps the only candidate to ground the many differences between them. My discussion will focus mostly on recent versions of the so-called bundle theory, according to which ordinary objects are some sort of aggregates of properties. I will argue that all of the versions of bundle theory proposed to solve the grounding problem face serious challenges. Due to space constraints, I will not discuss hylomorphic theories (which are also a type of constituent ontology[6]) in this thesis, even though the idea that ordinary objects are made of something like matter and form has also been proposed recently as a way of solving the grounding problem.[7]

In the fifth chapter, I will discuss another possible motivation for constituent ontology that consists in its capacity to account for the phenomenon that Douglas Ehring calls qualitative persistence (Ehring 1997, 2011). Suppose that a red object which is not affected by anything else stays red from t_1 to t_2. Roughly speaking, Ehring's question of qualitative persistence is the question of what is involved in this object staying red from t_1 to t_2. According to Ehring, the only way to account for qualitative persistence in light of certain thought experiments he describes is to accept the existence of enduring tropes, that is, enduring particularised properties. While trope theorists are not necessarily constituent ontologists, most of them are, and it seems to be a short step from accepting tropes to thinking that they are parts of ordinary objects. I will argue that Ehring's argument for enduring tropes is ineffective and that enduring tropes do not account for qualitative persistence.

[6] Although not every version of hylomorphism is a constituent ontology, see Evnine (2016).
[7] See Koslicki (2008; 2018). For a persuasive criticism of these attempts, see Sidelle (2014).

1.2. Notes on terminology

In this thesis I will use the word 'part' to signify a relation that primarily obtains between ordinary objects, such as my chair and one of its legs. However, for the sake of neutrality, I will sometimes talk about properties as being *constituents* of ordinary objects. This is to avoid assuming that properties are parts of ordinary objects in the same sense in which a leg is a part of the table. I will also be talking about ordinary objects as being *made* of their properties (when describing constituent ontologies), and not being constituted by their properties, because in contemporary metaphysics, the word 'constitutes' signifies a relation obtaining between, for example, the clay statue and the lump of clay that materially coincides with it (and thus between a pair of ordinary objects). I will be using the words 'ordinary objects', 'substances' and 'concrete particulars' interchangeably. The way I will use these terms is represented well in the following passage from Michael Loux:

> … substances are objects of pre-philosophical thinking; they present themselves to the ontologist as data for philosophical analysis. His task is to provide a coherent account of the ontological structure of these familiar non-philosophical objects. (Loux 1978, 107)

Some of the expressions I mentioned above do not describe the intended class of ordinary objects perfectly. For example, I would like to include things such as cells and electrons in the intended class, though these are far from being ordinary objects. Also, the word 'substance' has been used in the history of philosophy in many different ways, the dominant of these, perhaps, being that substances are somehow basic entities.[8] However, not everybody would agree that things like artefacts, which I include in the intended class, are basic entities in any interesting sense. The situation is not much better when it comes to the expression 'concrete particulars', especially concerning concreteness, by which different philosophers often mean different things.[9]

As I have already said, I do not want to exclude the possibility that properties might be parts of ordinary objects in the same sense in which ordinary objects have other such objects as parts.

[8] For a useful historical overview of different accounts of substances, see Hoffman and Rosenkrantz (1997, ch. 1).
[9] For different ways to characterise the concrete/abstract distinction see for example the discussion in Lewis (1986a, 81-86). As for the universal/particular distinction, there has been a recent scepticism that the distinction could be drawn in other terms, see MacBride (2005).

Someone could question this claim, though. For example, it could be said that the very meaning of the word 'part' excludes the possibility of properties literally being parts of things like organisms and chairs. A thought like this lies behind the traditional criticism that constituent ontologies, which treat properties as parts of ordinary objects, make some sort of category mistake. However, it would be too quick to accuse constituent ontologists of blatantly violating how the word 'part' is used. It certainly sounds somewhat strange to say that the property of solidity, for example, is a part of my table. But it is not entirely obvious that this is due to my table having such a part being excluded by the very meanings of our words. It could equally be that objectors take the claim in question to be obviously false and confuse this with it being meaningless.

It should be said that not all philosophers who defend either a relational or a constituent ontology explicitly label their positions using these terms. In that sense, seeing the history of much of recent philosophical thinking about ordinary objects through the lens of the constituent/relational division is somewhat an after the fact reconstruction of this history. Part of the reason for why many relational or constituent ontologists do not label their respective positions in these ways seems to me to lie in the fact that they usually do not develop their views in opposition to the philosophers accepting the alternative approach. Most of the time, relational ontologists debate with relational ontologists, and the same holds for constituent ontologists. Here is a quote from Eric Olson:

> Constituent and relational ontologies are not just two competing views, but radically different ways of thinking about the metaphysics of concrete objects. Relationalists are concerned with the way material things relate to their parts--their concrete, particular parts, that is. They think about what changes of parts a thing can survive, if any--think of the ship of Theseus, the puzzle of Dion and Theon (or amputation paradox), and the problem of increase (or growing paradox). They ask whether the same parts can compose two different, "coinciding" objects at once, and when smaller concrete particulars compose a larger one. For the most part, constituent ontologists ignore these questions and ask entirely unrelated ones: whether concrete particulars conform to the identity of indiscernibles, what it is for several properties to belong to the same thing, whether there is "more to" a particular than its properties, and how to avoid Bradley's regress, for instance--questions of no interest to most relationalists. The result is separate debates about the metaphysics of concrete objects with little common ground. This can be frustrating, because participants in these debates often presuppose a constituent or a relational ontology without saying so, leaving readers to guess. (Olson 2017, 63-64)

As Olson emphasises in the quote above, relational and constituent ontologists tend to focus their attention on different sets of problems. This should come as no surprise, given how radically different these approaches are. Recently, however, philosophers on each side have started to tackle problems that traditionally have occupied philosophers on the other side of the debate. This is in particular true of constituent ontologists. One of the questions Olson associates with the relational approach is that of how two ordinary objects could spatially and materially coincide (be made of the same matter). This apparent possibility seems to violate many intuitive principles that are part of our thinking about ordinary objects. Only recently have constituent ontologists also started to explicitly deal with this problem, which had previously been almost exclusively the focus of relational ontologists (or at least of those philosophers who do not accept anything like the idea that properties are parts of ordinary objects). What makes the constituent approach well-suited to this problem is the fact that constituent ontologists postulate a more fine-grained structure to ordinary objects, consisting of their property-parts, so that objects that coincide materially might nevertheless differ when it comes to their property parts.

My main focus in this thesis will be to critically assess whether constituent ontologies could be deployed fruitfully in tackling some of the problems that have traditionally occupied relational ontologists. Many constituent ontologists promise those who initially disbelieve their main idea that this is overcome when we see how fruitful the approach can be in accounting for many previously puzzling phenomena. In this thesis, I will argue that constituent ontologies do not entirely live up to this promise. This is not to say that the constituent approach to these problems in recent years has not been interesting and instructive. For one thing, it certainly goes further than the somewhat dismissive attitude constituent ontologists previously had towards these problems. For another, it brings constituent ontologists into a discussion with relational ontologists. Given that the problems related to material coincidence do not specifically arise for constituent ontologists nor for relational ontologists (that is, these problems are not framework-specific), one way to motivate adopting the constituent approach over the relational is to show in what way constituent ontology provides a better framework within which to tackle these problems.

Contrary to the usual accusation that constituent ontologists are committing something like a category mistake, and that no coherent picture of the property structure of ordinary objects could be drawn, I am of the opinion that this can be done, and I will later propose one potential way to do this.

2. Characterising constituent ontologies

In the previous chapter, I introduced the main ideas behind constituent and relational ontologies. In this chapter I want to further clarify the commitments of constituent ontology.

Constituent ontologies allow that concrete particulars might have other parts or constituents beside properties. Furthermore, constituent ontologies do not require that concrete particulars be completely decomposable into properties. It is possible to make a distinction here between three different theses varying in strength:

(i) Things like tables and organisms have properties as parts
(ii) Things like tables and organisms could be broken down without remainder into properties
(iii) Things like tables and organisms have no other proper parts or constituents apart from properties.

These theses are obviously different. There is nothing in the notion of parthood that would require us to accept (ii) or (iii) if we accept (i), nor to accept (iii) if we accept (ii). For example, it is obvious that (ii) does not entail (iii). If I make a house entirely out of bricks, it will be possible to break it down into bricks without remainder, even though my house has parts apart from bricks (for example, it has walls as parts as well).[10] In general, if a thing could be broken down without remainder into $x_1,\ldots,x_n$, that does not mean that it could not have a part which is not one of $x_1,\ldots,x_n$. In the same spirit, constituent ontologists could accept that ordinary objects are made entirely of properties (in the sense of having a complete decomposition into properties) even if they have parts which are not among the properties that are in the decomposition, and possibly are not properties at all. This point is sometimes neglected by constituent ontologists. Even if my table is entirely made of properties, it still has its legs as parts, which, presumably, are not properties themselves (otherwise, there would be no reason to think that the table itself is not a property). If this is the case, then constituent ontologists have to tell us more about how the ordinary parts of the table, like its top and legs, are related to its property parts. This is something that will be discussed more in chapter 3.

[10] Of course, just because (iii) does not follow from (ii) in general, does not mean that it does not follow when we restrict our attention to the property parts of ordinary objects. However, my point is just that the notion of part does not license the transition from (ii) to (iii), even if the inference might be valid for a restricted domain of entities.

Just as (ii) does not seem to entail (iii), neither, obviously, does (i) entail (ii). Many constituent ontologists accept (ii), however, some of them do not accept a thesis stronger than (i). For example, most hylomorphists accept that things have a prominent property part, namely their form,[11] but they think that there will always be a remainder when we 'subtract' forms from the hylomorphic compound.[12] Of the three theses above, only (i) can be plausibly taken as a necessary condition for a view to be a constituent ontology (later, I will propose an even weaker condition than this).

Similarly, bare particularism,[13] which takes ordinary objects to have among their parts or constituents entities which are neither properties nor ordinary objects themselves, violates both (ii) and (iii). Since I think that hylomorphism and bare particularism form a family of views, to which the more classical variant of constituent ontology (namely the classical bundle theory) belongs as well, I think we should rely on (i), or something even weaker, in delineating constituent ontologies. Most constituent ontologists whose theories I will be discussing in subsequent chapters motivate their adoption of some form or constituent ontology by arguing that (i) is the case. As far as I can see, these arguments do not also support stronger theses like (ii) and (iii).

This is not to say that some traditional arguments for constituent ontologies are not better construed as requiring at least (ii) or maybe even (iii) to hold. For example, the traditional empiricist argument for the bundle theory could be understood as supporting a thesis at least as strong as (ii). According to this line of thought, we have immediate epistemic access only to properties, and so everything that we could have epistemic access to is either a property or is entirely made of properties. In contemporary philosophy, a similar argument is defended by Keith Campbell:

> The senses detect cases of properties [that is, particularized properties, like the whiteness of some table]. Instruments are designed to detect imperceptible quantities, which are

[11] There are exceptions here. Some hylomorphists do not think that ordinary objects have forms as parts, see for example Evnine (2016). On the other hand, even when it comes to those who think that forms are parts of ordinary objects, it is not obvious that forms belong to the ontological category of properties. For example, Kit Fine takes forms in some cases to be certain functions understood in the mathematical sense as rules for pairing times with objects existing at them. See Fine (1999).

[12] Things get more complicated if we think that the matter of a hylomorphic compound is always a further hylomorphic compound or compounds. If this is the case, then the matter itself is decomposable into further matter and form. If this goes on infinitely, then it will be true that a hylomorphic compound could be broken down without remainder into a set of forms, though the set would have to be infinite. However, if there is something like a prime matter or a matter that itself is not composed of matter and form, then no hylomorphic compound would be decomposable entirely into forms. For a discussion of these points, see Longenecker (2018).

[13] Bare particulars are supposed to be those constituents of ordinary objects that somehow bear or unify their properties, but are not qualified by the properties in the same sense in which the ordinary objects of which they are constituents are. See for example discussions in Alston (1954), Armstrong (1997), Allaire (1963), and more recently Pickavance (2009; 2014). For a non-constituent variant of bare particularism, see Connolly (2015).

> properties, not metaphysical substances. There is no penetrating the qualitative 'vail' to reach the alleged innermost substance… So if substances are thus systematically and in principle elusive, why not exclude it from our theorizing. (Campbell 1990, 18)

By 'metaphysical substance', Campbell here means a component of ordinary objects that is neither a property nor is made of properties (in his terminology, is not a complex of properties). Epistemic arguments like this one have fallen out of fashion in recent metaphysical debates. The main premise of this argument seems dubious. It is far from obvious that we do not have immediate epistemic access to things that are not properties. It seems to me that epistemic access to something requires that it has properties, but that does not mean that access to it is somehow mediated by access to its properties. Furthermore, even if the epistemic principle that tells us to postulate only those entities to which we have an immediate epistemic access (or entities made of such entities) might tell against postulating constituents of ordinary objects that are not properties nor ultimately made of properties, some other epistemic principles might pull in an opposite direction and require us to postulate such constituents. For example, introducing non-qualitative constituents of ordinary objects might be motivated by the desire to preserve some very general principle, or the overall simplicity of our theory.

Should we accept something like (i) as a *necessary* condition for a theory to be a constituent ontology? A further complication arises if we ask what kind of parthood relation has to obtain between a concrete particular and some property so that the resulting view could be classified as a constituent ontology. Let us call 'standard parthood' the parthood relation that is expressed by the predicate in sentences like 'My hand is a part of me' or 'The roof is a part of the house' (where we have some particular roof and house in mind). Should constituent ontologists think that the relation expressed by the predicate in these sentences holds between concrete particulars and some of their properties? In other words, should they think that properties stand in the same relation to concrete particulars as your hand, for example, stands to you? Or is it only necessary for a constituent ontology that some relation analogous to the one holding between me and my hand holds between concrete particulars and their properties? Call for the moment the relation (let's suppose that there is only one such relation) which is not standard parthood, but is analogous to it, 'constituency'. Could constituent ontologists think that the relation between ordinary objects and their properties is not standard parthood, but only constituency? I think that the answer to this question depends on whether constituent ontologists could tell us more about this intended relation which is not standard parthood, but is in some sense analogous to it.

One necessary condition for x to be a constituent of y seems to be that x is exactly located where y is exactly located, or is exactly located[14] at the subregions of the region where y is exactly located.[15] If this were not the case, then there would be no reason to think of constituency as something like parthood. However, this is obviously not a sufficient condition for a relation to be analogous to standard parthood in the way that is of interest in this context. We could imagine that the region occupied by x is a subregion of the region occupied by y, without x being a part of y (e.g. a cosmic ray passing through me) or anything like its part.[16] Just from the fact that the parthood relation holds between the regions occupied by two objects, it does not follow that parthood (or something analogous to it) holds between those objects themselves.

It could, perhaps, be added that constituents, just like ordinary parts, have to be the source of the character of the object having them. My table is a certain way because it has certain material objects as parts. Analogously, constituent ontologists think that my table is a certain way because it has certain properties as parts or something like parts. So, a possible proposal is to say that y is a constituent of x only if:

(1) y is not a standard part of x (not a part of x in the sense in which my arm is a part of me)
(2) y is a source of x's character
(3) y is located at the (proper or improper) subregion of the region where x is located.

The problem with this proposal is that it is doubtful that these conditions are also not satisfied by the relation of instantiation or exemplification as it is conceived, for example, by Platonists, who are relational ontologists. Since we are trying to characterise the relation (different from standard

[14] When I talk of location in the subsequent text, I mean exact location.
[15] Raul Saucedo has recently argued for the possibility that parts might not be where the things of which they are parts are. If this were the case, then it might not be necessary even for properties to be where the objects of which they are constituents are. Saucedo argues for this on the basis of plausible recombination principles applying to fundamental properties and relations. One possible problem with this is the following. If parts do not have to be where their wholes are, then I could be a part of my table, even if I do not occupy the region where my table is, nor a subregion of that region (note that in this situation the table is not a scattered object, nor is there a scattered object occupying the region which is the sum of my region and my table's region). But what difference does the holding of such a relation between me and my table make? Compare two situations, the first of which is such that I am a part of my table, while the second is just like it as far as possible, except that I am not a part of my table. It seems to me that the difference between these two situations is entirely confined to the fact that I am a part of the table in the first, while I am not a part of the table in the second (and whatever logically follows from this). In particular, the fact that my table has me as a part does not affect its qualitative character, nor its location in any way. Actually, it seems dubious that we are talking about two distinct possibilities here. This suggests to me that a relation that would behave like this could hardly be a fundamental relation. Furthermore, the possibility would make the distinction between relational and constituent ontologies a very arcane matter. For example, some constituent ontologists could think that properties are parts of ordinary objects, while at the same time being Platonic universals not existing in space and time. The difference between this view and standard relational ontology would be so subtle that I do not think it would be of much interest. But it seems that the difference is significant and that it crucially revolves around the notion of parthood, and so that parts must be where their wholes are. See Saucedo (2011).
[16] Thanks to Eric Olson for this example. For further discussion of this point, see van Inwagen (1990, ch. 4).

parthood) that might hold, according to some constituent ontologists, between objects and their properties, it does not seem sufficient to cite only those features of that relation that even the relation of instantiation, as relational ontologists think of it, might satisfy.

It seems to me perfectly coherent for relational ontologists to say that x instantiates y iff y and x satisfy the three conditions above. The only thing they have to add is that the location of y is in some sense derivative on the location of x. In other words, they would have to say that, for some property y to be located at r is for y to be instantiated by some concrete particular which is located at r. In this sense, facts about the location of properties would be derivative on facts about the location of their instances.

However, this immediately suggests a further way to distinguish constituency from mere instantiation as it is conceived by relational ontologists. We can say that y is a constituent of x only if:

(1) y is not a standard part of x (not a part of x in the sense in which my arm is a part of me)
(2) y is the source of x's character
(3) y is non-derivatively located at the (proper or improper) subregion of the region where x is located.

I think Platonists cannot accept that some object x exemplifies property y only if x and y together satisfy the three conditions above. If they think properties are located where their instances are but not merely in the sense of being instantiated by them, we might wonder what is left of their Platonism.

I am not sure, though, if there is a unique relation the holding of which is at least partly a matter of the three conditions above being satisfied, or if there is a single such relation at all. However, if there were such a relation that would satisfy (1)-(3), it seems like constituent ontologists might think that properties stand in that relation to ordinary objects, even if they are not ordinary parts of them. In the next chapter, I will discuss in more detail what seems to me the best route for constituent ontologists to take on this question of whether properties should be thought of as parts of ordinary objects, or only their constituents.

So, if we want to remain neutral on the kind of parthood relation that constituent ontologists could postulate to hold between ordinary objects and their properties (whether it is what I called standard parthood, that is, the relation of parthood holding between me and my arm, or only something analogous to it), we should reformulate the first necessary condition for constituent ontologies in the following way:

(1') Things like tables and organisms have properties as standard parts or constituents.

(1') is a better candidate than (1) for a necessary condition for constituent ontologies. Some theories that are standardly classified as constituent ontologies do not satisfy (1) if by 'part' in (1) we only mean standard parthood. For example, David Armstrong (1989; 1997) thinks that ordinary particulars are what he calls thick particulars.[17] This is his technical term for a state of affairs involving some bare particular and a conjunctive property consisting of the intrinsic properties of the ordinary particular which is identified with the thick particular in question. For example, I am a thick particular, which is to say, a state of affairs involving a bare particular instantiating the property which is the conjunction of intrinsic properties that I have. This view is classified as a constituent ontology because it takes concrete particulars to be states of affairs which have properties as some sort of parts or constituents. But the sense of parthood according to which properties are parts of states of affairs (and so of concrete particulars, according to Armstrong) is not standard parthood. Armstrong thinks the relations in question are governed by different principles. For example, it is sometimes said that two states of affairs could have the same constituents (such as the state of affairs of a loving b, and b loving a, respectively), without being identical, while there are no concrete particulars that have the same (proper) standard parts, or so the thought goes. If this is the right way to interpret Armstrong, then his view counts as a constituent ontology only if (1') is accepted as a necessary condition instead of (1).

There is a further way in which even (1') might be refined. Lewis (1983, 345) thinks that there are many theoretical roles that we associate with properties, and that no single set of entities is fit to play every role. What can qualify some group of entities to play a particular property role could disqualify them from playing some other property roles.[18] If we think that whichever entities play

[17] For another example of a constituent ontology according to which ordinary objects have properties as parts in a different sense from the one in which they have other ordinary objects as parts, see Casullo (1988).
[18] Lewis thinks that the system of entities that provides, for example, the semantic values for abstract singular terms like 'redness' is not the same as the system of entities that play a role in accounting for genuine resemblances and causal powers of objects. However, both of these roles are property roles.

some of the property roles are properties, then there will be different groups of entities that could be called properties with equal right (Edwards 2014, ch. 6).

Suppose we think that members of a group of entities A are properties because they play one property role, and that members of another group of entities B are also properties, but playing a different property role. In that case, the above given necessary condition for constituent ontologies will not be sufficiently specific:

(1') Things like tables and organisms have properties as standard parts or constituents.

Should we require that entities from both group A and group B be parts or constituents of tables and organisms in order for this particular ontology to be constituent? Or is it enough that either A-group entities or B-group entities be parts of tables and chairs? Or perhaps there is a privileged property role, such that depending on whether the entities playing that role are parts or constituents of ordinary objects, we can classify the resulting ontology as either relational or constituent? There is a significant disagreement on this matter in the recent literature on the topic. Later in this chapter, I will discuss the view proposed by Michael Loux according to which the answer to the last question is affirmative, and the privileged property role in question is character grounding. On this view, an ontology is classified as either relational or constituent depending on whether properties conceived as character grounders are either parts of ordinary objects or not.[19] Before addressing this, I want to discuss how classifying ontologies into relational or constituent depends on our views about the ontological categories to which ordinary objects and their properties belong.

[19] For more on this role, see Garcia (2016).

2.1. Ontological categories

In the previous part of this chapter, I discussed several ways of specifying the main idea behind constituent ontologies, which is that concrete particulars like tables and organisms have properties as their parts. However, constituent ontologists not only believe that properties are constituents or parts of concrete particulars, they also think that properties and concrete particulars are fundamentally different kinds of things. Using more traditional terminology, they believe that properties and concrete particulars belong to different fundamental ontological categories. This feature of constituent ontologies tends to raise the most suspicion about the very coherence of this approach (Loux 2015). The thought is that if concrete particulars and their properties are fundamentally different kinds of entities, it seems puzzling how concrete particulars can be made of their properties. If properties are taken to be abstract entities, how can we by a simple agglomeration get something which is concrete? Alternatively, if properties are universals, how can we get a particular by somehow putting universals together?[20] This criticism is most pressing for bundle theorists, because they think that ordinary objects are entirely made of properties. Hylomorphists and bare particularists think that some of the ingredients of concrete particulars are not properties, so it seems that this criticism is not so worrying for them.

Of course, the fact that something is made of entities which are F does not entail that the thing itself is F. However, it is not necessary that somebody who is objecting to constituent ontologies on this basis makes this sort of fallacious inference. The idea behind the criticism in question could be that mereological composition is just identity, or analogous to identity,[21] and so that, if the whole is identical to its parts, or stands in a relation to them that is analogous to identity, then it is hard to see how a whole made of abstract/universal entities could be concrete/particular. If a whole made of abstract entities is identical to some abstract entities (or stands in a relation analogous to identity to some abstract entities), then it is very plausible to think that the whole in question has to be

[20] In criticising bundle theories, Robert Garcia asks how something made of properties could fail to be a property itself. This is another instance of the above problem, though it seems to me that it is less pressing than the cases involving abstractness and universality. Take the properties redness and roundness, and let us assume there is a sum of them. Is the sum in question a property itself? According to Garcia, the answer has to be 'yes'. But what property is the sum of redness and roundness? Is it a conjunctive property 'being red and round', or a disjunctive property 'being red or round', or some other combination of the two? None of these answers is more plausible than others, and so it seems to me that the pressure to say that the sum of properties is itself a property is not high. See Garcia (2014).

[21] For the idea that composition is analogous to identity, see Lewis (1991, 81-87). For a discussion and criticism of the idea that composition is identity, see Sider (2007).

abstract. Perhaps bundle theorists have reasons to reject the idea that composition is identity or is analogous to identity.

In my further characterisation of constituent and relational ontologies, I will rely heavily on Peter van Inwagen and his understanding of ontological categories (van Inwagen 2014). We first need to introduce some terminology, in particular the notion of ontological category. Van Inwagen takes ontological categories to be very comprehensive natural classes. The notion of natural class is often informally introduced (although not analysed) by saying that natural classes are classes whose members exhibit unity in a certain important respect. For example, the class of all red things is unified in an important respect, while the class of things which are red or round is not unified in any intuitively important respect. Also, which classes are natural is a mind- and language-independent matter – meaning it is neither a matter of our disposition to group certain sets of objects together rather than another, nor is it a matter of our possessing (relatively) simple predicates that apply only to members of certain sets of objects. Even if we spoke a language in which we had predicates like 'grue',[22] it still seems that the class of grue things would not exhibit a higher degree of unity than it actually does, despite our having a simple predicate that applies to the members of that class.

Furthermore, natural classes are maximal, in the following sense. Take the class of two red things, on the one hand, and the class of all red things on the other. Both classes seem to exhibit an important unity (and in the same respect). However, the second class, the class of all red things, is the more comprehensive one of the two. If, out of two classes (or any number of them), both exhibit the same sort or kind of unity, but one of them is more comprehensive than the other, then the more comprehensive one trumps the claim of the less comprehensive class to be natural. When two classes exhibit the same sort of unity, but are not comparable, because neither is a proper subclass of the other, then neither counts as a natural class. What counts instead is some class of which both are proper subclasses.

That there are natural classes of entities, according to van Inwagen, is not sufficient for the existence of ontological categories. For there to be ontological categories, it has to be possible to organise everything (or almost everything) that exists into a small number of most general natural classes (natural classes which are not proper subclasses of other natural classes). This is a condition that most traditional ontological taxonomies satisfy, because on each of them it is possible to categorise

[22] Something is grue if it is green and observed before t, or blue and not observed before t, for some arbitrary chosen time t. See Goodman (1983).

everything that exists into a small number of natural classes.[23] For example, according to some taxonomies, everything that exists is either concrete or abstract, these being the two most general natural classes.[24] Without going into the subtle details of van Inwagen's account, we can say that if everything (or almost everything) that exists can be classified into a small number of most general natural classes, then these classes are primary or fundamental ontological categories. It is also possible to define what it is for a class to be a secondary ontological category, tertiary, etc. If within a primary ontological category, everything (or almost everything) could be grouped into a small number of most general natural classes within that category,[25] then those classes are secondary ontological categories.

Now that we have an informal notion of a natural class and a characterisation of what it is for a natural class to be an ontological category, and in particular, what it is for a natural class to be a *primary* ontological category, we can introduce the distinction between polycategorial and monocategorial ontologies. Monocategorial ontologies are those according to which there is a single primary ontological category. Assuming that everything belongs to some ontological category or other, it follows that, according to monocategorial ontologies, a fundamental ontological category is a natural class that has everything as a member.[26] This natural class would be the most comprehensive in that every other natural class would be a subclass of it. Think of an ontology according to which only concrete particulars like concrete artefacts, natural non-living things and organisms exist, and these entities comprise a natural class.[27] By contrast, polycategorial ontologies are ontologies according to which there is a pair of objects such that each object in the pair belongs to some ontological category, but there is no ontological category to which they both belong. The most prominent example of such an ontology is the so-called substance-attribute ontology, according to which everything that exists is either a concrete particular, like a table or an organism, or a property, but there is no ontological category to which both concrete particulars and properties belong.

Van Inwagen takes the division between relational and constituent ontologies to be a subdivision within polycategorial ontologies. He takes polycategorial ontologies to include at least the primary

[23] For a survey of the most influential systems of ontological categories, see Westerhoff (2005, ch. 1).
[24] For an example of a more contemporary taxonomy, David Lewis takes everything (or almost everything) to be an individual or a set, and nothing is both. For a discussion see Divers (2002, 45).
[25] That is to say, into natural classes whose only natural superclass is the primary ontological category in question.
[26] Although the class that has everything as a member leads to Russell's paradox, as I will discuss in the following paragraphs.
[27] I will address the problem that arises if we say that ontological categories are classes, and that everything that exists is a concrete particular, and so that there are no classes at all.

ontological category of concrete particulars.[28] Constituent ontologies are polycategorial ontologies according to which concrete particulars have entities from other primary ontological categories as parts or constituents. In other words, according to constituent ontologies, concrete particulars like chairs and tables are (at least partly) made of entities which are not concrete particulars, in a way that is the same or analogous to the way in which concrete particulars are made of other concrete particulars.

Let us say that the common-sense mereological structure of concrete particulars consists of other concrete particulars which are its parts. Furthermore, let's say that the ontological structure of concrete particulars consists of their parts or constituents which are not concrete particulars, but for example, properties. Constituent ontologists think that ordinary objects have, besides mereological structure, ontological structure as well. This is usually accompanied by the thought that an ontological structure is somehow the primary or basic structure of material objects, while their mereological structure is derived from or dependent on their ontological structure.

On the other hand, relational ontologies are those polycategorial ontologies according to which concrete particulars do not have any structure apart from the common-sense mereological structure comprising other concrete particulars. According to this picture, it is true to say of my table that it is made of its legs and its top, but there is no sense of the word 'made' according to which we could say that my table is made, even partly, of anything that is not a concrete particular. In short, according to relational ontologies, concrete particulars do not have ontological structure, despite there being entities that belong to an ontological category which is not the category of concrete particulars.

Relational ontologies are not the only ontologies that deny that ordinary objects have an ontological structure. Monocategorial ontologies, according to which only concrete particulars exist, also deny that these particulars have an ontological structure. These ontologies are not relational because they are not polycategorial. Because of that, we could not define relational ontologies (at least not in the sense in which van Inwagen uses that notion) merely as those ontologies according to which ordinary objects are without ontological structure.

[28] This is not necessarily the shape of every polycategorial ontology. For example, an ontology according to which only properties and space-time regions exist is a polycategorial ontology without concrete particulars (assuming supersubstantivalism is not true, and that concrete particulars are not identical to space-time regions).

Van Inwagen offers an exceptionally clear characterisation of ontologies in terms of natural classes, and consequently in terms of primary ontological categories. However, a few comments about this picture should be made.

First, the picture might seem ontologically biased. By taking ontological categories to be natural classes of a certain kind, it assumes the existence of classes. However, we might wish to have an account of ontological categories which would be acceptable even to someone who does not believe in classes. With that in mind, it is important to note here that talk of classes in this context seems dispensable. It is true that the notion of naturalness as it was used by Lewis, for example, applies primarily to classes (Lewis 1983). According to Lewis, properties are classes of actual and merely possible individuals.[29] However, the use of naturalness according to which it is a predicate that applies exclusively to classes is not the only possible use.

Recently, Theodore Sider has broadened the usage of naturalness so that the concept is not primarily expressed by a predicate that applies to classes. According to Sider, the concept of naturalness is best expressed instead by an operator that could be combined with linguistic expressions of arbitrary grammatical categories to form a sentence (Sider 2012, especially ch. 6). So, for example, we can talk about the naturalness of sentential operators or quantifiers. In the same sense, we could talk about the naturalness of predicates. Thus, instead of expressing the fact that concrete objects comprise an ontological category by saying that the class of concrete objects is natural, we could simply attach the naturalness operator to the predicate 'is concrete' in order to express something true about naturalness.

There is a slight advantage to the approach to naturalness and ontological categories via predicates instead of classes. Suppose you believe that, as a matter of necessity, there are only abstract objects. Then the class of all things is just the class of abstract objects. If ontological categories are classes, then the class of all things would be an ontological category. However, we might still wish to say that two abstract objects belong to the same ontological category by way of being abstract, and not merely by way of being entities. In other words, we might wish to say that there is a category of abstract objects, without there being a category of things, despite abstract objects being, as a matter of necessity, all the things there are. One way to express this idea is to say that only the

[29] According to Lewis, merely possible individuals are not non-existent individuals, but individuals all of whose parts are spatiotemporally isolated from us. Furthermore, Lewis has two conceptions of properties. According to the abundant conception, every class of individuals counts as a property. According to the sparse conception, only some classes do. Lewis introduces these two distinct conceptions because he thinks no single set of entities could play all of the theoretical roles properties are supposed to play.

predicate ‘is abstract’ is a natural predicate, while the predicate ‘is an entity’ is not.[30] This is possible if we accept the second approach, which facilitates talk of naturalness and ontological categories in terms of predicates. In more technical jargon, if we accept the second way of thinking about ontological categories, the notion of ontological category, will turn out to be hyperintensional,[31] differentiating between the predicate ‘is abstract’ and the predicate ‘is a thing’, even if these predicates were necessarily co-extensive.[32]

It could be objected here that this alternative story still commits us to the existence of predicates or linguistic expressions, and so is not ontologically neutral. However, this would be just an appearance. As I mentioned already, according to Sider, the concept of naturalness is best expressed by an operator that can be combined with expressions of arbitrary grammatical categories to form sentences. Sider introduces the operator ‘L’ for talking about naturalness, whose grammar is entirely flexible (Sider 2012, 92). ‘L’, of course, could be combined with predicates, for example ‘is red’. If the resulting sentence is true, namely ‘L(is red)’, then what is expressed is a truth about naturalness. If no expression in this sentence plays a referential role otherwise, then the truth of the sentence in question does not commit us to the existence of properties nor to the existence of predicates. For example, if the sentence ‘My table is red’ does not otherwise commit us to the existence of redness, there is no reason to think that the sentence ‘L(is red)’ commits us to its existence. It is important to notice that ‘is red’ in this sentence is used and not mentioned. This is why Sider takes L to have a flexible grammar. If ‘is red’ had been mentioned in this context, ‘L’ would be a predicate that applies to linguistic expressions. However, L is not a predicate, but has a more flexible grammar than predicates.

Of course, we need language to be able to talk about naturalness, but the truth of what is said when it is said in the way suggested by Sider does not commit us to the existence of abstract linguistic entities. We could further introduce an operator, ‘C’, to regiment talk about primary ontological

[30] For an approach to ontological categories along similar lines, see also Oliver (1996). According to Oliver, ‘The sorting of the entities into ontological categories is a matter of ideology; predicates, such as "... is a set", are used to say to which category an entity belongs.’ (Oliver 1996, 2)

[31] For a discussion about hyperintensionality, see for example Nolan (2014).

[32] A class-theoretic approach to naturalness and ontological categories could try to mimic these advantages by saying that naturalness applies to pairs consisting of classes and properties, so that the pair consisting of the class of abstract objects and the property *being abstract* is natural, while the pair consisting of the class of abstract objects and the property *being self-identical* is not. Also, it could be said that necessarily co-extensive class terms could not always be substituted within the context ‘… is a natural class’, because different class terms could indicate different properties, thus changing the truth value of the sentence that results from the substitution. However, this makes the whole picture even more ontologically demanding. Not only do we need classes for it to work, but we need properties (as distinct from classes) as well.

categories.[33] If 'C(is abstract)' is true, then any two abstract things are of the same primary ontological category. And, of course, 'C(is abstract)' can be true, while 'C(is an entity)' is not, even if everything is an abstract object. In other words, the expression 'C' creates a hyperintensional context, which seems intuitively correct.

The second thing to note in relation to van Inwagen's conception of ontological categories is that it classifies as polycategorial some ontological taxonomies that are traditionally taken to be monocategorial. For example, the classical bundle theory, according to which concrete particulars are bundles of properties, is traditionally classified as a one-category ontology, and so a monocategorial ontology.[34] On the other hand, according to van Inwagen, classical bundle theory is a paradigmatic example of a polycategorial ontology. This is because according to the theory, properties, on the one hand, and concrete particulars, on the other, belong to different primary ontological categories (in van Inwagen's sense).

The disagreement here, however, seems to be only verbal. Van Inwagen characterises primary ontological categories as those among a small number of very comprehensive natural classes that are not proper subclasses of other natural classes. If, according to the classical bundle theory, both properties and concrete particulars are members of exclusive natural classes that are not subclasses of further natural classes, it is correct to classify the classical bundle theory as a polycategorial ontology. Those who think of classical bundle theory as a monocategorial ontology usually define fundamental ontological categories in a different way. Here is an example from Jonathan Lowe:

> What does it mean to describe a certain ontological category as being 'fundamental'? Just this, I suggest: that the existence and identity conditions of entities belonging to that category cannot be exhaustively specified in terms of ontological dependency relations between those entities and entities belonging to other categories. (Lowe 2006, 8)

[33] The operator 'C' could be defined along the lines of van Inwagen's definition of which classes are primary ontological categories. Somebody might think that such a definition would need to involve quantification into non-nominal positions, and thus would commit us to the existence of abstract entities after all. If we follow van Inwagen's definition, we would define 'C(F)' as 'N(F) & ~$\exists$G(N(G) & $\forall$x(Fx $\rightarrow$Gx))', that is, 'is F' expresses a primary ontological category iff 'is F' is natural and there is no other natural predicate that is strictly more general than 'is F'. As a response, it could be said that not all philosophers think that quantification into non-nominal positions is ontologically committing to some entities unless we already think that the expressions occupying particular non-nominal positions are committing as well. If this is the case, then if the truth of 'a is F' does not commit us to the existence of abstract entities, neither does '$\exists$G(a is G)'. For further discussion, see van Cleve (1994, 588) and O'Leary Hawthorne & Cortens (1995, 153).

[34] See for example Campbell (1990, ch. 1).

If we have this kind of conception of what counts as a fundamental or primary ontological category, we will naturally think of the classical bundle theory as a one-category ontology, because, according to that ontology, there is only one fundamental ontological category in Lowe's sense – namely, the category of properties. Most bundle theorists think that concrete particulars do not comprise a fundamental category in Lowe's sense because the existence and identity conditions of concrete particulars could be exhaustively specified merely by reference to their constituting properties.[35]

2.2. Character derivation

Constituent ontologists ascribe a structure to material objects that differs from their (common-sense) mereological structure. The first consists in the properties that ordinary objects have as parts and is called metaphysical or ontological structure. According to relational ontologists (and in general, all those who do not accept the idea of ontological structure), ordinary objects are metaphysical 'blobs' in that nothing that belongs to another ontological category is a part or a constituent of them. Constituent ontologists think that their position has an advantage because they can account for the character of ordinary particulars in terms of their ontological structure. The term 'character' is supposed to refer to what is expressed when in the ordinary course of life, we describe material objects as being a certain way (having certain properties, being related in a certain way and belonging to certain kinds).[36] It is supposed to capture those aspects of ordinary objects that the proponents of opposing ontological approaches could take as starting points in their theorising. Ordinary non-modal qualitative characteristics, like shapes and colours, seem to be paradigm examples of the aspects of character constituent ontologists are usually interested in. Somewhat less central are modal properties and persistence conditions, though it seems that talk about which events things could or could not survive still occupies a prominent place in our discourse about ordinary material objects.[37]

[35] According to Michael Loux, it is a framework constraint on every constituent ontology that no two concrete particulars could have the same constituents. See Loux (2011, 228). There are exceptions here, though. For example, according to Gonzalo Rodriguez-Pereyra, ordinary objects are made of their properties, but two ordinary objects could be made of numerally the same properties. This version of bundle theory in polycategorial even in Lowe's sense. See Rodriguez-Pereyra (2004).

[36] See for example Loux (1978; 2006).

[37] There are dissenting voices here, nevertheless. For example, David Robb thinks we are less pressured to account for the modal aspects of ordinary objects' character because no causal powers of objects depend on their modal properties. See Robb (2004, 483).

Another prominent aspect of character is the common-sense mereological structure. This is the aspect of character that has attracted the least attention from constituent ontologists. In the next chapter of this thesis, I will discuss some promising ways in which constituent ontologists could account for the mereological structure of ordinary objects in terms of their ontological structure.

Constituent ontologists are not always specific concerning what the derivation of character amounts to. To give some examples, my table is white, it is a table, it has a book lying on it, etc. Constituent ontologists propose to look at the ontological structure of ordinary objects to account for such facts. If my table is white, then this fact has something to do with my table having whiteness as a part or constituent. We apparently have two facts here, the first one being that my table is white, and the second one being that by table has whiteness as a part.

What is the relationship between these two facts? One option for constituent ontologists is to say that these are the same facts, that is, they can say that for my table to be white is just for it to have whiteness as a constituent. According to this view, accounting for the facts concerning my table's character is just an attempt to describe the same fact in a more perspicuous way by referring to the properties my table has as parts. On the other hand, if these facts are different, an account of the character of an object will have to look at some other relation between these two facts. [38] The most likely candidate is something like the relation of grounding.[39]

As I mentioned in the first section of this chapter, Michael Loux thinks that the distinction between relational and constituent ontologies should be drawn depending on whether the entities that are character grounders are parts of concrete particulars or not. He offers an alternative characterisation of the constituent-relational distinction which is somewhat similar to van Inwagen's, but with a couple of important differences. Given that we want to account for the character of ordinary individuals, Loux thinks we are faced with a dilemma. Either the source of character is internal to objects, or it is not. By an 'internal' source of character, Loux means a source of character that concerns objects' parts or constituents (I will later propose broadening this

[38] A useful distinction in this context has been discussed by Paul Audi. Audi differentiates between grounding an aspect of character and giving a theory of character. I think this roughly corresponds to the distinction discussed above. According to Audi, to ground an aspect of the character of my table is to find another fact about the table that, obviously enough, grounds that aspect of it. Given that grounding is usually (though not by everybody) taken to be irreflexive, the facts in question are different. On the other hand, the theory of character is a matter of saying what the aspect of the character in question consists in. On this picture, the fact that my table is white could just be the fact that it has whiteness as a part, these being the same facts. See Audi (2014, 113).

[39] For recent discussions of this, see Guillon (2021) and Devitt (1980).

understanding of what should count as an internal source of character). For example, according to classical bundle theory, my table is white because it has the property of whiteness as a constituent.

On the other hand, the source of character could be external to ordinary particulars. An example of this sort of approach is Platonism, according to which properties do not exist in space and time at all, and the character of ordinary particulars is explained by them standing in some sort of external relation of instantiation or exemplification to Platonic properties.[40] In short, if we want to account for the character of ordinary particulars, the options are to turn to the internal structure of ordinary particulars, or to the relations that ordinary particulars bear to properties that are external to them in Loux's sense.

I want to make a few remarks here about Loux's way of drawing the relevant distinction. First, Loux allows that the sources of character need not be properties, and in particular, he seems to allow that the sources of character could be entities which belong to the same category as the bearers of derivative character (Loux 2011, 210). This sets him apart from van Inwagen, who thinks of relational and constituent ontologies as polycategorial ontologies. Take for example resemblance nominalism, which accepts the existence of concrete particulars only. Roughly speaking, according to resemblance nominalism, the source of the character of concrete particulars are resemblance relations to other concrete particulars which are 'external' to them.[41] It seems to me that Loux would classify this view as relational, despite it being a paradigm of a monocategorial ontology. On the other hand, van Inwagen would characterise as relational some ontologies that Loux would not.

In fact, van Inwagen's own view is an example in point. He thinks that transcendent universals exist, but he does not believe that ordinary objects have their character in virtue of instantiating universals, nor that they have their character derivatively at all (van Inwagen 2004). Universals exist because we have to quantify over them in order to be able to say the things we would like to say (while being able to account for intuitively valid inferences), but they do not play any role when it comes to deriving the character of ordinary particulars, nor does, according to van Inwagen, anything else play such a role. This is a relational view according to van Inwagen, but neither relational nor constituent according to Loux, because it does not take seriously the project of character derivation.

[40] Not all Platonists, though, think that the character of ordinary objects stands in need of explanation. See van Inwagen (2011).
[41] See Rodriguez-Pereyra (2002) for a recent development of this view.

Another thing to note is that, if we think that the project of character derivation is of central importance in drawing a distinction between relational and constituent ontologies, then it seems that some views that might share their motivation with constituent ontologies could end up being relational according to Loux. So, his way of drawing the distinction does not seem to carve the space of positions along their natural boundaries. What I have in mind is the following. Imagine a non-standard version of the bundle theory, according to which ordinary particulars are not bundles (sums) of properties, but are constituted by such bundles, in the sense in which it is sometimes said that persons are constituted by organisms, or that dollar bills are constituted by pieces of paper. Suppose further that the properties in the bundle are not parts or constituents of the ordinary objects constituted by these bundles.[42] Finally, let us also take that my table is white because it is constituted by a bundle that includes the property of being white. Why would somebody believe in this theory? A few reasons come to mind. If we believe that character derivation is of central importance, we might also believe that in order for properties to account for the character of ordinary particulars, they have to stand in some sort of intimate relation to concrete particulars. As Olson emphasises, if properties are to ground the character of ordinary objects, a natural thought is that they have to be closely related to them (Olson 2017, 66). This thought seems to lead naturally to some version of constituent ontology, because the relation of parthood is an obvious candidate for such an intimate relation holding among concrete particulars and their properties. However, there are numerous problems with taking properties to be parts of ordinary particulars (as I will discuss in the next chapter). This can prompt someone to look for an alternative intimate relation between ordinary objects and their properties which is not parthood, and the relation of constitution (between bundles of properties and ordinary objects) might seem like a promising candidate.

Another reason to believe in such a theory is that it apparently enables us to respond to the problem of the identity of indiscernibles. Many philosophers have objected that bundle theory entails the principle of the identity of indiscernibles (properly interpreted), which is usually thought to be false because of hypothetical scenarios like the one involving two indistinguishable spheres in a symmetrical universe.[43] The reason is that if the two spheres are indistinguishable, then they are

[42] Constitutionalists do not always characterise the relation of constitution in mereological terms, so it seems that it is not incoherent to claim that a thing could be constituted by a bundle of properties, without having the properties in the bundle as parts. See, for example, Baker (2000). The fact that Baker does not define constitution in mereological terms has, however, been highlighted as a source of problems for her view. See Sider (2002) and Zimmerman (2002).

[43] See Black (1952). O'Leary-Hawthorne argued that the bundle theory can actually help us save the principle of the identity of indiscernibles from the objections relying on the possibility of symmetrical universes, like the one involving two spheres. The idea is that bundle theory can help us save the principle while at the same time accommodating the possibility of the symmetrical universe involving two spheres, by saying that in such a universe we have a single bi-located

bundles of the same properties, and since bundles of the same properties are identical,[44] it follows that the spheres are identical, contrary to the assumption that there are two of them. However, if objects are merely constituted by bundles of properties, without being identical to bundles, then we can say that we have two spheres which are both constituted by the same bundle. I am not going to discuss further any merits that this theory might have. I just wish to mention a few reasons why somebody who thinks that objects stand in an intimate relation to their properties could think that objects are merely constituted by bundles of properties, instead of having properties as parts.

We might ask if such a theory is a variant of constituent ontology or not? It follows from Loux's characterisation that if constitution of ordinary objects by bundles on the above discussed theory is not defined in mereological terms, and thus if ordinary objects do not have their properties as parts, then the theory is a relational ontology. However, it seems to me that if our main concern is with character derivation, then the above theory is much closer to the standard bundle theory than to the paradigmatic relational ontologies according to which objects do not stand to properties in any sort of intimate relation. Both this theory and the more standard bundle theory start from the assumption that if properties are to be the ultimate source of the character of ordinary particulars, they have to stand in some sort of intimate relation to ordinary particulars. In contrast, many relational ontologists think that even Platonic universals not existing in space or time could be the source of character (Russell 1912). For example, in discussing Armstrong's view, Theodore Sider says the following:

> The electron and the positron differ intrinsically in virtue of instantiating different perfectly natural universals; why would the universal of unit negative charge being co-located with the electron explain this difference better? Would it be easier for the universal to "do its thing" if it were spatially closer to the electron? I don't see why. A universal is not a bright light that illuminates its instance from within, causing the instance to take on its own properties. (Sider 1995, 373)

This quote from Sider suggests that he thinks that the division between relational and constituent ontologies hinges on whether the source of the character of ordinary particulars is where the ordinary particulars are. He seems to think that whether sources of character are, in addition, parts

sphere. However, as Loux emphasises, this idea threatens to collapse the categorial distinction between spheres and their properties (universals). See Loux (1998, 239).

[44] Loux takes the principle that bundles with the same constituents are identical as one of the framework principles of constituent ontology. See Loux (2011, 228).

of ordinary objects is an internal debate among constituent ontologists.[45] This would suggest that if Loux is right that character derivation is of central importance for drawing the distinction between relational and constituent ontologies, it might not be necessary for an ontology to count as constituent that the sources of the character (properties, for example) of concrete particulars be parts or constituents of ordinary particulars on that ontology.

In the rest of the thesis, I will be following van Inwagen in his characterisation of the distinction between relational and constituent ontologies. Thus, I will be calling constituent ontologies only those according to which properties are parts or constituents of concrete particulars. I find constituent ontologies understood in this sense most interesting, but at the same time most puzzling. Also, I will be discussing if constituent ontologies could help us with problems arising from the possibility of material coincidence. Only those ontologies according to which properties are parts of ordinary objects seem to be of use in this context.

If somebody favours Loux's characterisation and agrees with me that, if that characterisation is right, then constituent ontologists should require properties only to stand in some sort of intimate relation to concrete particulars without necessarily being their parts, what follows should be understood to concern only some versions of constituent ontologies in Loux's sense, namely those according to which the intimate relation in question is actually parthood.

[45] See Connolly (2015) for an opposing view. According to Connolly, parthood matters much more in this context than Sider acknowledges.

3. General questions of constituent ontology

In this chapter, I deal with some traditional objections to constituent ontologies (in particular bundle theories) and offer a version of constituent ontology that I believe is both coherent and evades these objections. As explained in the previous chapter, constituent ontologists (in van Inwagen's sense) think that concrete particulars have among their parts (or constituents) entities that belong to a primary ontological category which is distinct from that to which concrete particulars belong. The usual shape this idea takes is that concrete particulars have properties among their parts, where concrete particulars and properties belong, respectively, to distinct primary ontological categories. The second clause, about membership in distinct categories, is supposed to express the thought that concrete particulars and properties are radically distinct sorts of things. This characterisation of constituent ontologies leaves it open whether the property parts of concrete particulars should be thought of as tropes or universals. Where the distinction between tropes and universals is relevant, it will be explicitly mentioned.

The kind of structure that constituent ontologists ascribe to ordinary objects, and which consists in their property parts, is sometimes called an *ontological structure* (van Inwagen 2011; 2015). However, both relational and constituent ontologists agree that objects have an ordinary mereological structure. By 'mereological' structure, they mean the sort of structure of concrete particulars which consists in their having other concrete particulars as parts. So, when we say that my table has the property of whiteness as a part or constituent, we are describing an aspect of its ontological structure, not mereological structure. On the other hand, when we say that the table has its legs as parts, we are describing an aspect of its mereological structure. The choice of words here, however, could be somewhat misleading. For example, when we say that the sentence 'This table has whiteness as a part' does not describe an aspect of my table's mereological structure, it might seem like we are contradicting ourselves because, in an obvious sense, to say that x is a part of y is to describe the mereological structure of y (or an aspect of it). Also, it should be noted that in describing the structure of concrete particulars consisting of other concrete particulars as 'mereological', we do not want to convey the idea that the parthood relation holding among concrete particulars obeys the principles of classical extensional mereology (or any other formal system of mereology in particular), while the relevant relation between concrete particulars and

their properties does not.[46] In that sense, the expressions 'mereological structure' and 'ontological structure' should be understood in the technical sense stipulated by the participants in these debates.

3.1. Constituent ontology and category mistakes

One of the traditional objections to constituent ontologists is that they are committing something like a category mistake when they say that properties are parts or constituents of concrete particulars. If we think that predicates have something like a domain of application, which consists of those bits of our universe of discourse to which such predicates could in principle apply, then we could think of at least some category mistakes as arising when we pair a predicate with a term referring to an entity outside its domain of application.[47] Sentences representing category mistakes usually sound strange, and we might be reluctant to ascribe a truth value to them (or at least, we might think that they are neither true nor false). Typical examples are sentences like 'The number 2 is yellow'.

I am not entirely convinced that in saying something like 'Whiteness is a part of my table' we are saying something as strange as 'The number 2 is yellow'. In my experience, when people hear about constituent ontologies for the first time, they are usually not willing to reject the theory just because its main idea might sound to them like it lacks meaning, and some even find it obvious that ordinary objects have their properties as something like parts. However, there are perhaps ways to explain the difference in how the two sentences above sound, even if they both express category mistakes. There is perhaps a way to understand 'Whiteness is a part of my table' as conveying something manifestly meaningful, namely that the table is white, while no matter how charitable interpreters we are, there is no way to understand 'The number 2 is yellow' as conveying something meaningful. Thus, both sentences could be category mistakes even if we are sometimes willing to go along with

[46] Some authors resist calling a relation parthood (and describing it as 'mereological') if it does not obey the principles of uniqueness (roughly speaking, the idea that no two objects have the same proper parts) or universality (the idea that for any objects whatsoever, there is a sum of them). I find this somewhat puzzling. There could be a meaningful disagreement about the principles governing parthood, and so it is not just a matter of the meaning of the term 'part' that parthood obeys uniqueness and universality. For example, Michael Loux says that properties are not mereological parts of concrete particulars because it is not the case that properties from any set whatsoever compose something. See Loux (2011, 228).

[47] For example, Thomas Sattig argues that each sortal term comes with a range of properties that could be meaningfully applied to entities of that sort. That would mean that applying a predicate to some object expressing some property outside the range of that object's sort would result in a category mistake. See Sattig (2015, 17).

the first because there is a way to read it as conveying something that obviously makes sense, even if it strictly speaking makes no sense.

It could also be thought that constituent ontologists are in a very bad dialectical position here because they start from the idea that properties and ordinary objects are fundamentally different categories of entities, and one sort of evidence for this categorial division might be that sentences like 'Whiteness is a part of my table' are category mistakes, while a sentence like 'This leg is a part of my table' is not. The thought behind this is that substitution in the same context could not result in a category mistake unless the substitute term refers to an entity of a different category from the entity referred to by the substituted term. Philosophers in the mid-twentieth century relied precisely on this kind of evidence in drawing categorial distinctions.[48] However, contemporary metaphysicians are accustomed to drawing categorial distinctions or making categorial identifications on a broader basis than merely a linguistic one. For example, even though it may sound strange to say that my table is a member of whiteness, sets of individuals conceived as properties could be fit to play the roles that properties are supposed to play, even if the initial linguistic evidence might tell against identifying properties with sets.

Even if those who accuse constituent ontologists of making a category mistake could explain why the sentence 'Whiteness is a part of my table' does not always sound strange despite being a category mistake, they should still explain why we should think of it as a category mistake in the first place. One natural thought is that properties are abstract entities, while objects like tables are concrete, and it does not make sense to say that something concrete could be composed of things which are abstract. But if this is not just to beg the question against constituent ontologists, there has to be an analysis of concreteness and abstractness from which it follows that whenever we say that an abstract object is a part of a concrete object, we are making a category mistake. For example, it could be said that abstract entities are non-spatial and non-temporal, while concrete entities are spatial and/or temporal, and so that saying that a non-spatial and non-temporal object is a part of a spatial and/or temporal object is a category mistake. But even if the last claim is true, the former sentence is obviously not an adequate characterisation of the abstract/concrete distinction. There could be ontologies according to which the distinction coincides with this way of drawing it. For example, if somebody believes that there are only concrete particulars and platonic universals, then the abstract/concrete distinction might coincide with the spatial/non-spatial distinction. However, the characterisation in question is not ontologically neutral. Many philosophers would say that

[48] For a short historical overview of category mistakes, see Magidor (2020).

impure sets having their members located in space are themselves located in space, despite usually being classified as paradigmatic abstract entities. Also, immanent universals are located entities that are also abstract.

Alternatively, it could be said that concrete entities could change intrinsically, while abstract entities could not, and that it makes no sense to say that objects exhibiting intrinsic variation are made of intrinsically changeless entities.[49] However, even if this is the right way to understand the distinction between abstract and concrete, the last claim seems dubious. Philosophers who accept instantaneous temporal parts usually think that these have their temporal extension essentially, and something which is essentially instantaneous could not change intrinsically in time (though it could perhaps be possibly distinct). But if ordinary objects are sums of such instantaneous temporal parts, then they exhibit intrinsic variation with respect to time, even if they are made of things that do not exhibit intrinsic variation across time. Thus, the auxiliary principle required for demonstrating the category mistake (namely that it makes no sense to say that a changing entity could not be made of changeless entities) does not sound that plausible at all. It could even be that elementary particles do not change intrinsically, and change in composite objects results from change in the relations among particles. That would again be the case of an intrinsically changing entity being made of intrinsically changeless entities.[50]

It is certainly correct that if properties are parts of concrete particulars, they behave differently from those parts that themselves are concrete particulars. One difference is that ordinary parts of concrete particulars (or at least those salient among them) are associated with 'recipes' for making things. If you want to make a table, there is a recipe for how to arrange some other concrete particulars (of a certain kind) so that you get a table. However, there is no recipe for how to arrange some *qualities* in order to obtain a table: in fact, it is questionable what it would even mean to manipulate properties in the way in which we can manipulate some concrete particulars to create further such entities.

Another difference is that, for example, if you break off a leg from a table, you do not have to replace it with another leg or another part in order for the table to persist. On the other hand, if I 'destroy' my table's whiteness by painting the table another colour, its whiteness will be replaced by that colour. In general, it seems that there is a generic dependence between the property parts of a

[49] Yablo suggests that abstract objects have their intrinsic properties essentially. See Yablo (2002, 220).
[50] Thanks to Eric Olson for this example.

table (if something has a colour, then it has a shape as well) which does not hold between its ordinary parts.[51,52] However, it does not seem to me that just because property parts (if properties really are parts of ordinary objects) behave differently from the ordinary parts of concrete particulars, we then have to say that they could not be parts of ordinary particulars.

Finally, even if these facts are taken to have more substantive significance than I acknowledged, there is still a way out for constituent ontologists. They could say that the sense in which properties are parts of ordinary particulars is different from the sense in which concrete particulars are parts of other concrete particulars. Of course, there is then a pressure to explain how we can call the relevant relation between properties and concrete particulars 'parthood', given the above differences from the parthood relation relating only concrete particulars. I said something about this in the previous chapter. Later in this chapter I will propose a particular variant of the view according to which we have two closely connected, but still distinct, parthood relations operative here.

3.2. Could mereological structure be derived from ontological structure?

The second problem constituent ontologists face is explaining how the two structures ascribed to ordinary particulars fit together. As already said, constituent ontologists share with their relational counterparts the belief in what was called the mereological structure of ordinary particulars. More precisely, this is the case for all constituent ontologists who are not also mereological nihilists. Mereological nihilism is the thesis that no concrete particular has another concrete particular as a proper part (a part distinct from itself).[53] Assuming, then, that a constituent ontologist is not a mereological nihilist, a few problems arise from ascribing concrete particulars both mereological structure, and a further, more fine-grained, ontological structure.

It was mentioned in the introductory chapter that constituent ontologists think that ordinary objects do not have their character primitively (or at least not those aspects of character that do not concern which properties they have as parts). By 'character', we meant the pre-theoretical facts about concrete particulars that concern the properties they have. When I say that my table is white,

[51] This fact is exploited, and somewhat strengthened, in a well-known paper by Simons (1994).
[52] Some philosophers think that this dependency is due to contingent laws of nature, and not some necessary metaphysical 'laws'. So, for example, even though properties in our world come in groups, there are possible worlds where they could occur isolated. See Schaffer (2003).
[53] For some influential defences of mereological nihilism, see Rosen and Dorr (2002) and Sider (2013).

I give a description of an aspect of its character. But this fact about my table is not ultimate: there has to be something further which is the source of this aspect of my table's character. This is the thought that in many cases motivates one or another version of constituent ontology. However, if we believe that ordinary particulars have a mereological structure, then we already have an easy explanation of this aspect of my table's character in terms of its ordinary parts. For example, my table is white because of the colour of its parts. This seems like a sufficient explanation of its character. Why should we add further that it also has whiteness as a part? If we say that, then it seems that we have something like a systematic over-determination of the character of mereologically complex objects. My table is white because it has ordinary white parts, but it is also white because it has whiteness as a part. Unless having white parts and having whiteness as a part are somehow dependent on each other, the fact that my table is white will have two independent explanations.

The worry about overdetermination of character is seldom mentioned in the literature. This is not to say that something like a discussion of it cannot be found. For example, at one place, Lewis rejects the need to account for the resemblance of objects in terms of structural universals, because he thinks that we can already explain such resemblance in terms of the concrete parts resembling objects have:

> But it is one thing to say that resemblance is to be explained in terms of shared universals; it is another thing to say that whenever two particulars are alike, those particulars themselves share a universal. Why not say that structural resemblance of A and B is to be explained not as sharing of universals between the whole of A and the whole of B, but rather as sharing of universals between corresponding parts of A and of B? (Or more generally, as sharing of n-adic universals between corresponding n-tuples of parts.) Only the simplest way of explaining resemblance in terms of shared universals requires there to be shared structural universals. (Lewis 1986b, 28)

According to Lewis, in order for a thing to be, for example, a methane molecule, it is sufficient that it have one carbon atom and four hydrogen atoms as parts, related in a certain way. Why should we also add that it has a corresponding structural universal, namely *being a methane molecule*, as a constituent? This seems like a problematic kind of character overdetermination.

But could structural properties be distinct in this respect from properties like whiteness? Constituent ontologists could reply that for an entity to be a methane molecule is just for it to have one carbon and four hydrogen atoms as parts, related in a certain way. In a sense, there is no 'gap' between being a methane molecule and having these atoms as parts. On the other hand, it could perhaps be said that to be white is not merely to have white concrete parts. There may be a gap here, and the property *whiteness* could be needed to bridge that gap. However, I do not think we should accept this as an explanation for why whiteness is a part of my table without taking *being a methane molecule* to be a part of methane molecules. If there is a gap between being white and having white concrete parts, then it is not entirely obvious how the gap is bridged by the property of being white.

It seems to me that there are two options for constituent ontologists when faced with an overdetermination problem. One option is to say that the fact that my table has white concrete parts, and the fact that it has whiteness as a part, are not independent. One of these facts might depend on the other. In such a case, the overdetermination would be benign, like in the case of more distant and proximal causes of the same effect. On the other hand, constituent ontologists could say that my table having white concrete parts and having whiteness as a part are independent of each other, and only in collaboration do these two facts account for my table being white. This, however, would be a very strange claim to make because, if having white concrete parts and having whiteness as a part were truly independent, then it should be possible for something to have white concrete parts without having whiteness as a part, and so for something to have white concrete parts without being white, which seems highly implausible.[54] So, the first option, which takes the two facts to be connected, is the more likely route.

With that in mind, we could expect constituent ontologists to say that the mereological structure could not on its own ground the character of a complex particular (or could not be the ultimate such ground) because the mereological structure itself is a further aspect of an object's character that requires derivation from its ontological structure. Speaking of the constituents of concrete particulars which are not themselves concrete particulars, Loux says the following:

> The items in question are to be contrasted with the common-sense parts of a familiar particular. Indeed, the constituents of a sensible particular are responsible for its common-sense mereological structure no less than any other aspect of its character. (Loux 2011, 208)

[54] Or more precisely, being entirely decomposable into objects which are such that each of the surfaces they share with the whole is white.

We are, however, owed a more detailed account of how the ontological structure of ordinary particulars could be responsible for their mereological structure. I will now consider a few possible proposals of how this could be done.

3.2.1. A simple proposal

Let us start with what seems like the most obvious account. Somebody could say that my table has a leg, A, as a part because it has, as a constituent, the property *having A as a part*. Call this the simple account.

What is the nature of the property *having A as a part*? The basic idea behind constituent ontologies is that ordinary things are somehow made of more basic constituents, in most cases, properties. But if there are properties like *having A as a part,* and if such properties are needed to ground an aspect of the mereological structure of ordinary objects, it seems then that we cannot describe ordinary particulars as sums of properties without mentioning other concrete particulars and the parthood relation between them. Formulated in a different way, ordinary objects are, according to constituent ontologists, composed of metaphysically more fundamental items. If this is so, then these items themselves could not in turn be composed of concrete particulars. However, if there is such a property as *having a leg as a part*, then it seems that that relational property is a sort of complex entity[55] that has some concrete particulars as parts or constituents, and this seems to go against the reductive ambitions of constituent ontologists. Here is Loux again, in a slightly different context:

> The bundle theorist is attempting to provide an account of the ontological structure of substances that shows them to be constructions out of ontologically more basic things; but the appeal to the haecceities of ordinary objects [like being identical with a] would be illicit for anyone engaged in that project. Those haecceities already presuppose the concrete objects whose reconstruction is the aim of the project. (Loux 1998, 237)

Just as it is not consistent with their basic project for bundle theorists to introduce such properties as *being identical with A* in order to distinguish between objects that would otherwise have the

[55] See for example Lewis (2002, 3).

same constituents, so it seems illegitimate for them to introduce properties like *having A as a part* in order to account for the mereological structure of ordinary objects.

One possible reply to this criticism is that, since A is itself just a sum of properties, then the property *having A as a part* could be ultimately decomposed into properties. So, even if the property *having A as a part* has A (a concrete particular) as a constituent, that constituent dissolves into further properties. However, this reply presupposes that A itself does not have a mereological structure. If A, however, in turn has B as an ordinary part, then it has to have the property *having B as a part* among its property parts. In such a case, even if A itself dissolves (could be decomposed) into properties, there will be some among those properties (such as the property *having B as a part)* that are complexes with concrete particulars as constituents, and so our problem resurfaces at a lower mereological level. In other words, in order for this reply to work, it is required that at some level of decomposition, we reach concrete particulars that do not have other concrete particulars as parts, and so do not have among their property parts properties like *having x as a part* for some concrete particular x.

The problem could also be represented in this way: constituent ontologists want to construct, in one way or another, concrete particulars out of their properties. Properties are basic entities, while concrete particulars are somehow constructed out of them. But if there are such properties as *having A as a part*, then it seems that at least some properties will have to be constructed out of concrete particulars, contrary to the above picture. Now, if A itself is made of properties, then we could say that the property *having A as a part* could be ultimately composed of properties.[56] However, this presupposes that A could be decomposed into properties, none of which is of the form *having x as a part.* But this will be true only if A is a mereological atom (does not have other concrete particulars as parts).

Let us call an object gunky (the term 'gunk' was introduced by Lewis (1991)) if each of its concrete parts (including itself) has concrete proper parts. Let atomism be the view that there are no gunky objects. In order for the above account to be successful, it requires the truth of mereological atomism. As a matter of fact, if bundle theory should be a necessary truth about the ontological structure of ordinary objects, then it requires the necessity of atomism. Many philosophers,

[56] Compare the following: even if I have an arm as a part, this does not mean that I could not be ultimately composed of atoms if my arm is composed of atoms.

however, have argued from the conceivability of non-atomistic worlds to their possibility.[57] In any case, I do not think we should make a constituent ontology dependent on any view about the mereological structure of objects.

3.2.2. Structural properties

However, maybe constituent ontologists do not have to account for such facts as that my table has some particular leg, A, as a part. Perhaps they only need to account for the fact that my table has as a part some leg with certain qualities. For example, if a wooden leg is a part of my table, this fact could perhaps be explained by my table having as a part or constituent the property *having a wooden leg as a part.* It could be that in our complete description of the world, we do not need to mention particular entities. It could be said that the most we could rightly expect of constituent ontologists is to account for such facts as that my table has a leg of a certain description as a part, but not also facts like that it has some *particular* leg as a part. After all, constituent ontologies, especially universals-based bundle theories, are intended to eliminate primitive particularity from the world. Facts about particulars, it could be said, emerge from general facts concerning the aggregation of universals (Dasgupta 2009; 2014). This is not to say that by eliminating primitive particularity, universals-based bundle theorists have to eliminate the category of particulars altogether. Standard universals-based bundle theory does not eliminate particulars form ontology, it just denies them the status of basic entities.[58]

While this picture avoids the problems that affected the simple proposal, it brings some of its own challenges. Let's say my table has a wooden leg as a part because it has as a part or constituent the property *having a wooden leg as a part*. But suppose my table in fact has two wooden legs as parts. How can we account for this aspect of my table's mereological structure? In general, what can account for the difference between a table that has only one wooden leg as a part, and a table that has two such wooden legs as parts? It certainly seems that these two tables have different mereological structures. If we want to account for the mereological structures of the two tables in terms of their ontological structures, then there has to be a difference in the ontological structures

[57] See for example Sider (2001). The possibility of gunky worlds has also played a role in the debate about non-reductive physicalism and the causal drainage problem, see for instance Kim (2008, ch. 2).
[58] In chapter 4, I will discuss a version of universals-based bundle theory that eliminates particulars from ontology altogether. This variant of bundle theory is not properly classified as constituent ontology.

of the two tables. Perhaps we can say that the property *having a wooden leg as a part* is a part of the two-legged table twice. But what could we mean by saying that something has something else as a part twice? How can a single thing be a part of something else two times?[59]

Maybe we could say that the two-legged table has as a part or constituent the property *having two wooden legs as parts.* But now it seems that our table has as parts or constituents not only properties, but also numbers, given that it is plausible that the property *having two wooden legs as parts* has the number two among its parts or constituents. It seems that we cannot account for the mereological structure of my table in a piecemeal fashion, by accounting for each individual concrete part it has, because in that case there would be no way to distinguish among objects whose concrete parts are qualitatively the same, but that only differ in the number of such parts.

Perhaps at this point we can introduce structural universals, because having such universals entails not only facts concerning individual parts, but facts concerning the entire decomposition of the objects having them.[60] Roughly speaking, something has a certain structural property if it has as parts some concrete particulars that are propertied in a certain way, and that stand in external relations to each other.[61]

A typical example of a structural property found in the literature is the earlier mentioned property *being a methane molecule.* Something is a methane molecule only if it has exactly one hydrogen and four carbon atoms as parts, related by certain bonding relations. The fact that something is a methane molecule entails that it has certain concrete particulars as parts. Since something is a methane molecule only if it has one carbon and four hydrogen atoms as parts bonded together, we can say that the structural property *being a methane molecule* involves the properties *being a carbon atom* and *being a hydrogen atom* and some relation of bonding.

Now, the proposal to explain mereological structure in terms of ontological structure could be applied to the structural properties of concrete particulars. Why does a methane molecule have as a part some carbon atom? The answer is that the methane molecule has the structural property *being a methane molecule* as a part or constituent, and having this property as a part or constituent entails having a carbon atom as a part. Can we account for the fact that out carbon molecule has two

[59] Karen Bennett recently argued that it makes sense for a certain object to be a part of something more than once, so to speak. See Bennett (2013).
[60] Some xs are a decomposition of some y iff no two of the xs overlap, and the xs compose y.
[61] For a detailed discussion of structural properties, see Armstrong (1997, ch. 3). For a criticism of structural universals in particular, see Lewis (1986b).

carbon atoms as parts? It seems so. The explanation is the same: having the property *being a methane molecule* as a part entails having two carbon atoms as parts. By resorting to structural universals, we can account for the different numbers of indistinguishable concrete parts that things have in their mereological structure.

In order for this proposal to work, it requires the truth of a liberal combinatorial principle for structural properties. What guarantees that my table will have a structural property that involves the property *being a leg*? It seems to me that only something like the following combinatorial principle can do the work required:

> For any two properties F and G (or more in the most general case, and a single property in a limiting case), and some external relations Rs, there is a structural property whose possession is a matter of: (1) having n number of non-overlapping parts which are F, (2) having m number of additional non-overlapping parts which are G (3) having its F-parts and G-parts related by R in some particular pattern.[62]

For example, for the property *being a table top* and the property *being a table leg* and a five-place relation R of being fastened in the very specific way that the parts of my table are fastened, there is a structural property S of having four table legs and one table top as parts related by R. Because my table has S as a constituent, it has four legs and a top as parts.

This proposal has an advantage over the previous simple proposal, because it does not take properties to be constructed out of concrete particulars. Recall, according to the previously discussed simple proposal, my table has a leg as a part because it has as a constituent the property *having A as a part*, where A is the name of some table leg. The problem with this proposal was that the property in question is a complex that has A, a concrete particular, as a constituent (or something like it). As opposed to this, structural properties are complexes that only include other properties. For example, the structural property *being a methane molecule* does not include hydrogen atoms - it includes the property *being a hydrogen atom* instead. But this is not a problem for constituent ontologists.

[62] See Forrest (1986) for a more detailed discussion of combinatorial principles that generate structural properties.

However, this advantage of the current proposal over the simple one is at the same time the source of other problems for it. Let us make a distinction hinted at the beginning of this section between having some particular object (that happens to be F) as a part, and having some F as a part. The first kind of property we could call a *de re* mereological property, while the second we could call a *de dicto* mereological property.[63] For example, there is a distinction between my table having this particular top as a part, and my table having some top as a part. Having the first property entails having the second (at least if table tops are essentially table tops), while the second does not entail the first because (let's assume) my table could be made of a different top. Structural properties are suitable for explaining why my table has some top as a part, but they do not explain why it has this particular top as a part, and despite what has been said above, somebody might still insist on explaining both *de re* and *de dicto* mereological features of concrete particulars in terms of their ontological structures.

In general, my table can retain all its structural properties while being made of different concrete particulars, as long as these concrete particulars are of the same type as its actual concrete parts and are related in the same way. But then it seems that we only have an account of the general mereological features of my table, or, in other words, of its *de dicto* mereological features. The *de re* mereological features of my table are left unaccounted for by its ontological structure according to the current proposal that relies on structural properties.

As I mentioned at the beginning of this section, if somebody is a constituent ontologist who thinks of ordinary objects as bundles of universals, then she perhaps does not have to give an account of the *de re* mereological features of ordinary objects. For bundle theorists who are universalists, facts concerning particulars are somehow emergent from the totality of general facts. So, universalists have a ready answer to the above worry. However, not all universalists should try to account for the mereological structure of ordinary objects in terms of structural universals, especially those whose theories are the main topic of my thesis.

In the next chapter, I will discuss how constituent ontology, and especially bundle theory, could help us approach some problems concerning materially coincident objects. Materially coincident objects are those that are composed of the same material parts but are nevertheless distinct because they have different modal (and possibly some other) properties. The usual example of materially coincident are a clay statue and the lump of clay of which it is made, which differ in their modal

[63] Thanks to Dominic Gregory for suggesting this terminology.

properties. However, if materially coincident objects are made of the same parts existing in the same surroundings, how can they differ in the modal or any other respect? How could the clay statue and the lump of clay differ modally if there is no compositional difference between them? This is the so-called grounding problem. Many constituent ontologists have attempted recently to account for the modal differences between the clay statue and the lump of clay by distinguishing between the property parts of the statue and the property parts of the lump. If the clay statue and the lump of clay have property parts in addition to their ordinary parts, then it could turn out that modal differences between materially coincident objects are always accompanied by compositional differences, even if the compositional differences in question concern property parts and not ordinary parts.

But if this has been one of the main reasons for the popularity of constituent ontology in recent literature, then it is incompatible with accepting structural properties, in particular structural universals. This is because accepting structural universals would re-introduce *compositionally ungrounded modal difference*. Take for example, a methane molecule, CH_4 and a butane molecule, C_4H_{10}. If we think that structural properties have other properties as parts, then these two universals will have the same properties as parts, namely the properties *being a carbon atom* and *being a hydrogen atom* (together with the relevant bonding relations). So, the two structural universals, *being a methane molecule* and *being a butane molecule*, have the same property parts - yet, these two universals differ in their modal properties. For example, the methane universal is such that necessarily, whatever is an instance of it has only one carbon atom as a part, while the butane universal is such that necessarily, whatever is an instance of it has exactly four carbon atoms as parts. This modal difference exists despite the two universals sharing all their parts.[64]

At the end of this chapter, I will propose an alternative way for constituent ontologists to ground the mereological structure of ordinary particulars in their ontological structure. The advantage of that proposal will be that it does not reintroduce modally ungrounded differences. Before presenting the proposal, however, I will first discuss some other issues that arise if ordinary objects are taken to have both ontological and mereological structure.

[64] Katherine Hawley defended compositionally ungrounded modal differences between structural properties by appeal to the existence of such differences between concrete particulars. But somebody who finds the latter cases problematic could not take this route. See Hawley (2010).

3.3. Relational ontologies and instantiation

One of the main perceived advantages of constituent ontologies is that they can dispense with the primitive relation of instantiation.[65] By construing properties as parts or constituents of ordinary particulars, it seems that constituent ontologists are in a position to say what the instantiation of a property amounts to. One reason for trying to dispense with primitive instantiation is that this improves the overall simplicity of the theory by reducing the number of ontological or ideological primitives.[66] But this is not the only apparent advantage, nor is it the most important one. Instantiation, as it is conceived by relational ontologists, is a relation that seems problematic in itself.

Why is the relation of instantiation problematic from the perspective of relational ontology? Here is a recent representative example of a criticism of the instantiation relation as conceived by relational ontologists:

> Platonic realism must account for a connection of instantiation between entities of ontically unique realms. As is well known, it suffers from vicious regress and the mysteriousness of a relation traversing two realms. (Fisher 2018, 157)

Not every aspect of this criticism, it seems to me, is equally pressing. Let us take each in turn.

3.3.1. Instantiation and regress

Although Fisher does not elaborate on it, the criticism that invokes vicious regress usually starts from the assumption that for my table to be white, it is not sufficient that the table and whiteness exist. They also have to be related in a certain way. Thus, for my table to be white is for it to be related in a certain way to the property whiteness. Presumably this relation is instantiation. But for my table and whiteness to stand in the relation of instantiation, it is not sufficient that my table,

[65] See Williams (1968). For a discussion and criticism of the idea that parthood enables us to dispense with primitive instantiation, see Connolly (2015).

[66] If instantiation is conceived of as a relation, then the move improves ontological economy. If it is conceived as a primitive predicate to which no relation corresponds, then the move improves ideological economy. Recently, Sam Cowling argued that instantiation should be understood as location, where to instantiate a property is to be located in a property space. This, according to Cowling, improves the ideological economy of the theory. See Cowling (2014).

whiteness and instantiation coexist. My table and whiteness have to be related to the relation of instantiation in a certain way. In other words, the pair <my table, whiteness> has to instantiate instantiation itself. But then the pair consisting of the original pair <my table, whiteness> and instantiation has to instantiate instantiation, et cetera. The regress seems vicious because the relatedness at each stage seems to depend on the relatedness at the next stage. But what is the source of the regress here? Certainly not the relation of instantiation: the regress started already at the level of my table and whiteness. As Fraser MacBride emphasises:

> What sets off the regress is just that the existence of property and object alone is insufficient for property possession. But if the fact that the existence of an instantiation relation is insufficient to explain property possession means that such entities incur a commitment to Bradley's Regress, then, equally, properties and objects incur the same commitment because those entities do not explain property possession either. (MacBride 2001, 88)

If MacBride is right, and if the regress is initiated already by the fact that the existence of an object and a property is insufficient for the object in question to have the property in question, then it is not obvious in what sense this criticism applies only to relational ontology, because relational and constituent ontologies share the assumption that objects and properties exist and that the existence of some property and an object is insufficient for the object to have a property.

Constituent ontologists are likely to respond here that only they have the means to stop the regress. They might agree that the mere existence of an object and a property is not sufficient for the object to have the property, but they could add that if the object has the property as a part, the regress does not ensue, because that is sufficient for the object to have a property. Facts about parthood seem special in that they might reasonably be taken to be basic or brute. If x is a part of y, then it would perhaps be unreasonable to require here that in order for this to be the case, the pair <x,y> has to instantiate the relation of parthood. If parthood or composition are anything like identity, facts about parthood might be taken to be brute just as facts about identity seem to be.

While I agree that there is some advantage to constituent ontologies when it comes to stopping the regress,[67] I think that advantage only holds when it comes to the possession of properties. While I

[67] I think relationalists should respond to the regress worry by simply refusing to admit that there is a relation of instantiation. They could say that in order for a to be F, a has to instantiate Fness, but the talk of instantiation should not

think that the instantiation of properties could plausibly be understood in terms of parthood, it is doubtful that the instantiation of relations could be understood in the same way.

Let's start with Fisher's reconstruction of D. C. Williams's account of predication, which seems to be representative of the constituent account of property instantiation:

'a is F = df. 'a embraces an f-trope that manifests the kind F.'

It is not entirely clear to me what Williams has in mind when he talks of tropes manifesting kinds. He seems to think that tropes themselves could play the role of kinds or universals, or behave as if they were universals, in situations in which we count tropes not by strict identity but by exact resemblance. Talk of 'embracing' seems to be of more importance in this context. For a concrete particular to embrace a trope is just to have it as a part and to occupy the same region of space-time as that trope. The above account applies only when F is what Williams calls an inherent or intrinsic property. But what about relations? For example, if Romeo loves Juliet, then the relational trope of loving is embraced by neither Romeo nor Juliet, nor are the relational property tropes (like *loving Juliet*, or *being loved by Romeo*)[68] parts of either of them. If Romeo loving Juliet could not be understood in terms of parthood, then in order for Romeo to love Juliet, Romeo and Juliet have to be related to *loving* in some other way. Let us call this relation R. But if in order for Romeo to love Juliet, the pair <Romeo, Juliet> need to stand in R to *loving*, then it also necessary that the pair <<Romeo, Juliet>, loving> stands in R to R itself, etc. This seems like the same sort of regress that relational ontologists face with their relation of instantiation.

Let us assume that relying on the relation of parthood is a way to block the regress. I suggested above that this might not be sufficient, because neither relations (like loving) nor their corresponding relational properties (like *loving Juliet*) are parts of their terms. However, constituent ontologists might agree with this while still arguing that there is something else of which relations are parts (even if these things are not their terms), and that this is what blocks the regress. In other words, constituent ontologists might say that even if relations are not parts of their relata taken separately, they are parts of the sums of their relata, and what makes a difference as to whether a pair of objects stands in a relation or not is whether their sum has the relation in question as a part or not. This is exactly what Williams accepts:

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be understood here as involving a relation to which the pair <a,F> have to be related further in order for a to instantiate Fness.

[68] Williams calls these 'adherent' tropes, see Williams (1968, 4).

> …what is an adherent quality of a thing x is an inherent quality of the thing which is the sum of x with the relatum y… (Williams 1968, 4)

However, there are a couple of obvious worries about this proposal. Firstly, the account seems to commit us to the principle of universal composition. More specifically, it commits us to the existence of a sum of $x_1…x_n$ whenever $x_1…x_n$ stand in an n-ary relation.

Secondly, it is not obvious that we are provided with a full account here. That *loving* is a part of the sum of Romeo and Juliet does not tell us if Romeo loves Juliet, or vice versa, or if both are true. In order to account for the direction in which the relation holds, constituent ontologists must not introduce some other entity into the picture, otherwise the regress will be initiated again, because the sum of Romeo and Juliet will have to be related to this further entity if that entity is to account for the direction in which *loving* relates Romeo and Juliet. Constituent ontologists could choose to introduce new modes of composition here, say $composition_1$ and $composition_2$. For example, they could say that Romeo loves Juliet when *loving* is a $part_1$ of a sum_1 of Romeo and Juliet, but that Juliet loves Romeo when *loving* is a $part_2$ of a sum_2 of Romeo and Juliet. This, however, seems like a serious cost of the view, and it is doubtful how much it would help.

Some issues with this proposal become apparent when we turn away from atomic truths concerning binary relations, to atomic truths concerning relations with higher numbers of terms. For example, imagine that there is an atomic truth that involves a basic predicate with three argument places. If the truth in question concerns a basic relation that differentially applies to all its terms,[69] then there will have to be more than two modes of composition in order to account for the direction in which the relation in question applies to its terms. Let R be this relation. If 'Rabc' express a fact that is different from the fact expressed by 'Racb', both of which in turn are different from the fact expressed by 'Rbca', etc., then there will have to be at least six different modes of composition in order to account for the different directions in which relation R could apply to its terms. Of course, it is questionable whether there are such basic relations as R, but perhaps we should not accept a theory whose ideological/ontological costs would be excessive if there were such relations.

There is also what might be called the problem of pairing. We might ask why the fact that Romeo loves Juliet depends on *loving* being a $part_1$ of a sum_1 of Romeo and Juliet, while the fact that Juliet

[69] That is to say, replacing any two terms in a given relation results in a different fact, just as replacing Romeo and Juliet in the fact that Romeo loves Juliet results in a different fact.

loves Romeo depends on *loving* being a $part_2$ of a sum_2 of Romeo and Juliet. Why is it not the other way around? In general, we might ask how a particular direction of the holding of a relation is related to some particular mode of composition. I do not see any possible answer to this question, and so the dependence in question has to be taken as brute, which is highly implausible.

Thirdly, going back to the main idea that having relations as parts can block the regress (even if we put the direction of the holding of the relation aside), it is not obvious that the solution can work for all types of relations and relational properties. I think it is helpful at this point to introduce Lewis's distinction between intrinsic and extrinsic relations. Because this distinction can be found in a proto-form in Williams, it is reasonable to assume that Lewis was influenced by Williams's classification. So, following Lewis (1986a, 62), let us call a relation internal if its holding supervenes on the intrinsic nature of its relata. For example, *being of the same height* supervenes on the intrinsic properties (namely heights) of its relata. External relations are those whose holding does not supervene on the intrinsic nature of their relata, but it supervenes on the intrinsic nature of a sum of their relata. According to Lewis, the relation of spatial distance is like this. For example, if you take a sum of me and my table, then this sum is intrinsically such that I am at a certain distance from my table.

Internal and external relations are both intrinsic. Relations which are not intrinsic are extrinsic. If x and y stand in an extrinsic relation R, then it is possible for an intrinsic duplicate of the sum of x and y to be such that none of its parts are related by R. An example of an extrinsic relation is *being married to.* Whether two persons are married or not depends not only on the intrinsic character of their sum (if there is such a thing), but also on their institutional surroundings. If, as the proposal we are currently considering says, relations are parts of the sums of their relata, then some relations that are intuitively extrinsic will turn out not to be such (as I will suggest).

How should we account for the holding of extrinsic relations, like *being married to*, in terms of parthood? It will not work to say that an extrinsic relation like *being married to* is a part of the sum of the two persons who are married, because in that case the relation will turn out to be intrinsic after all (either internal or external). For example, if *being married to* is part of a sum of Romeo and Juliet, then every intrinsic duplicate of a sum of Romeo and Juliet will have *being married to* as a part and so will be composed of persons who are married.[70] But that just means that *being married to* supervenes on the intrinsic nature of a sum of Romeo and Juliet, which makes the relation intrinsic

[70] Here I am assuming that having something as a part is an intrinsic property. This assumption is fairly uncontroversial.

(and in particular external), while the relation is intuitively extrinsic, that is, does not supervene on the intrinsic nature of a sum of it relata.

At this point constituent ontologists could say that, since whether two persons are married depends on their institutional surroundings, we can account for the fact they are married by taking *being married to* to be a part of a more inclusive entity that includes not only the married persons, but also the institutions relevant for marriage (however we explain this). But this move is not going to work in all situations. Sometimes, two things will stand in an extrinsic relation because of an absence of some things from their surroundings. Take two objects, x and y, and assume that they compose a world, the most inclusive whole. Assume also that the relation *composing a world* is a part of the sum of x and y. It is certainly possible for there to be a duplicate of the sum of x and y which is embedded in a wider whole, and so not a world. But in order for this embedded entity to be a duplicate of the sum of x and y, it has to have *composing a world* as a part, which is absurd, given that this entity is not a world, but is only a proper part of the world. Thus we have to conclude that *composing a world* is not a part of the sum of x and y. Even more importantly, unlike in the case of marriage, there is no more inclusive object than the sum of x and y (because x and y compose a world) of which *composing a world* could be a part. So, whether two objects compose a world could not be accounted for in terms of whether they have *composing a world* as a part. Therefore, it seems that constituent ontologists cannot account for the holding of every relation in terms of parthood.

3.3.2. Is instantiation mysterious?

The objection that the relation of instantiation as construed by relational ontologists is mysterious seems to me more pressing than the objections discussed previously, so I will devote some space to it here. One of Fisher's complaints is that the relation as construed by relational ontologists is mysterious because of its 'traversing two realms'. By this, Fisher means that instantiation sometimes relates entities belonging to different fundamental categories. But, if there are entities that belong to different ontological categories from us, why should it be surprising that there are relations relating entities from different categories? For example, if there are numbers, then we can have beliefs about them, and we can refer to them, which would certainly count as being related to abstract entities. Of course, somebody could (rightly) object that there are problems with explaining

how we can refer to and have thoughts about abstract entities.[71] However, a causal connection between entities is certainly not required for instantiation, and so we need a more substantive reason for thinking that instantiation is mysterious.

Even though Fisher does not elaborate on this, the charge might be developed along the lines of Lewis's criticism of magical ersatzism (Lewis 1986a, 174-191). According to magical ersatzism, possible worlds are abstract entities that represent concrete goings-on, but not in the way they are represented by sentences of some language, nor in virtue of any sort of internal structure. Such entities could be imagined, according to Lewis, as being mereologically simple. Lewis argued that if this is how worlds represent (that is, if worlds represent but not like sentences do, nor in virtue of their internal structure), then representation (or selection, as he calls the converse of representation) is mysterious in either of two ways to be discussed. Lewis's criticism of magical ersatzism could be applied to the relation of instantiation as it is conceived by relational ontologists.

First, let us ask whether the relation of instantiation is internal. As said, a relation is internal if it supervenes on the intrinsic character of its relata. Does instantiation meet this criterion? Let us restrict our attention only to intrinsic properties. Talk of properties in the following couple of paragraphs should be understood to refer to intrinsic properties, unless indicated otherwise.

Assume first that the instantiation relation is external, meaning that it does not supervene on the intrinsic nature of its relata taken separately. If x instantiates Fness, then there is a duplicate of x, say some y, and a duplicate of Fness, say Gness (Gness could be identical to Fness if x is not identical to y), such that y does not instantiate Gness. If my table instantiates whiteness, and instantiation is an external relation, then it seems possible that there is a duplicate of my table that does not instantiate a duplicate of whiteness. We could ask at this point, which properties are duplicates of whiteness? If whiteness does not have other duplicates apart from itself, then the view that instantiation is an external relation is not tenable. This is because in that case it would be possible for the duplicate of my table not to instantiate the duplicate of whiteness, and if whiteness is its only duplicate, it would follow that it is possible for a duplicate of my table not to instantiate whiteness. However, this does not seem possible, since every duplicate of my table is white. But if whiteness has other duplicates apart from itself, then what are these? It seems to me that the only non-arbitrary answer to this question is that all properties are duplicates of each other, and that those

[71] But note that this criticism usually relies on the idea that some sort of causal connection is required in order to achieve a determinate reference, and that the realms of abstract and concrete are causally isolated, see for example Swoyer (1996).

who take instantiation to be an external relation are actually best interpreted as accepting that properties do not have their own distinctive intrinsic natures: for example, whiteness does not have an intrinsic nature that distinguishes it from other properties.[72]

The problem with the view that instantiation is external is that the holding of the instantiation relation has modal consequences which seem to be incompatible with its being external. It is necessary, if my table is white, that it instantiate whiteness. But why should the intrinsic character of my table constrain the holding of an external relation like instantiation? Lewis compares this to the case of the distance relation, which he takes to be external. Given that distance is not internal, how could the intrinsic nature of one of the relata constrain the holding of the external relation of distance? It would be like saying that, as a matter of necessity, whenever my table is white, it is exactly two meters away from me. But this seems obviously absurd. If the instantiation relation is external, then it is mysterious in the sense of having unexplainable modal consequences.[73]

Suppose now that instantiation is internal. As said previously, internal relations supervene on the intrinsic nature of their relata. Given that, according to this conception of instantiation, the intrinsic features of properties are relevant for instantiation, we can no longer assume that all properties are intrinsic duplicates. Proponents of this position would say that my table instantiates whiteness without instantiating redness because there is an intrinsic difference between whiteness and redness.

However, the problem with this view comes to light when we ask what the intrinsic features of properties are upon which the relation of instantiation supervenes. Lewis thinks that we grasp an internal relation if we are either somehow acquainted with its instances, or if we know the intrinsic properties of its relata, upon which it supervenes. According to most relational ontologists,

[72] The best explanation of why somebody would think that instantiation is external is that they also believe that all properties are intrinsically indistinguishable (in the sense of qualitative intrinsic properties). Of course, that person could think that properties have intrinsic natures that they share with some, but not all other properties. For example, it could be said that whiteness and redness are intrinsic duplicates, but that whiteness and greenness are not. It would follow from this that instantiation is not internal. My table is white and so instantiates whiteness, but it does not instantiate a duplicate of redness, so instantiation is not internal. However, it is hard to see on what grounds somebody could think that properties share their intrinsic nature with some other properties, but not all of them. So, it seems that the best way to understand externalists is to interpret them as saying that all properties are intrinsically indistinguishable. See also van Inwagen (1986, 203).

[73] The fact that the distance relation is different from instantiation, in the sense that the distance relation is entirely independent of the intrinsic nature of its relata, while instantiation is not entirely independent (though it is not completely dependent either) does not seem to be relevant here. Notwithstanding the relevance of the intrinsic character of my table for whether it instantiates whiteness, if the relation is external, its modal consequences are problematic. As Lewis emphasises, 'it remains unintelligible that the intrinsic nature of a thing should constrain the external relations in which it stands' (1986a, 181).

properties exist outside space and time, so it is not obvious that we could grasp instantiation by being acquainted with its instances. The assumption behind this is that, in order to be acquainted with a relation, somebody has to be causally related to each of its relata. Because we are causally isolated from properties (according to relational ontologists) we do not grasp instantiation merely by being acquainted with its instances.

There remains another way to grasp an internal relation, namely by knowing which intrinsic properties are relevant for its holding. But now we could ask, what are the intrinsic properties of whiteness that (together with the fact that my table is white) determine that it and the table stand in the relation of instantiation? The most obvious, and it seems only possible, answer if we are relational ontologists is that it is the property of being instantiated by something if it is white. But, as Lewis and van Inwagen emphasise in another context, it should be obvious that this response is not very useful. We tried to understand what an internal relation of instantiation would be by looking at the intrinsic properties of the properties of relevance for it. But now it seems that we have no conception of the intrinsic nature of properties upon which instantiation supervenes that is independent of the relation of instantiation itself. Without an instantiation-independent grasp of the intrinsic nature of properties that are of relevance for whether they stand in the instantiation relation to concrete particulars, it seems that there is no way to grasp the relation of instantiation as construed by relational ontologists.[74]

To sum up, the dilemma for relational ontologists is the following. If instantiation is not an internal relation, then it is problematic because it introduces problematic modal connections between the intrinsic properties of objects and the holding of the instantiation relation. On the other hand, if relational ontologists classify instantiation as internal, then, by claiming to grasp the internal relation of instantiation, they in effect say that they are doing something which presupposes magical powers (Lewis 1986a, 207-210). That is because they are claiming to grasp an internal relation of instantiation, but neither by being acquainted with its instances, nor by having an instantiation-independent grasp of the intrinsic features of properties in virtue of which this relation holds.

Before going further, somebody could try parodying the above Lewisian reasoning by arguing that, if the reasoning involved is valid, it could be used to show that we do not understand certain other relations beside instantiation that we certainly seem to grasp. For example, van Inwagen argued that the same reasoning could be used to show that we do not understand the relation of set

[74] For a thorough presentation of this argument in a slightly different context, see van Inwagen (1986).

membership, or singleton membership. Singleton membership is obviously not internal because an object which is numerically distinct from me but is my duplicate is not a member of my singleton. Since the relation is external, it introduces a problematic modal connection between members and their singletons.[75] That is, if the relation is external, then it follows that there is a problematic modal connection between the identity of one of the relata (a member) and the holding of the external relation in question.

Lewis partly agreed with van Inwagen, but argued that he can account for the modal connection by relying on his counterpart theory:

> On my theory of modality the question becomes: why doesn't some other-worldly counterpart of Possum have a singleton which isn't a counterpart of the singleton that Possum actually has? And my answer is: what makes one singleton a counterpart of another exactly is their having counterpart members. (Lewis 1991, 37)

According to Lewis, to be a counterpart of Possum's singleton is exactly to have a counterpart of Possum as a single member, so there is no question of a singleton of some counterpart of Possum not being a counterpart of Possum's actual singleton. But, as far as I can see, this does not entirely answer the worry we are dealing with here. The problematic modal connection induced by the singleton-membership relation consists not merely in the fact that Possum is essentially a member of Possum's singleton, but also in the fact that Possum is essentially a member of any singleton. If singleton-membership is an external relation, it should be possible for there to be a world in which the same concrete objects exist as in the actual world (or their intrinsic duplicates), and in which there are also enough abstract objects for everything to have a singleton, but in which some of the concrete objects do not have singletons. Of course, some of these abstract objects would not be called singletons, but I do not think this is of much significance here. Lewis assumes that, necessarily, every concrete object has a singleton. But if singleton-membership is external, then it is mysterious why this would be the case, even if in every world there are enough abstract objects for every concrete object in that world to be a sole member of one.

[75] Van Inwagen's discussion on this point is actually more detailed than this. He considers the possibility that set-membership is determined by the identity of one of the relata (members) and the intrinsic nature of another of the relata (sets), that is, that the set-membership relation is what he calls range-internal, internal only with respect to the second argument place. He argues that, if this was the case, we would not have a membership-independent grasp of the intrinsic nature of the second of the relata of the set-membership relation which is relevant for the holding of that relation, and thus that grasping such a relation would involve magical powers.

Compare this with the explanation of why it is necessary that any two individuals stand in a spatio-temporal relation, which for Lewis is a paradigm of an external relation. This might also seem mysterious, because if spatio-temporal relations are external, why should it be necessary that every two individuals be spatio-temporally related? For Lewis, this is just a matter of how possible worlds are individuated. Possible worlds are characterised as maximal spatio-temporal wholes, which is to say that two individuals, x and y, are parts of the same world if and only if each part of x is spatio-temporally related to every part of y. It follows from this that for every possible world, every two proper parts of it are spatio-temporally related. But this is just a consequence of the definition of worlds and the analysis of *de dicto* modality given by Lewis. Speaking unrestrictedly, there are individuals which are not spatio-temporally related. And worlds themselves are not spatio-temporally related to anything (unless we can say that they are spatio-temporally related to themselves). But if (speaking unrestrictedly) not everything is spatio-temporally related to something, then why is it the case that (speaking unrestrictedly) every individual has a singleton? If singleton-membership is an external relation, this seems like a mysterious modal fact.

Besides set-membership, the Lewisian argument can be generalised for other apparently well understood relations. One example is identity. We could pose the same dilemma: is identity internal or external? It seems that it is not internal. That x is an intrinsic duplicate of y is consistent both with them being numerically identical and numerically distinct. So, it is not an internal relation. Suppose then that it is external.[76] But, given that identity holds necessarily whenever it holds, we are left wondering why distinct things could not be identical, and vice versa. The necessary connection implied here is slightly different from the one described above involving instantiation, but it seems to me that if one is mysterious, then so is the other.

Could we save identity by saying that it is an internal relation after all, as long as we admit haecceities, like *being identical to Socrates,* as intrinsic properties? In that case, every duplicate of Socrates will have the property *being identical to Socrates*, and so it will be true after all that the relation of identity supervenes on the intrinsic nature of its relata. However, we cannot grasp the property *being identical to Socrates* without already understanding identity, so we seem to encounter the same problems as above.

[76] It is certainly not extrinsic. If identity were extrinsic, that would mean that whether two things are identical could depend on something else, a thought that most philosophers find unattractive (though not all). For an opposing view, see Nozick (1981, ch. 1).

Perhaps we can answer the worry about set-membership and identity by claiming that we somehow grasp the relations of identity and set-membership by being acquainted with their instances. We seem to be acquainted with the relata of the identity relation. In addition, Lewis thought of impure sets as simples located where their members are, and even as possibly being the relata of causal relations (Lewis 1986a, 83). Thus, we can at least fix the reference to singleton-membership relation by saying that it is the relation holding between, for example, Possum and a simple abstract object collocated with Possum. However, properties as relationalists think of them are non-spatial and non-temporal entities, and so even if we perhaps could grasp identity and set-membership by being acquainted with their instances, the same would not be true of the relation of instantiation.

Assume, then, that the above criticism of the relation of instantiation as conceived by relational ontologists has force. One reply by relational ontologists could be to accept that the relation is external, but to claim that the mystery around modal connections disappears as soon as we see that for x to be F is just for it to instantiate Fness. Relational ontologists could then say that modal connections are problematic only if they are unaccounted for in further terms. If we just say that there is a necessary connection between being F and instantiating Fness, without trying to explain why this is so, we end up with a mysterious modal connection. However, relational ontologists could argue that qualitative character is constitutively related to facts about instantiation: they could say that x's being F is grounded in x instantiating Fness.[77]

Talk about grounding, or the metaphysical explanatory relation often expressed by the 'in virtue of' locution, has become commonplace in recent metaphysics.[78] The notion is usually introduced via examples, before being further refined by laying down the principles governing it. Without paying too much attention to the categories of entities that are related by the grounding relation, we could say that the existence of some set is grounded in the existence of its members, or that facts about wholes are grounded in facts about their parts. Similarly, we could perhaps say that facts about the qualitative character of substances are grounded in facts about what properties they instantiate. Proponents of grounding usually think that grounding connections entail modal connections. Because the existence of a set is grounded in the existence of its members, it is also necessary that if the members exist, the set exists as well. Alternatively, it could be said that sets are dependent for their identity on their members, and that this kind of dependence has modal implications. To many

[77] Van Inwagen is a relational ontologist who explicitly denies that there is such a constitutive connection between being F and instantiating Fness (see his 2004).
[78] See for example Rosen (2010), Schaffer (2009) and Fine (2001).

philosophers, modal connections that are accounted for in terms of grounding or some kind of ontological dependence do not seem unacceptably mysterious (Kleinschmidt 2015).

Alternatively, somebody could try to explain strong modal correlations in terms of metaphysical laws (Rosen 2006). Just as natural laws could dispense with the mystery around the strong connection between certain kinds of facts, so could metaphysical laws dispense with the mystery around the correlations that hold with metaphysical necessity between certain kinds of facts. For example, it could be a law of our world that things have their character by way of instantiating properties. Possession of a qualitative character in our world could be a matter of instantiating universals, but there could be other worlds, far remote from ours, where qualitative character is a matter of being characterised by a trope, or it could be a brute fact. If this were the case, then, quantifying over absolutely all worlds, it would not be necessary that red things instantiate redness,[79] because there would be worlds in which red things do not instantiate anything. However, the sense that red things could not fail to instantiate redness could be explained by the fact that when we say this, we are not quantifying over all worlds. In thinking about alternatives to how things actually are, we could hold the laws of metaphysics fixed, in the same way that we sometimes keep the laws of nature fixed in entertaining alternative possibilities. If it is a metaphysical law that things have their qualitative character by way of instantiating properties, then if in envisaging alternative possibilities we keep this law fixed, we will, unsurprisingly, conclude that there is a strong correlation between the qualitative character of objects and facts about the instantiation of properties.

Even though the positions above are merely sketched here, it seems that both could deal with what seem like problematic modal connections. One potential worry, however, could be that both of them base the character of ordinary objects on their relations to something entirely distinct from these ordinary objects. According to both solutions, my table is white because it stands in the relation of instantiation to something which is wholly distinct from it. However, it is a shared view among many philosophers that whether my table is white is only a matter of how it is in itself, and could not depend on anything which is wholly distinct from it.[80]

It is exactly with regard to this point that I think the constituent approach is better positioned compared to the relational approach. According to the constituent approach, for my table to be white is just for it to have whiteness as a part. Constituent ontologists do not have to say that having

[79] I am assuming here that things in other possible worlds where qualitative character is a brute fact could be, for example, red in the same sense in which things that instantiate redness are red. See Rosen (2006).
[80] See for example Audi (2013). For an opposing view, see Sider (1995).

qualitative character is a matter of standing in a relation to something wholly distinct from an object, that in addition exists outside space and time. Because they think that properties are parts of concrete particulars, the source of concrete particulars' character, namely properties, are not wholly distinct from them. But relational ontologists cannot say this: if they wanted to account for the modal implications of instantiation by saying that these modal implications are backed by grounding connections, they would have to say that there is a grounding connection between the character of objects and entities entirely distinct from them. However, this seems to introduce another mystery: how can the character of something be grounded in a relation it bears to something completely distinct from it? According to van Inwagen, this would be like saying that me and my brother being two is grounded in the fact that we stand in the *being numbered by* relation to the number two. On the other hand, constituent ontologists could say that, since properties are parts of ordinary objects, and so are not wholly distinct from them, there is no similar mystery arising as to how their qualitative character could be grounded in the properties they have as parts.

To sum up the discussion thus far, I think that there is something important in Fisher's observation that the relation of instantiation, as relational ontologists conceive of it, is mysterious. It is mysterious either in the sense that it introduces mysterious modal connections, or in the sense that it is hard to explain how we can have a grasp of it in the first place. Relational ontologists could try to account for the modal connection by saying that instantiating a property is what grounds the character of an object, or something similar. But in that case, they end up with another problem: how can something entirely distinct from some concrete particular, an abstract entity not existing in space or time, ground the character of that particular? On the other hand, constituent ontologists could say that character is a matter of instantiating a property, but since they can understand instantiation in terms of parthood, they do not face the same problem as relational ontologists.

In the next section of this chapter I discuss some problems for constituent ontologists that arise from understanding instantiation in terms of parthood. Some problems arise because, if constituent ontologists are right, concrete particulars have both an ontological and mereological structure: they have properties as parts or constituents, but they also have other concrete particulars as parts. I will argue that these problems are best solved by accepting some version of mereological pluralism. In particular, I will argue that the sense in which concrete particulars have properties as parts is not the same as the sense in which they have other concrete particulars as parts. I will also argue that this idea helps explain how the ontological structure of concrete particulars can account for their mereological structure, which was the problem I discussed at the beginning of this chapter.

3.4. Constituent ontologies and instantiation

If things have both ontological and mereological structure, then the crucial question for constituent ontologists is how these two structures are related. It is obvious that the two structures are interwoven, so to speak, within the same object. Instead of talking of constituent ontologies in general, I will restrict the following discussion to the bundle theory, which is the most common variant of constituent ontology, and I will remain neutral on whether property parts should be understood as tropes or immanent universals.[81]

If the bundle theory is true, I am made of the properties that I instantiate. But I am also made of other concrete particulars which are parts of me, such as my arms, or other body parts. My arms in their own right have ontological structures, too. Further details of the ways that mereological and ontological structures are related depend on the way in which we specify the relation between me and my arm, on the one hand, and the relation between me and the properties I instantiate, on the other. Let mereological monism be the view that the parthood relation relating properties to ordinary objects is the same relation as the one relating ordinary objects to each other. The main attraction of this view is in that it accounts for both the mereological and ontological structure of concrete particulars by relying on a single relation of parthood, and so reduces the number of primitive concepts deployed by our overall theory of concrete particulars.

Mereological monism is a source of familiar difficulties for constituent ontologists. One problem concerning the analysis of instantiation has recently been discussed by J. D. Lafrance, who attributes his formulation to Lewis (Lafrance 2015). The problem rests on two principles that most bundle theorists are likely to accept:

(INST) Concrete particular a instantiates property F iff F is a part of a
(TRANS) If a is a part of b, and b is a part of c, then a is a part of c

[81] Immanent universals are supposed to be properties that could literally be shared between their instances. If two things have the same determinate shade of red, then there is an immanent universal (assuming immanent universals exist) that is their common part. In other words, if there are immanent universals, then resemblance in some cases amounts to sharing a part. Tropes, on the other hand, are particular cases of property types. Each of the two things of the same shade of red has its own redness trope, but these tropes are not numerically identical. It is sometimes said that nothing can be a property unless it could be shared among its instances (see for example Oliver (1996, 20)). Tropes obviously do not fit this role because they are never shared. Instead, trope theorists usually take properties to be sets of tropes, and the sharing of a property to mean having tropes from the same set of tropes which is a property. I think there is still a sense in which tropes are properties, and I will talk about properties in what follows as covering both tropes and immanent universals.

The first principle captures the main principle of the bundle theory, namely that objects are bundles of their properties. The second principle, the transitivity of parthood, is usually taken to be constitutive of the parthood relation, and its application is not restricted by considerations related to ontological categories. In other words, the variables used in its formulations could be interpreted as standing for objects from arbitrary ontological categories. To see how the problem arises, let us go back to the example of my arm. My arm is a part of me, and the mass of my arm is a part of my arm. It follows by (TRANS) that the mass of my arm is a part of me. But then it follows from (INST) that I instantiate the mass of my arm, which, together with the assumption that my actual mass and the mass of my arm are incompatible properties, implies that I instantiate incompatible properties.[82]

Here is a further problem for mereological monism that has recently been posed by Olson (2017). Let us first define 'composition':

> y is composed of the xs iff each of the xs is a part of y, and every part of y overlaps (shares a part) with at least one of the xs.

According to most bundle theorists, I am composed of my atoms. Now, take some property Fness that I instantiate and that is, according to (INST), a part of me. It seems intuitively true that I am composed of certain atoms. Given that I am composed of some atoms, and that Fness is a part of me, it follows from the definition of 'composition' that Fness overlaps at least one of the atoms that compose me. Compare this with the following: given that I am composed of some atoms, every other concrete part of me has to overlap at least one of these atoms. For example, I have some electrons as parts because they are parts of my atoms (and so trivially overlap them). Also, my arm is a part of me because it overlaps many of my atoms by having them as parts, or by being made of parts distributed across the many atoms that compose me. So, when some property Fness is a part of me, is it a part of me in the way an electron is a part of me, by being a part of one of my atoms? Or is it a part of me like my arm is a part of me, by being made of parts distributed across my atoms?

According to Olson, the first option will not always be available to constituent ontologists. Since I do not share many of my properties with my atoms, if Fness is one of these properties, then it cannot be a part of any of my atoms. The reason is that if it were a part of one of my atoms, then, by (INST), the atom in question would be F, contrary to the supposition that Fness is not shared. Let Fness be my mass, for example. Fness cannot be a part of any of my atoms, because otherwise I would share

[82] Not everyone would find this conclusion problematic, see for example Toner (2008).

a mass with one of my atoms. In fact, it seems that most of my properties are like this – they are not shared with my atoms.

If Fness is not a part of any of my atoms, then Fness has to be composed of entities distributed across my many atoms, just like my arm. This just follows from the fact that I am composed of atoms, and so every part of me is also composed of those atoms, or parts of them. But, according to Olson, not every property that I have can be composed of parts distributed across my atoms. This is in particular the case if we take Fness to be a shape property, size property, or the property of having a certain atomic structure. Olson's arguments for each of these cases are slightly different, and I will present only the argument in the case when Fness is interpreted as a shape property.

According to Olson, I could share a shape with an object much smaller than myself, and so with an object having far fewer atomic parts than I have. But that means that the smaller object's shape would be composed of fewer atomic-sized parts than my shape is, and so we cannot have the same shape, contrary to the supposition:

> A small plaster figurine could have the same shape [as the thing composed of my atoms]. So could a thing composed of the figurine's atoms. Its shape, like O's [the thing composed of my atoms], would have to be composed of parts of its individual atoms. But its shape would have far fewer parts than O's shape has, or at any rate fewer atom-sized parts. So they could not be the same shape (or qualitatively identical shape tropes). (Olson 2017, 73)

There is a similar problem to Olson's arising for mereological monism. Assume that there are intrinsic properties whose possession does not supervene on the intrinsic properties and the arrangement of the atomic parts of their possessors. Let Fness be a non-supervenient property in this sense and let x be F. Since Fness is non-supervenient, it will be possible for there to be some object y whose atomic parts are intrinsic duplicates of the atomic parts of x and stand in the same spatial and causal relations.[83] For example, imagine that we have two physical duplicates, one of which is a zombie, while the other is a conscious being, and let Fness be the property of being conscious. The conscious duplicate has Fness as a part (by (INST)), while the zombie one lacks it.

[83] This can be represented more formally by saying that the atomic parts of x and y could be brought into a 1-1 correspondence that preserves their intrinsic properties and the spatial and causal relations among them.

Since Fness is a part of the conscious duplicate (and assuming that Fness is not a part of any of its atoms), Fness has to be composed of parts distributed across its atoms. But remember that the conscious and zombie duplicates are both made of atoms that themselves are intrinsic duplicates and are arranged in the same way. Why does only the conscious duplicate have Fness as a part, while the zombie lacks it? This situation is analogous to that which would arise if there was a microphysical duplicate of me, namely an object made of intrinsically the same atoms arranged in the same way, but that does not have an arm as a part. This object would be just like me, except that its atoms occupying the relevant arm-shaped region would not compose an arm. But then we might wonder why this is the case. If me and this entity are microphysical duplicates, how can it be that some of my atoms compose my arm, while his atoms do not?

If the conscious duplicate's property part Fness is made of its atoms' parts, the question arises why the zombie lacks Fness as a part, given that it is made of atomic parts which are intrinsic duplicates of the conscious being's atomic parts. It is no way out simply to accept that some of the parts of the conscious being's atoms compose Fness, while the duplicate parts of the zombie arranged in the same way do not, unless we also accept that whether composition occurs does not depend entirely on the intrinsic properties and arrangements of the objects which are candidates for composing something.[84] And even if extrinsic factors might sometimes be relevant for composition, it is not clear which extrinsic factors would be relevant in the case of our duplicates that differ with respect to consciousness. So, we seem pressed to conclude that Fness is after all not composed of the parts of the conscious being's atoms, which violates the intuition that the conscious thing is entirely made of atoms. This might be a surprising consequence. It seems that those who believe in the possibility of physical duplicates differing only in their consciousness do not have to accept that conscious beings are not made entirely of atoms. The possibility of zombies is sometimes associated with property dualism, the view that at least some mental properties are in an important sense independent or irreducible to physical properties. The possibility of zombies is not taken to imply substance dualism, which is roughly the view that there is more to thinking beings than their atomic parts and whatever is made of such parts.[85] If things have their properties as parts, and if the above reasoning is correct, then it seems that the possibility of zombies also entails something like substance dualism in the above sense that conscious beings are not made entirely of atoms.

[84] For the view that composition depends only on intrinsic factors, see Vander Laan (2010). For a discussion of the opposing view, see Gilmore (2010).
[85] According to Dean Zimmerman: '[Substance dualism is] the doctrine that no human being is an object composed entirely of the kinds of physical stuff that make up rocks and trees and the bodies of animals', see Zimmerman (2005, 491).

3.4.1. Lafrance's way out

One way out of these difficulties has been proposed by J. D. Lafrance. According to him, the problems arising from the acceptance of (INST) and (TRANS) are easily solved if, instead of the binary parthood relation, we accept a relation of parthood that is indexed to regions of space. In other words, instead of accepting 'x is a part of y' as the most perspicuous representation of facts concerning parthood, we should instead accept 'x is a part of y at r' (where r is a region of space exactly occupied by x) as the metaphysically most transparent way of expressing that two things are related as a part and a whole.[86] It is crucial for this position that the fact that x is a part of y at r is irreducibly indexed to the region of space r, and not equivalent to the fact that x is a part of y and that x is exactly located at r. It follows from this that both (INST) and (TRANS) are ill-formed, because they both involve a dyadic relation of parthood. As already said, according to Lafrance, the index of the parthood relation is an exact location of the part. So, for example, if my arm is located at region r, then my arm is a part of me at r.[87]

Still, even if (INST) and (TRANS) are ill-formed, we want some versions of these principles to be true when formulated in terms of spatially indexed parthood. Here is Lafrance's proposal (slightly modified):

(INST1) O instantiates Fness at r if and only if O is located at r and Fness is a part at r of O.

(TRANS1) For any region s and r, if x is part of y at s while y is part of z at r, and if s is one of r's subregions,[88] then x is part of z at s. (Lafrance 2015, 210)

Let us first see how these principles help with the first problem described above. To recall, the first problem arises because, if the categorially unrestricted transitivity of binary parthood is accepted and we accept (INST) above, it follows that the mass of my arm is a part of me, and so that I instantiate both my mass and the mass of my arm, which are incompatible properties. However, we cannot conclude the same from (TRANS1) and (INST1).

[86] See also Hudson (2001).
[87] For alternative ways to relativise parthood to location, and a discussion of whether various relativised notions of parthood satisfy the usual principles of parthood, see Kleinschmidt (2011).
[88] The subregion relation could not be parthood, otherwise we would have a binary parthood relation between regions.

From the fact that my arm's mass is a part of me, we cannot infer that I instantiate my arm's mass. Since my arm's mass is located where my arm is located, it only follows from (TRANS1) that I have my arm's mass relative to the proper subregion of the region where I am located (that is, relative to the region where my arm is located). But from this and (INST1) we cannot conclude that I instantiate my arm's mass.

Could Lafrance's revised principles help with the problem posed by Olson? Before discussing that question, the rest of spatially relativised mereological vocabulary has to be introduced. Recall that the problem arises because, since I am composed of my atoms, each of my property parts will have to overlap at least one of the atoms (this follows from the definition of composition). Olson's problem has been formulated with the binary relation of parthood in mind, but it could be restated with the spatially indexed version as well. Since overlap and composition are defined in terms of parthood, they will also be spatially indexed:

> x overlaps y at r iff there is some z such that z is a part at r of x and z is a part at r of y (Lafrance 2015, 209)

> xs compose[89] y at r iff (1) each of the xs is a part of y at some subregion of r
>
> (2) r is a union of the regions from the set: {r'| for some x which is one of the xs, x is a part at r' of y}
>
> (3) every part of y at some subregion r' of r overlaps at least one of the xs at a subregion of r'

[89] Lafrance does not define 'xs compose y at r' explicitly, but this is how he defines universalism: 'For any *xs*, there is an *f* (the fusion) such that every one of the x*s* is a part of *f* at some region *r* and every part of *f* at some region *s* overlaps at a subregion of that *s* at least one of the *xs*.' (2015, 209). It is not entirely clear to me, though, how to extract from this the definition of 'xs compose y at r'. The above seems to me like a promising attempt.

Strictly speaking, the definition of spatially relativised composition should allow for something to be composed of different objects at different places, just as the temporally relativised notion of parthood allows for something to be composed of different objects at different times. Also, it seems to follow from the above definition that I am composed of the atoms of my hand relative to the region where my hand is located. However, we would like to say that I am composed of my atoms in a way in which I am not composed of the atoms of my hand. How can we say this using the relativised notion of composition if there is a region relative to which I am composed of my hand's atoms and a region relative to which I am composed of all my atoms?

First, we can introduce (partial) functions from regions of space to some objects that jointly occupy those regions. If *f* is one such function, we can say that *f* captures the mereological profile of x iff for every region r for which *f* is defined, x is composed of *f*(r) at r (where 'being composed at r' should be understood along the lines of the above definition). Further, it could be said that the function that captures my mereological profile is defined only for the region I occupy, and not for the region my hand occupies, and that is where the relevant difference lies. Also, an object is multiply located in time if the function that captures its mereological profile is defined for more than one region of space.

Going back to Olson's problem, if I am composed at r (the region where I am exactly located) of some atoms, then every other part of me at a subregion of r overlaps at least one of these atoms at a subregion of that atom's region. Could my mass overlap one of my atoms at a subregion of that atom's region? One way for this to be the case is for my mass to be a part at some region of at least one of my atoms. Previously the problem was that this would entail that I and one of my atoms share a mass. However, if Lafrance is right, my atom could have my mass as a part without being as massive as I am, as long as my mass is not a part of that atom at the region the atom occupies.

While this might seem formally correct, the solution seems somewhat ad hoc. Suppose my mass is a part of at least one of my atoms at the subregion of that atom's region. But which one of my atoms would that be? Since none of my atoms share my mass, it is entirely arbitrary which of them has my mass as a part relative to its subregion. Suppose further that the atom in question gets detached from me. Does it then keep my mass as a part? This seems plausible, given that detachment does not entail losing parts. But then it seems that atoms can have as parts the mass properties of wholes of which they are not parts anymore. We can also ask when the atom in question acquired my mass as a part. Was it before or after it became a part of me? These questions sound almost absurd, so this way of solving Olson's problem obviously will not work. Alternatively, we could say that my mass is composed, at the region it occupies (which is my region as well), of the parts distributed across my atoms. I think this solution can work for mass properties. For example, my mass can be composed at the region where I am located of the masses of my atomic parts. However, this will not work for shape properties, for the same reasons Olson gives.

Even when it comes to solving Lewis's problem, an initial reaction to Lafrance's proposal might be to wonder if the relativisation of parthood is really needed once we are allowed to modify (INST). The crux of Lafrance's proposal is not only the spatially indexed parthood relation, but his alternative account of instantiation as well:

(INST1) O instantiates F at r if and only if O is located at r and F is a part at r of O.

Since ternary parthood is not the only relevant factor according to this solution, we could wonder at this point if the proponents of a binary relation of parthood could also solve the problem by modifying their account of instantiation. For example, why not accept the following principle:

(INST2) O instantiates F iff F is a part of O and F and O are co-located. (this is similar to the view of D. C. Williams presented in section 3.3.1)

This principle only employs binary parthood, and it seems that it can successfully avoid Lewis's problem. For example, even if my arm's mass is a part of me, it does not follow from (INST2) that I instantiate my arm's mass, since my arm's mass and I are not co-located. Is there a reason to prefer (INST1) over (INST2)? One possible reason could be this. Suppose you have many small wooden statuettes and you attach them to each other, so that you have a bigger piece of wood made of many small statuettes. Now suppose also that you attach them to each other in such a way that the resulting piece of wood constitutes a bigger statue. Some people think that the piece of wood and the statue could not be identical because they have different properties. Let's assume this for a moment that this is the case.

Plausibly, if the piece of wood has some small statuette as a part, and if a statuette has the property *being a statue* as a part, then the piece of wood has the property *being a statue* as a part as well. Given that the piece of wood constitutes a bigger statue, it is also plausibly co-located with the property *being a statue* that is a part of the bigger statue it constitutes.[90] If we accept (INST2), it would follow from this that the piece of wood is a statue, which we assumed was impossible, because nothing is both a piece of wood and a statue, given that statues and pieces of wood have different properties.[91] However, (INST1) does not suffer from the same problem. In the above example, the piece of wood has the property *being a statue* as a part only relative to a proper subregion of the region it occupies, and from this and (INST1) we cannot conclude that the piece is a statue. The fact that the piece of wood is also co-located with the property *being a statue* is of no relevance according to (INST2).

Is this a decisive reason in favour of (INST1), as opposed to (INST2)? Many philosophers find the possibility of co-located concrete particulars problematic, and it is not entirely obvious that in the example given, the statuettes are parts of the big piece of wood. Somebody could claim that only pieces of wood which constitute the statuettes are parts of the big piece, but that the same does not

[90] It is not entirely uncontroversial that the big piece of wood has small statues as parts. For example, somebody could think that the piece of wood can only have other pieces of wood as parts, and since no small statue is identical to the piece of wood that constitutes it, no small statue is a part of a piece of wood. It is plausible, however that the statue can have some piece of wood as a part. If this is possible, then by the same reasoning as above, it will follow that the statue has the property *being a piece of wood* as a part.

[91] This is at least the more standard position. Some philosophers, however, think that even though the statue and the piece of wood are numerically distinct, the statue is a piece of wood by way of borrowing that property from the piece of wood that constitutes it, and the piece of wood is a statue by way of borrowing that property from the statue it constitutes. See Baker (1999).

hold for the statuettes themselves. Since in the remainder of the thesis I will discuss if constituent ontologies could accommodate the possibility of co-location, it is worth emphasising that for philosophers who motivate their version of constituent ontology by its capacity to solve issues surrounding co-location, (INST1) has an advantage over (INST2). But this is not the case across the board.

Spatially relativised parthood is not without further problems. If tracking the spatially relativised notion of parthood is hard even when we restrict ourselves only to the concrete parts of ordinary objects, adding universals to the mix makes the picture even more complicated. Some of the problems have already been noted in the literature. For example, as Olson (2002) notes, what prevents some objects from being composed of different sets of entities relative to distinct regions? Why not say that my table and your table are a single object composed of different sets of atoms relative to different regions? Or, even more extremely, what prevents us from saying that I am identical to my laptop? I could be an organism relative to the region where some organism-wise arranged particles compose something, and I could be a laptop relative to the region where some laptop-wise arranged particles also compose something. Or why not take it to the extreme and accept something very close to existence monism,[92] namely the idea that there exists only one composite material object made of distinct sets of simples relative to a distinct region of space?

Of course, those who accept spatially relativised parthood could say that they are in the same boat as those who accept temporally relativised parthood (Hudson 2001). For example, if there is some organism made of cells at t_1, and a laptop made of electronic bits at t_2, why not say that this is the same object, composed of different parts at different times? The reason we do not identify an organism existing at one time with a laptop existing at another is that this would go against the criteria of persistence through time, such as causal and qualitative continuity. Organisms usually do not turn into computers by following a causally/qualitatively/spatio-temporally continuous path through space-time.[93] Could those accepting spatially relativised parthood say something similar? We have a solid grasp of what is required for persistence through time. The table I am sitting at now is the same as the table I sat at yesterday because there is a continuous path (in a relevant sense) through space-time between the table as it was yesterday and the table as it is today. But what could be said of the persistence through space? It is not obvious that our notions of qualitative and causal continuity could be so easily transposed to the spatial case. So, it is not obvious how we can

[92] For a discussion of existence monism see Schaffer (2018).
[93] For a discussion of these criteria for identity through time, see Hirsch (1982).

talk intelligibly about what can be called the 'endurance' of objects through space, which seems to be required by the introduction of spatially relativised parthood.

Lafrance's solution to Lewis's problem is to say that the relation of parthood is spatially indexed. If it is possible for there to be non-spatial complex entities, then we must also accept a binary relation of parthood which is not spatially indexed. Furthermore, Lafrance talks of one region being a subregion of the other. If the relation between a region and its subregions is parthood, then, I presume, it cannot be a spatially relativised notion of parthood. Alternatively, we can take regions to be sets of points that have their subregions as subsets. However, some philosophers have proposed understanding sets as having their subsets as parts, and again it would be surprising if subsets turn out to be spatially relativised parts of their supersets, even is some sets have spatial location. For these reasons, I think that even if we accept Lafrance's spatially indexed relation of parthood, it is doubtful that all the work can be done by that single relation of parthood.

At the end of this chapter, I will suggest the view that there are at least two different relations of parthood, which we could call 'spatial parthood' and 'qualitative parthood', such that concrete particulars have properties as their qualitative parts, while they have other concrete particulars as their spatial parts. This view could be classified as mereological pluralism.

Before elaborating more on the details of this proposal, I want to present an alternative variant of mereological pluralism that is somewhat similar to my proposal. After presenting some problems with this view, I will elaborate more on my suggestion, and show how it avoids some of the problems that have been discussed in this chapter.

3.4.2. Robb's proposal

David Robb has offered what seems to me to be one of the most promising accounts of how the ontological and mereological structure of concrete particulars could be related.[94] Even though he is not entirely explicit about it, his is also a picture according to which there are two parthood relations, one of which is defined in terms of the other. Robb develops his account with the following important constraint in mind:

[94] This terminology may be slightly misleading. If properties are parts of concrete particulars, then, in a sense, the mereological structure of concrete particulars should concern property parts as well. However, I will stick to the common usage that reserves the title 'mereological structure' only for the structure consisting of other concrete particulars.

> Coordination: A principle of qualitative unity should explain how qualitative and substantial unity are systematically related to one another. (Robb 2005, 475)

By the principle of substantial unity, Robb means an answer to the Special Composition Question (SCQ), as discussed by van Inwagen (1990.) The SCQ, according to van Inwagen, is the question of the conditions under which some objects compose a further object, where by 'objects' he means concrete particulars. For example, somebody could think that some objects (xs) compose a further object iff the xs are in contact, or if the xs are such that none of them could move independently of others, or similar. Intuitively, when we ask about the principle of unity for concrete particulars, we are asking about a relation R whose holding among some concrete particulars explains why they compose something.

More generally, whenever there is a sense in which something is made or composed of some other things, we can formulate a question analogous to van Inwagen's SCQ for the kinds of things and mode of composition in question. For example, given that according to the standard bundle theory concrete particulars are made or composed out of properties, we could ask the question under what conditions some properties compose some concrete entity. An answer to this last question, according to Robb, would be the principle of qualitative unity. For example, my table is made of its top and its legs, but it is also made of its properties (according to most bundle theorists). The principle of substantial unity would tell us which relation obtains between the top and the legs in virtue of which they compose the table. On the other hand, the principle of qualitative unity would tell us what the relation is between my table's properties in virtue of which they compose (in the same or different sense) that very table.

What is the idea behind Coordination? Robb is not entirely explicit on this. What might be a 'systematic relation' between the principles of qualitative and substantial unity? I think that Robb has the following idea in mind. Suppose the top and the legs compose my table. Let's say they compose it in virtue of standing in some relation R. My table is also made of properties (in the same or different sense). These properties compose my table in virtue of standing in some relation R'.[95] But it is no coincidence that, when the top and the legs stand in R and so compose my table, they compose something with certain qualities. It follows that it is no coincidence that, when the top and the table stand in R and so compose a table, some properties (presumably intrinsic) also get to be

[95] Let's disregard for the time being that there might not be an informative principle of substantial or qualitative unity. For a defence of the idea that there is no informative principle of substantial unity, see Markosian (1998).

related by R' in virtue of which they compose the same table. The point of Coordination seems to be that we need some explanation for the following: why is it the case that, when some concrete particulars stand in R and so compose some concrete particular, the properties of that particular also stand in R'? Unless we want to allow for the possibility that some concrete particulars might compose something which has no properties, we have to show why there is a systematic connection between the different principles of unity.

Robb tries to show this by formulating the principle of qualitative unity in such a way that it is apparent how the two principles are systematically connected. Robb's strategy is to formulate a principle of qualitative unity in such a way that, no matter which principle of substantial unity is correct, it follows that the satisfaction of both the principle of qualitative unity and the principle of substantial unity is not a coincidence.

With this in mind, here is Robb's principle of qualitative unity:

(CU) For any substantially complex object O [thing with concrete particulars as parts] and properties F and G, F and G are qualitative parts of O iff F and G are both structured on the (exhaustive) substantial parts of O at some mereological level. (Robb 2005, 477)

As already discussed at the beginning of this chapter, possessing a structural property is a matter of having parts with certain qualities related in certain ways. If the possession of a structural property S, for example, is a matter of having a part which is F and a part which is G, and which are related by R, then in the case of any object x which is S, we can say that x's possession of S (for Robb, this is a trope) is *structured* on the set that includes x's F-part and x's G-part related by R. For example, having the property of being a methane molecule consists in having parts of a certain kind, namely one carbon atom and four hydrogen atoms, which are related in a certain way. For any particular methane molecule, its being a methane molecule is structured on the set that includes its carbon and hydrogen atoms. Finally, to say that x's being S is structured on an exhaustive decomposition of x is to say that the objects in the set on which x's being S is structured compose x.

According to Robb, all the properties of substantially complex objects are structural properties (or are dependent on such properties). Robb's principle of qualitative unity tells us that some properties compose some object O iff each of them is structured on some exhaustive decomposition of O

(though not necessarily the same one).[96] For example, if the properties Fness and Gness are my parts, then Fness is a property the possession of which consists in having concrete parts of certain kinds related in certain way, and I have parts of those kinds which are related in that way. It is also the case that Gness is a property whose possession consists in having concrete parts of certain kinds related in certain way, and I also have parts of those kinds which are related in that way.

Does Robb's principle (CU) entail that Coordination is satisfied? Suppose that some atoms compose something because the relation relevant for substantial unity holds among them. Suppose this thing is me. Then, a composite object exists (me) which has the properties F, G, H… Because Fness is a structural property whose possession is a matter of having parts of a certain kind related in a certain way, it follows that when my atoms compose me, something comes into existence whose parts are of the right kind and related in the right way so that the object in question is F. When a carbon atom and some hydrogen atoms are bonded together so that they compose a methane molecule x, it follows automatically that something comes into existence on whose exhaustive decomposition the property (or some trope) *being a methane molecule* is structured. So, when the conditions are satisfied for some atoms to compose a methane molecule, the conditions (laid out in (CU)) are also satisfied for that methane molecule to have the property *being a methane molecule* as a part.

Finally, (CU) seems to entail that Robb has to accept some sort of mereological pluralism. To see why, assume that mereological monism is true. In this case the sense in which concrete objects have properties as parts is the same as the sense in which they have other concrete particulars as parts. Since parthood is transitive, it follows that because my arm is a part of me, and my arm's mass is a part of my arm, I have my arm's mass as a part. But this contradicts the assumption that all the properties that are part of me have to be structured on a complete decomposition of me. My arm's mass is certainly not structured on any complete decomposition of me (rather, it is structured on some complete decomposition of my arm).[97] So (CU) entails mereological pluralism. The most basic

[96] It could be questioned whether (CU) has the right form to be an adequate answer to the composition question for properties, where the right form should be obtained by quantifying away the term O from (CU), see van Inwagen (1990). We could, accordingly, reformulate (CU) to say that properties F, G, H… compose something iff there is a concrete particular such that each of F, G, H… is structured on some exhaustive decomposition of the particular in question. One peculiar consequence of this, however, is that it remains possible for some properties to be structured on the decompositions of one concrete particular, while composing another. As is stands, (CU) seems more like an answer to van Inwagen's general composition question (GCQ). An answer to the GCQ is an attempt to fill in the blanks in the following: some xs compose y iff _____. Unlike an answer to the SCQ, which involves a relation among the xs in virtue of which they compose *something*, an answer to the GCQ will involve a relation that obtains among the xs and y in virtue of which the xs compose y. It is, in effect, an attempt to define a composition in non-mereological terms.

[97] There might be some way to avoid this consequence by giving a more complicated account of when a property is a part of some concrete particular, but that is still in the spirit of Robb's proposal.

sense in which my properties are parts of me is different from the most basic sense in which my cells are parts of me.

I am sympathetic to adopting a mereological pluralism as the best way to develop the idea that ordinary objects have both ontological and mereological structure. In the next section, I will sketch a version of the view according to which the parthood relation relating concrete particulars to other concrete particulars is not the same as the parthood relation relating properties to concrete particulars. Before that, however, I want to give a few critical remarks on Robb's account.

The first problem for Robb is that we need an account of qualitative unity for objects that are not substantially complex. For such objects, we could not say that their properties are united by being structured on their decompositions, because they does not have any (proper) decomposition. Here is how Robb formulates the problem:

> If there are substantially simple objects, however, then a different principle of unity will be needed for them, since simples do not have structural properties. Even if we allow simples to have structural properties in a trivial sense, (CU) cannot serve as an informative principle of qualitative unity for simples. Suppose, that is, we let the properties of a substantial simple S be "structured on" the "parts" of S, namely on S itself, which is, after all, a (non-proper) part of S. Still, for these properties to be structured on S is for them to be properties of S, and so we are back where we started. (CU) is useless for substantial simples. (Robb 2005, 485-486)

Robb's reply is that substantially simple objects are also qualitatively simple, so that the principle of unity for such objects is just identity. The property Fness (or trope, according to Robb) is a part of some substantially simple object only if Fness is identical to that object. Thus, substantially simple objects could only have a single property to which they are identical.[98]

In a way, atomic concrete particulars are just simple properties (so things without proper parts which are concrete particulars are themselves properties) and vice versa. However, this is a speculative hypothesis that seems to be susceptible to refutation by empirical science, or at least not easily reconcilable with science postulating simple objects with more than one property.

[98] Of course, since it seems that everything has to have more than one property, the best way to interpret Robb is as talking of natural properties here. That is, it seems that according to Robb, objects have only natural properties as parts. There are no obvious problems with taking that something has only one natural property as a part.

Take for example electrons, which, if current physics is right, have no other particles as proper parts, and have mass and charge. Some mass and charge are, according to constituent ontology, parts of an electron. However, if an electron is (substantially) mereologically simple, this cannot be the case because they could not be structured on an electron's decomposition into substantial proper parts, as required by (CU), since electrons do not have substantial proper parts. It follows that electrons have to have proper parts on which their mass and charge are structured.

Suppose that atomism is true, namely, that there are objects which are substantially simple (something Robb accepts as well). Since an electron is not substantially atomic (because it has at least two properties that are structured on its substantial proper parts), it has to have atomic proper parts.[99] What are these atomic parts? As said, atomic objects for Robb are just simple (non-structural) properties. It follows from this that charge and mass could not be these further atomic parts of an electron, because charge and mass are the structural properties of an electron. Thus, Robb's theory would entail that science will discover some hitherto unknown non-structural properties (tropes) to be the atomic parts of electrons on which its charge and mass are structured, which hardly seems like a desirable consequence for a philosophical theory.

What Robb might say instead is that science as is could after all be reconciled with his theory. One way to accomplish this is to say that there are no such things as electrons, but two simple objects, one of which only has mass (and no other property) and another which only has charge (and no other property). What we actually have are two simple objects which are just properties, namely mass and charge (and likewise for the other properties of electrons). Because these things always occur together (perhaps as a matter of natural law), we wrongly think that there is a single object with both mass and charge. This still involves a certain re-description of how we usually treat physical particles, though it does not seem obviously incoherent, and it does not entail that physical particles are ultimately made of some unknown non-structural properties. However, the obvious problem with this view is that it entails that there are no electrons, though we might say that there are some mass property and charge property arranged electronwise, in the sense that they occur together so as to create an illusion that there is a single object with both mass and charge.

A further problem becomes apparent if we ask whether the mass and charge in question compose anything. It does not seem entirely plausible that they do not. If it is a law of nature that the mass and charge of 'electrons' always occur together, then it is reasonable to think that they compose a

[99] In the rest of this discussion, by 'atomic objects', I will mean substantially atomic.

further object (perhaps together with some other simple objects/properties). If the relation between that charge and that mass is insufficient for composition, it is hard to see in what other circumstances composition could occur at all. If, on the other hand, those properties compose something, the thing they compose will not have the charge and mass in question because (we assumed) that mass and that charge are simple properties/objects, and so a thing composed of them would be substantially/qualitatively complex. Since substantially complex objects could only have structural properties as parts according to (CU), it follows that an object made of the simple charge and mass of an 'electron' could not have these simple (non-structural) properties. But if a thing composed of the charge and the mass of an electron does not have those properties, it is hard to see which other properties it could have.

The second problem with Robb's proposal is that it does not seem that each of my properties is structured on an exhaustive decomposition of me. Mental properties could be a case in point: they seem to be structured on parts of our nervous system, but not on all the parts in some exhaustive decomposition of us (we are not exhaustively decomposable into our nervous systems, because we could not be composed only of our nervous systems - we need other parts as well). In short, many of my parts and their intrinsic properties seem irrelevant to which mental properties I have. I think Robb tries to address a problem like this in the following passage:

> (CU) does not, by the way, require that unified properties be structured on the same objects at every mereological level. Consider a wooden cube painted green. The cube's greenness and its being made of wood are both qualitative parts of the cube. Yet these properties are not structured on the same objects at a low mereological level, for there are particles in the interior of the cube involved in the cube's being made of wood that aren't involved in the cube's colour, which is restricted to the surface. Nevertheless, these properties are structured on the same objects at higher mereological levels-for example, they are both structured on the left and right halves of the cube - so (CU) correctly counts them as unified. (Robb 2005, 477)

Could we say that, even though I have parts which seem irrelevant for my mental properties (just as Robb's cube has bits which are irrelevant for its colour), such as an atom in my left index finger, my mental properties could be structured on the decomposition of me into my left half and right half, both of which include some parts of me which are relevant for my mental properties? I do not see how this could be the case. In Robb's example, the colours of the cube's halves both seem to be

relevant for the colour of the cube. If we ask why the cube has the colour it has, it seems like a good answer to say what colours its parts have. But it is much less plausible that my pain could somehow be structured on my right half and my left half. In other words, there are no obvious plausible candidates for the properties of my left half and my right half such that I am in pain because my halves have these properties.

Finally, emergent properties seem to be those which are not structural properties. If emergent properties were structural, then the possession of an emergent property would follow from having parts with certain properties, while emergent properties are exactly those whose possession is not explainable merely in terms of the properties of parts. It follows that if there are emergent properties, then nothing could have such a property as a part. This is because it follows from (CU) that if Fness is a part of some concrete particular, then Fness is a structural property structured on a complete decomposition of that particular. Since emergent properties are not structural, (CU) seems to entail that they are not parts of anything.

Robb discusses the problem with emergent properties in footnote 24 of his paper (2005), and, as I understand his response there, he thinks that a case for (CU) is at the same time a case against the existence of such properties. Because (CU) seems like an attractive principle for capturing the relationship between the ontological and mereological structure of material objects, we have some reasons to reject the possibility of emergent properties. A possible direct response Robb suggests[100] could be to amend (CU) by adding that some property Fness is a part of O iff Fness is structured on a decomposition of O, or is at least nomologically (if not in a stronger sense) dependent on the properties structured on a decomposition of O. So, to see which properties I have as parts, we should first look at (i) which properties are structured on one or the other complete decomposition of me, and then see (ii) which properties are dependent on the properties that satisfy (i).

A problem for this reformulation could arise if emergent properties turned out to be those that only nomologically depend on structural properties,[101] with natural laws understood as regularities. In that case, Robb's response could turn out to involve circularity. For example, imagine that my mental properties are emergent and that they are parts of me because they nomologically depend on my non-mental properties, where nomological dependence is a matter of there being a natural

[100] "For any substantially complex object O and properties F and G, F and G are qualitative parts of O iff F and G or their respective grounding properties are structured on the (exhaustive) substantial parts of O at some mereological level." (Robb 2005, 482)

[101] For a further discussion of emergence along these lines, see van Cleve (1990) and Kim (1999). Van Cleve ascribes this picture to early C. D. Broad.

law saying that whatever has a certain non-mental property P, has a certain mental property M. Whether this will involve circularity or not will depend on how we think about laws of nature. According to Humeans, laws are regularities that summarise particular matters of fact. On this picture, it being a law that all Fs are Gs depends (among other things) on the fact that all Ps are Ms. What this last universal generalisation means, according to constituent ontologists, is that everything that has the property P as a part, has M as a part as well. So, what grounds the fact that it is a law that all Ps are Ms is the fact that whatever has P as a part has M as a part. But then it cannot be the case that the law that all Ps are Ms can ground the fact that whatever has P as a part has M as a part. The alternative for Robb would be to accept some more governing conception of laws, according to which particular matters of fact are dependent on laws, and not vice versa. But this is not likely to be a small cost.

These objections are not decisive. It is questionable whether there are emergent properties, and metaphysics can perhaps result in surprising claims concerning what is left for science to discover. However, I think an alternative story could be given of the relationship between the mereological and ontological structures of concrete particulars that avoids these problems, and which also, like Robb's theory, could address some of the issues that were discussed before.

3.5. Two distinct parthood relations

In order to solve some of the problems I have discussed in this chapter, I think bundle theorists should accept that there are two distinct parthood relations, one of which relates properties to concrete particulars. In developing a proposal like this, I follow Robb in thinking that bundle theorists (and constituent ontologists in general) have to account for the systematic connection between the principle of substantial unity, and the principle of qualitative unity. This requirement is rarely explicitly stated in the literature. As we have seen, Robb thinks that the best way to account for the systematic connection is from the perspective of the principle of qualitative unity. His principle of qualitative unity is formulated in such a way that, given any principle of substantial unity, the desired connection is secured.

According to my proposal, there are two distinct relations of parthood: one relating concrete particulars to other concrete particulars, and the other relating properties to concrete particulars.

Let us call the latter relation ‘qualitative parthood’, and the former ‘spatial parthood’. Thus, for example, I have my head and hands as spatial parts, and my mass as a qualitative part. I will define spatial parthood in terms of qualitative parthood. Given my definition, it will follow that as soon the facts concerning which properties make which concrete particulars are fixed, the facts are also fixed that concern which concrete particulars are parts of other concrete particulars, thus securing the systematic connection Robb has in mind.

I want to suggest that qualitative parthood should be taken as a more basic relation than spatial parthood, in the sense that what it is for spatial parthood to hold between two things is partly explained or defined in terms of which qualitative parts they have. That is the sense in which spatial parthood is the less basic of the two relations, if, generally speaking, the defined items are always less basic than the items in terms of which they are defined. However, spatial parthood accords with the use of the predicate ‘is a part of’ better than qualitative parthood does. Most sentences about parthood that the majority of us would readily accept are rendered true according to the interpretation that takes ‘parthood’ to mean spatial parthood, while the same is not the case for qualitative parthood. As a matter of fact, most of these sentences would turn out false if we were to interpret ‘is a part of’ to mean qualitative parthood. I should also mention that my view is not that there is a more general notion of parthood in terms of which spatial and qualitative parthood should be defined. That is, there is no basic, general notion of parthood, such that qualitative and spatial parthood could be defined in terms of. For example, I do not want to say that qualitative parts are just general parts that are properties. Rather, qualitative parthood is a basic relation in terms of which spatial parthood could be defined, in a way to be explained later.

The idea that there is a sense of parthood according to which properties are parts of ordinary objects, and which is distinct from the relation of parthood relating ordinary objects, is often criticised in the literature as mysterious and obscure (Olson 2017, Sider 1995). Here is a representative example by Sider, who is addressing Armstrong’s idea of constituency the following quote:

> Constituency is *not* parthood, although it is presumably a sort of “being in” or “containment”; otherwise universals wouldn’t seem to be “wholly present” in their instances. I find these new doctrines unhelpful, because I find constituency obscure. We are never given a positive account of what constituency amounts to, and until we are, we cannot evaluate whether it would represent superior explanatory power. (Sider 1995, 372)

It is not quite clear what Sider has in mind when he requires a positive account of constituency (I take constituency to be what I refer to as 'qualitative parthood'). What would it mean to give a positive account of *ordinary* parthood? Usually, in explaining what we mean by 'parthood', we point to examples. We might say that parthood is the relation that relates my table top with its legs, or my coffee mug and its handle. After examples are given, we could go on and discuss how the relation which we hopefully singled out behaves in general. We might ask whether it is transitive, reflexive, etc. Furthermore, we could inquire whether there are some more specific principles that the relation in question is obeying which distinguish it from other relations that are also transitive, reflexive, etc (Simons 1987). I think this is what it is to have a positive account of ordinary parthood. But if this is the case, then it seems like Armstrong could offer a positive account of constituency. After all, he points to examples, and attempts to give at least some principles governing constituency (for example, he thinks that the relation does not obey uniqueness, that is, he thinks that two entities with constituents might be distinct despite having the same constituents). Admittedly, the examples we might give of constituency are not ordinary, but then the question is how important this point is, and whether it is sufficient to make the relation of constituency helplessly obscure. I do not know the answer to this question, though it seems to me that if Armstrong is guilty of relying on an obscure notion of constituency (as distinct from ordinary parthood) in his account of the structure of objects, then so is Sider, as I will argue now.

The idea that there are two parthood relations one of which is defined in terms of the other, where the defined relation is actually better suited as an interpretation of our ordinary discourse concerning parthood, is accepted by many relational ontologists. The philosophers I have in mind are temporal parts theorists, most of whom are relational ontologists.[102] Most temporal parts theorists who take ordinary objects to be the sums of their temporal parts think that there is an atemporal relation of parthood and a temporally indexed relation of parthood, where temporally indexed parthood is defined in terms of atemporal parthood.[103] While temporally indexed parthood is defined in terms of atemporal parthood and so is less basic than atemporal parthood, it is obvious that temporally indexed parthood is what we have in mind when we usually talk of objects being parts of each other. Sider himself gave the most detailed story of how the two parthood relations are connected. Here is Sider's principle that connects atemporal parthood with temporally indexed parthood:

[102] With the notable exception of philosophers who combine temporal parts theory and constituent ontology, such as Ehring (2011), O'Leary-Hawthorne and Cover (1998), and Casullo (1988).
[103] Hawley (2001) takes the acceptance of atemporal parthood to be a defining characteristic of the view that things persist by having different temporal parts at different moments.

> x is part of y at [a time] t iff x and y each exist at t, and x's instantaneous temporal part at t[104] is part of y's instantaneous temporal part at t. (Sider 2001, 57)

Sider defines what it is to be an instantaneous temporal part of something in the following way:

> x is an instantaneous temporal part of y at instant t $=_{df}$ (1) x exists at, but only at, t; (2) x is part of y at t; and (3) x overlaps at t everything that is part of y at t. (ibid. 59)

This is how what it is to be a temporal part of something is defined in terms of atemporal parthood.

Temporal parts theorists say that, for example, some fingernail end is a part of me at t if and only if the temporal part of my fingernail end at t is a (atemporal) part of my temporal part at t. But the fingernail end in question is not a part of me atemporally. In order to say what they mean by atemporal parthood, temporal part theorists have to resort to temporally indexed parthood. Thus, what they mean when they say things like that the fingernail end is an atemporal part of me is what we would describe by saying that a fingernail end is a temporally indexed part of me at each moment at which it exists. However, this is obviously not the case, since at no time after I clip the fingernail end will it be a temporally indexed part of me despite existing at some of those times. For another example, consider some car and one of its wheels. The wheel is not an atemporal part of the car because, plausibly, the wheel came into existence before the car was assembled, and so there are times at which the wheel exists at which it is not a temporally indexed part of the car. But we say that wheels are parts of cars, and that fingernail ends are parts of us. Thus, we are saying the truth here only if we are interpreted as having temporally indexed parthood in mind.

Sider says that atemporal parthood is the more basic relation of the two, which is not what we usually have in mind when we talk about thing being parts of each other:

> The everyday notion of parthood is temporary, rather than atemporal: the fingernail end is part of me now. This is not to say that there is something wrong with the atemporal notion of parthood. A four-dimensionalist can take it as basic, and then use it to define the temporary notion… (ibid. 56)

[104] Here 'at t' indicates the location of x's temporal part in time.

But if Sider thinks that the notion of atemporal parthood is not problematic, then it is puzzling why he thinks that the notion of constituency, or what I would call 'qualitative parthood', is problematic or mysterious. I cannot see much of a relevant difference between the two that would explain why only one of them is mysterious, while the other is not. Atemporal parthood, just like qualitative parthood, is not our ordinary notion of parthood. Yet, it is thought of as a basic relation in terms of which our ordinary notion of parthood is defined. The same is true, as I will argue, of qualitative parthood. It can be taken as a basic relation in terms of which the ordinary notion of parthood could be defined.

Going back to qualitative and spatial parthood, we might ask, how are the two parthood relations connected? As I have said, I think that bundle theorists should take properties to be qualitative parts of concrete particulars, and they should take concrete particulars to be spatial parts of other concrete particulars.[105] I think bundle theorists should take as their starting point the claim that concrete particulars are made of all and only the intrinsic and non-relational properties they instantiate (in the sense of having these properties as qualitative parts). Even though this might seem like an obvious starting point for any bundle theory deserving that name, some recent bundle theories do not accept this. For example, according to the recently developed essential bundle theory (to be discussed later), the best option for bundle theorists is to take concrete particulars to be bundles of only their essential properties. Also, according to Lafrance (2015), I have as parts (although spatially indexed) some properties that I do not instantiate, for example properties that are parts of my arm. Furthermore, bundle theorists usually think that things only have their determinate properties as parts or constituents (Armstrong 1997). Thus, they accept something like a sparse conception of properties.[106] I will assume this, although my proposal could be modified to agree with thinking that properties come in abundance.

Take that objects or concrete particulars are made of all and only their intrinsic non-relational properties. Assume further that we have a principle of qualitative unity at our disposal, and that this principle accords with the basic idea of bundle theory, namely, that things have all and only their non-relational intrinsic properties as qualitative parts. How should we define spatial parthood given this starting point? Let us assume that I am made of my properties, say Aness, Bness, Cness… in the sense of having them as qualitative parts. My arm is made, in the same sense, of Fness, Gness,

[105] By calling this parthood relation spatial, I just mean that concrete particulars are usually spatially smaller from other concrete particulars of which they are parts. I do not want to suggest that the relation of spatial parthood is not temporally indexed.

[106] Sparse in Jonathan Schaffer's sense, according to which there are sparse properties at every level of mereological complexity of ordinary objects. See Schaffer (2004).

Hness… In the next couple of paragraphs, by 'property' I will mean an intrinsic non-relational property.

I think we could say that my arm is a spatial part of me in the sense that, for each property X that is one of F, G, H… (and so is a qualitative part of my arm), there is at least one property Y which is one of A, B, C (and so is a qualitative part of me) such that the instantiation of Y at least partly depends on the instantiation of X. By the instantiation of a property, I mean either a trope, or the presence of a universal at a region of space. For example, for each property of my arm, there is an intrinsic non-relational property of me whose instantiation depends on the instantiations of my arm's property in question. Take for example the mass of my arm. The instantiation of my mass depends partially on the instantiation of my arm's mass. In general, it seems true that for almost any property, say Fness, of my arm, there is some property of me, Gness, such that the instantiation of Gness by me depends partly on the instantiation of Fness by my arm. However, my account does not involve the reverse being required in order for my arm to be a spatial part of me. In other words, the account does not depend on it being true that for every property Gness of mine, there is a property Fness of my arm on whose instantiation the instantiation of Gness (partially) depends. In short, in order for my arm to be a spatial part of me, every property that is a qualitative part of my arm should play a role in grounding one or another of my properties, but it is not necessary that every property which is a qualitative part of me depend (even partially) on some property of my arm.

Here, then, is a sketch of the proposed idea of defining spatial parthood in terms of qualitative parthood, with the variables x and y ranging over concrete particulars, and z and z' ranging over properties:

> x is a spatial part of y $=_{df}$ for every z which is a qualitative part of x, there is some z' which is a qualitative part of y such that the instantiation of z' is partly grounded in the instantiation of z.

For example, the colour of my table seems to be partly grounded in the colour of one of its legs. If we accept the existence of tropes, this means that the existence of the colour trope of my table's leg partly grounds the existence of the colour trope which is a part of my table. On the other hand, if we believe in universals, then we can say that the presence of the specific colour universal where my table's leg is partly grounds the presence of the specific colour universal where my table is. Given that spatial parthood is defined partly in terms of qualitative parthood, it seems that spatial

parthood is less natural than qualitative parthood, or at least this is so if the defined items are always less natural than the items in terms of which they are defined. So, to sum up, qualitative parthood relates properties to concrete particulars. Spatial parthood between concrete particulars, on the other hand, is just a matter of the grounding relations between their qualitative parts. I want to emphasise that according to this picture, grounding relations between qualitative parts do not merely give conditions under which one object is a spatial part of another. Rather, the fact that x is a spatial part of y just is the fact that each qualitative part of x is a partial ground for some qualitative part of y. Once the distribution of properties across space-time is given, together with the facts concerning which properties qualitatively compose which concrete particulars, the grounding relations between these properties fixes which particulars are the spatial parts of which other particulars. Thus, there is a systematic connection between facts concerning spatial parts and facts concerning qualitative parts. Also, because this proposal allows some of my properties not to be grounded in the properties of my spatial parts, it can accommodate the possibility of emergent properties.

When we look at the ordinary use of the predicate 'being a part of', the central cases of its application are those where we say that one concrete particular is a part of another. In that sense, interpreting 'parthood' as meaning spatial parthood accords with ordinary use much better than interpreting it as meaning qualitative parthood. Only a minority of language users would recognise utterances of sentences like 'whiteness is a part of my table' as important, much less central, when it comes to the interpretation of ordinary utterances concerning parthood. However, it is nevertheless the case that qualitative parthood should be taken as the basic relation of the two. This is a version of mereological pluralism in that it involves two parthood relations, one of which is defined in terms of the other, though not two basic parthood relations as it is sometimes required for the view to be classified as mereological pluralism. (McDaniel 2014, Fine 2010)

Let us go back to what Lafrance called Lewis's problem. The problem arises if we assume the following two things:

(INST) Concrete particular A instantiates property Fness iff Fness is a part of A.

(TRANS) If a is a part of b, and b is a part of c, then a is a part of c.

Given that my arm's mass is a part of my arm and my arm is a part of me, it follows, by (TRANS), that my arm's mass is a part of me, and so it follows that I instantiate my arm's mass. More precisely:

(1) My arm's mass, M, is a part of my arm.
(2) My arm is a part of me.
(3) M is a part of me (from (1) and (2) by (TRANS)).
(4) I instantiate M (from (3) by (INST)).

This problem does not arise if we accept mereological pluralism. (3) follows from (1) and (2) only if the same relation of parthood figures in each of the premises (1) and (2). However, parthood in (1) is qualitative parthood, while parthood in (2) is spatial parthood. No matter whether we read parthood in (TRANS) as either spatial or qualitative parthood, it will not follow from (1) and (2) on their true reading that M is a qualitative part of me.

It can also be seen how the ordinary mereological structure of ordinary objects (which spatial parts they have) depends partly on their ontological structure (which qualitative parts they have). While, according to the current proposal, we cannot derive my mereological structure from my ontological structure, my mereological structure still depends partly on my ontological structure because it is a matter of how my ontological structure is grounding-related to the ontological structure of other concrete particulars.

We can also tackle the problem of the overdetermination of character by accepting these two parthood relations. The problem was that if concrete particulars have other concrete particulars as parts, then that seems sufficient for having character. For example, if my table has white parts, then why does it need whiteness as a part in order to be white? Having white parts should be sufficient. I suggested that constituent ontologists should take that having white concrete parts and having whiteness as a part are not independent facts, and so that the overdetermination in question is similar to the benign form of causal overdetermination by more distant and proximal causes. According to the above account, my table has the concrete parts it has partly as a matter of having certain properties as qualitative parts, and so we have no problematic form of overdetermination of character by way of two independent sets of facts about my table.

In this chapter I have discussed some general issues pertaining to constituent ontologies. However, no reasons have yet been given for why we should believe properties to be part of ordinary objects.

In the next chapter I will discuss what seems to me to be one of the strongest arguments for accepting constituent ontology, namely, the argument that constituent ontology is the best strategy for solving problems of material coincidence.

4. Constituent ontologies and material coincidence

In the thesis so far, I have discussed some general questions concerning the development of constituent ontology, in particular bundle theory. The recent literature on the topic does not lack in interesting and creative proposals as to how exactly ordinary objects should be constructed out of their properties. I also suggested another way in which we can think of the connection between mereological and ontological structure, which seems to me like a potentially promising route for bundle theorists to take. However, I have still not discussed any reasons for why we should accept bundle theory in the first place. In this chapter I will focus on what seems to be the most promising recent argument for the bundle theory, namely that it helps us tackle some traditional problems related to material coincidence.

A seeming common-sense platitude is that two material objects cannot occupy the same place at the same time.[107] Of course, I occupy the same place where my arm is, so it might seem that counterexamples to this platitude abound. However, my arm is a part of me, and I occupy the region where my arm is by having a part - my arm - located at that region. What is meant by the above platitude, however, is that no two material objects could wholly or exactly occupy the same region at the same time.

This popular opinion, however, can be shaken when philosophers present us with the many and varied cases in which we apparently have two or more material objects wholly occupying the same place at the same time. Suppose an artist makes a human-shaped statue[108] on Monday out of some quantity of clay she bought a few days before. The statue did not exist before Monday. We usually say that artists, and sculptors in particulars, bring things into existence by moulding various sorts of material into specific shapes. It would sound a bit strange to say, for example, that Michelangelo, in sculpting David, merely gave shape to some bit of material instead of creating something new. But if the artist from our example made something new on Monday out of the clay she bought a few days before, then the clay of which the statue is made is different from the statue itself. The obvious reason for this, of course, is that the clay existed before the statue was brought into existence, and nothing could predate its own coming into existence. It might even be the case that the clay of which the statue is made was in some other statue or artefact hundreds of years ago. In general, if we think that expressions like ‘the clay of which the statue is made’, or ‘the wood of which my table

[107] For a discussion of these seeming platitudes, see Sattig (2010; 2012).
[108] In the rest of the chapter, when I talk of a ‘statue’ I will have in mind some human-shaped statue.

is made' are genuinely singular terms that refer to material objects, then cases of exact spatial coincidence of material objects will not be hard to find (Zimmerman 1995; 1997). My table and the wood of which it is made would be spatially coincident material objects, yet they would be numerically different objects. The wood in my table obviously existed before the table was made of it. And even if the cellular tissue of which I am made does not predate me, I am made of different masses of tissue at different times, and so I do not seem to be identical to any such mass.

We might doubt that expressions containing mass nouns, such as 'the wood my table is made of', are semantically singular terms that refer to material objects. For example, somebody might think that 'the wood my table is made of' is a term that refers plurally to atomic bits of matter located where my table is. However, other apparent examples of coinciding objects are not hard to find. Thus, even if 'the wood my table is made of' is semantically plural, and so does not refer to a physical object that coincides with my table, the term 'the lump of wood in my table' seems like it is both syntactically and semantically singular (Fine 2003). Returning to the example of the statue, while the clay in the statue, if there is such a thing, can survive even in a scattered state, it is usually thought that a lump of clay has to retain a degree of 'physical coherence'[109] to remain in existence.

Now, the lump of clay and the statue also coincide spatially and are apparently numerically distinct. The artist bought the lump before creating the statue (from which it follows that they are numerically distinct), and the lump seems to have survived being moulded into the statue (and so it is likely that they spatially coincide after the statue is made, assuming the artist did not remove any bits of clay from the original lump she bought).

The difference between lumps of clay (which cannot be scattered) and things that are referents of expressions like 'the clay in the statue'[110] is relevant for another reason. If there are such things as lumps of clay, then it is possible to find apparent examples of numerically distinct objects that spatially coincide at every moment at which at least one of them exists. Suppose our artist makes the statue by making the part of the body above the waist first, making the part below later, and then merging the two parts together into a statue. The statue, it appears, comes into existence at the time of merging, and so does the lump of clay, which could not exist previously in a scattered state. Suppose further that both the statue and the lump of clay are later destroyed at the same time. It follows that they spatially coincide throughout their entire existence (Gibbard 1975). In this

[109] This expression is from a quote attributed to Kathleen Cook found in Zimmerman (1995, 57).
[110] The general term for such entities is sometimes taken to be 'mass', thus what 'the clay in the statue' refers to is a mass of clay, as opposed to a lump of clay.

case, while there is no time at which the lump exists without coinciding with the statue (and vice versa), it seems that the numerical distinctness between them can be established on the basis of qualitative differences which are not historical. First, the statue and the lump seem to differ in kind. The statue is a statue and not a lump, while the lump is a lump and not a statue. Furthermore, there apparently are modal differences between them. The statue cannot survive ceasing to be statue-shaped, while the lump can. The statue could also survive losing some of the bits of clay it has as parts, while the lump cannot survive this (Thomson 1998).

Some philosophers who accept the possibility of numerically distinct coinciding material objects also think these could differ in other respects, besides modal and historical. For example, some philosophers accept that persons are material objects numerically distinct from the bodies with which they spatially coincide. As a matter of fact, some philosophers who accept the possibility of material coincidence are motivated in this by the thought that human persons are entities that materially coincide with organisms, but are not identical to organisms.[111] Yet, philosophers who hold such views usually accept that there is a sense in which only persons are able to think, while the animals or bodies with which they coincide are not. On the other hand, they also think that there is a sense in which only an animal is alive, while the coinciding person is not. These qualitative differences between the person and its body do not amount to modal or historical difference in any obvious sense.

For another example, take a banknote and the piece of paper of which it is made. It is sometimes said that only the banknote could be said to have some monetary value, while the piece of paper does not (Baker 2000). Also, only the statue can be a subject of aesthetic appreciation, while the lump of clay of which it is made cannot.

To sum up, philosophers who accept the possibility of numerically distinct coincident material objects think that these could differ in all sorts of qualitative respects. These include modal and historical differences, differences in kind, as well as differences in properties such as thinking and being alive.

[111] See Baker (2000). For further discussion, see Olson (2001).

4.1. The grounding problem

In all the examples discussed above, the coinciding objects do not merely coincide spatially. They are also made of the same small parts while coinciding spatially. I will say that two objects *materially coincide* at t iff they share a decomposition at t. Two objects share a decomposition at t iff for some set of objects S, each is composed at t of the members of S. In the discussion that follows I will use the fairly standard definition of composition, according to which members of set S compose y iff each member of S is a part of y, and every part of y shares a part with at least one member of S.

We can also introduce a stronger relation than material coincidence. Let us say that two objects *completely coincide* iff whatever is a part of one is a part of another. Thus, the statue and the clay completely coincide iff every part of one is a part of the other.[112] Material coincidence, as I have defined it, does not entail complete coincidence. For example, the statue and the lump of clay could be made of the same atoms, however, only the statue may have an arm as a part, without the lump having it.

Everybody who accepts that there could be spatially and materially coinciding (in the rest of the chapter I will say just 'coinciding') objects is faced with the following problem. Given that the statue and the lump of clay of which it is made materially coincide, and so are composed of the same bits of matter, how could they differ with respect to their modal and kind properties (and possibly some other qualitative properties)? Many philosophers have found this to be one of the most pressing objections against the possibility of materially coinciding objects. It is familiarly known as the grounding problem.[113] Zimmerman expressed this concern in a particularly effective way:

> …if both my body and this mass of cells are physical objects that, though momentarily coincident and indiscernible, differ in their persistence conditions, then there are two objects exactly alike in every empirically discriminable intrinsic respect one of which has the stamina to withstand pressures and survive changes that the other cannot. Should not two physical objects constructed in precisely the same way out of qualitatively identical parts have the same capacities for survival under similar conditions? (Zimmerman 1995, 87)

[112] For a philosopher who accepts the possibility of completely coinciding material objects, see Thomson (1998). Of course, if we accept completely coinciding material objects, then parthood cannot be an anti-symmetric relation, otherwise no two distinct objects could be parts of each other, which is required by complete coincidence. For a discussion of mereology without the anti-symmetry of parthood, see Donnelly (2011).

[113] See for example Sosa (1987), Burke (1992), Johnston (1992), Olson (2001), Wasserman (2002) and Bennett (2004).

Take again the statue and the lump that coincide permanently. Both the statue and the lump are made of the same atoms. Each exists only when the other exists, and at every time each of them exists, they coincide. Furthermore, they stand in the same spatial and causal relations to their surroundings. This raises the question of how they could then differ in their modal and kind (sortal) properties.

The existence of some other differences between them that are mentioned in the literature is equally striking. If I am not identical with the organism which is located where I am, and only I think,[114] then how is it possible for me and the organism to be composed of the same parts? Furthermore, me and the organism with which I coincide are physically indistinguishable, yet we differ mentally. However, this implies that mental properties do not even weakly supervene on physical properties.[115] Of course, that we are composed of the same set of parts (say, set of atoms) does not entail that we share all of our parts. Perhaps it is only me that has a brain as a part, while the organism does not, and so it is only me that thinks of the two. However, an obvious response is to say that if anything has a brain in this situation, then it has to be the organism.

The guiding intuition behind the grounding objection is that an object's modal and sortal properties (as well as its mental properties) have to be determined by the properties and relations holding among the parts of which it is made, as well as by the relation of its parts to their surroundings.[116] It follows from this that if two things coincide and thus share a decomposition, they could not be discernible with respect to their modal and sortal properties.

Of course, we might attempt to explain modal differences between coinciding objects in terms of their sortal differences, or vice versa.[117] For example, it could be said that the lump can survive ceasing to be statue-shaped because it is a lump, while the statue cannot survive this because it is a statue. Furthermore, it could be said that I think while the organism with which I coincide does not because only I am a person out of the two.[118] However, while modal and mental differences could

[114] This is a widely held view in the literature, see for example Olson (2018).
[115] Mental properties weakly supervene on physical properties if there is no pair of entities in the same world that differ in some mental respect without differing in some physical respect. For the notion of weak supervenience, see Kim (1984).
[116] Somebody might point to the case of zombies, which are supposed to be our microphysical duplicates that nevertheless lack our mental life, as a counterexample to the above idea. However, it should be kept in mind that for the grounding objection to work, it is sufficient that objects' microstructure determines their modal/sortal/mental properties in a world, even if there could be microphysical duplicates existing in the qualitatively same surroundings but in numerically distinct possible world that differs in some of the above respects.
[117] This following point has often been discussed in the literature. See for example Zimmerman (1995), Olson (2001), Bennett (2004) and Fine (2008).
[118] This would of course require saying that I think because I am a person, while the standard Lockean view is that persons are persons because they think, in which case the latter could not explain the former.

perhaps be explained in terms of sortal differences, that would still leave sortal differences unexplained.

It should be noted that the grounding problem could also be formulated in terms of an appropriate notion of supervenience. For example, it could be said that the grounding problem arises because the modal and sortal properties of an object seem to weakly supervene on its microstructure and its surroundings. What is meant by this is that any two mereologically complex objects that have the same microstructure (are made of qualitatively indiscernible parts standing in the same relations) and are in the same surroundings have to be indistinguishable with respect to their modal and sortal properties.[119] However, this does not mean that the problem could be solved by formulating an alternative notion of supervenience that is compatible with microphysical duplicates in the same surroundings differing modally.[120] That there are notions of supervenience which are compatible with the existence of coincident objects which differ modally does not mean that there is a sense in which modal properties are determined by microstructure. Rather, this only means that some notions of supervenience are compatible with the absence of determination between the subvening and supervening properties.[121]

For example, Rea and Sider have introduced non-standard concepts of supervenience according to which things that are indistinguishable with respect to their microstructure and surroundings are also indistinguishable with respect to the property *being a statue or coinciding with a statue*. The existence of the coincident lump of clay and the statue does not violate this version of supervenience because even though the lump of clay and the statue are microphysically indistinguishable and are in the same surroundings, they both have the property *being a statue or coinciding with a statue*. However, this only means that the property *being a statue or coinciding with a statue* is determined by the microstructure and surroundings, but not also that *being a statue* and *being a lump* are so determined.[122]

[119] For the notion of weak supervenience, see Kim (1984).
[120] For such proposals, see Rea (1997) and Sider (1999).
[121] This is a familiar point made by many authors. For a detailed discussion, deRosset (2011).
[122] For a more detailed discussion of these matters, see Olson (2001).

4.2. Eliminative bundle theory

One of the non-standard versions of bundle theory is the eliminative bundle theory (EBT).[123] According to EBT, there are strictly speaking no concrete particulars like tables and chairs, but only universals variously related to each other. EBT theorists (call them 'eliminativists') think that most or all of our statements which are ostensibly about concrete particulars could be translated into statements solely about properties. The talk of translation here does not mean that in translating our talk about concrete particulars into talk about properties, we preserve the meaning of our statements concerning particulars. Rather, the translation of the statement about concrete particulars represents, in the most transparent way, how the world really has to be if the statement in question is true or at least could be asserted in ordinary contexts. For example, when we, in an everyday context, say that there exists a white wooden table, eliminativists think that what makes our assertion in some sense correct is that the whiteness and woodenness are compresent or coinstantiated. Of course, in explaining what they mean by compresence or coinstantiation, eliminativists have to resort to reference to concrete particulars. For example, they have to say that Fness and Gness are compresent in situations that we would usually describe as containing a concrete particular which is F and G.[124] Is this reference problematic, given that eliminativists do not think there are concrete particulars? According to Sider and Hawthorne, it is not:

> Since there is no other way to teach the notion of compresence, compresence "presupposes" particulars. This objection is misguided. At best it establishes a *conceptual* priority of thing-talk, whereas the issue is ontological. Even if thought is, in the first instance, of things, the world may yet at bottom contain nothing but universals. (Hawthorne & Sider 2002, 56)

So, according to Hawthorne and Sider, in order to learn predicates like 'being compresent' or 'being coinstantiated' as they apply to properties, we need to resort to reference to concrete particulars. According to their argument, this only establishes a conceptual priority of talk of concrete particulars, and so is consistent with strictly speaking eliminating such entities from one's ontology.

[123] EBT has been discussed in van Cleve (1985) and Hawthorne & Sider (2002).

[124] Some other philosophers who eliminate familiar objects from their ontology, but want to in some sense vindicate our talk of such objects, are in a similar predicament. For example, van Inwagen and Merricks do not believe in non-living things like tables and chairs. Yet, they offer paraphrases of our talk of tables in terms of atoms arranged table-wise. However, it is plausible to think that in order to explain what they mean by 'being arranged table-wise' there is no way to avoid mentioning tables. See van Inwagen (1990) and Merricks (2001).

EBT is not a constituent ontology. Recall that, according to constituent ontologists, concrete particulars and properties are members of different fundamental ontological categories, and properties are parts of concrete particulars or something analogous to parts. In that sense, constituent ontologies are polycategorial. EBT, however, is a paradigmatically monocategorial ontology because it countenances the existence of universals only. While the main topic of this chapter are bundle theories of the constituent variety, and in particular the question of whether such ontologies can help us make more sense of material coincidence, non-constituent EBT is worth exploring because it is still a version of bundle theory whose main variants *are* constituent ontologies, and also because EBT has been recently developed by Markku Keinänen and Tuomas Tahko (2019) with the problems of material coincidence in mind.

The first author to propose EBT, as far as I am aware, was James van Cleve. According to van Cleve, while it is true to say that there are tables and chairs, this is true not because there really are such things, but because sentences ostensibly about tables and chairs can be systematically translated into sentences exclusively about properties. According to van Cleve:

> This version [of bundle theory] would decline to identify individuals with complexes of properties, offering instead to translate any statement ostensibly about individuals into a statement exclusively about properties. For example, it might translate 'There is a red, round thing here' as 'Redness and roundness are here co-instantiated'. (van Cleve 1985, 103)

For example, the statement that there is something which is F and G is translated, according to van Cleve, into the sentence '!(F,G)', which reads as 'Fness and Gness are co-instantiated'. The situation that we would describe as containing two objects both of which are F and G, is described, in van Cleve's vocabulary, as '!!(F,G)', which reads as something like 'Fness and Gness are co-instantiated at least twice'. It is immediately obvious that the proposal in question involves many primitive instantiation predicates. Because there should be no limit in principle to the number of compossible indiscernible objects, for each number n, there will have to be a predicate that says that some combination of properties has been co-instantiated at least n times.

Another problem that Hawthorne and Sider notice with proposals like van Cleve's (and their own as well, which is somewhat more elaborated than van Cleve's and includes relations, but is similar in spirit) is that it seems to involve an objectionable form of holism. According to them, holism is 'a failure of complex truths [about some properties and relations] to reduce to simpler truths [about

the same properties and relations]' (Hawthorne & Sider 2002, 63). By 'complex truths', I take these authors to mean truths that concern (in some intuitive sense) a higher number of concrete particulars, or translations of such truths. Here is Hawthorne and Sider's most explicit statement of what holism involves:

> The objectionable holism implied by the modified bundle theory is that *no matter what the basic properties and relations are, truths about what intuitively count as complex systems involving just those properties and relations do not supervene on simple statements about those properties and relations.* (ibid.)

According to van Cleve's proposal, complex truths about the co-instantiation of some properties do not supervene on simple truths about the co-instantiation of the same properties. Take for example two systems, one of which involves four concrete particulars (as we would usually say), each of which is F and G, while the other involves three concrete particulars each of which is F and G. The system with four concrete particulars is more complex than the system with three concrete particulars, but they involve the same properties, namely Fness and Gness. For those who accept concrete particulars, the truth that there are at least four concrete particulars each of which is F and G will supervene on simple truths, such as that a is F and G, that b is F and G, that a is not identical to b, etc. However, the supervenience is not preserved at the level of van Cleve's translation.

Take first the system that apparently involves three concrete particulars which are F and G. What is true of this system according to van Cleve's EBT is the following: !(F,G), !!(F,G), !!!(F,G). In other words, in this system, Fness and Gness are co-instantiated (once), co-instantiated twice and co-instantiated thrice. Take now the system that apparently involves four concrete particulars which are F and G. What is true of it according to EBT is the following: !(F), !!(F), !!!(F) and !!!!(F). So, our two systems are indistinguishable when it comes to simpler truths (those involving up the three exclamation marks) concerning the properties Fness and Gness. However, they differ when it comes to more complex truths involving the same properties, like !!!!(F). Thus, complex truths involving Fness and Gness do not supervene on simple truths involving Fness and Gness, which amounts to holism as defined by Hawthorne and Sider. The holism is problematic because we would expect truths about systems of entities to supervene on truths concerning parts of the system.[125]

[125] It is arguable that every theory will perhaps have to involve some sort of holism, if it attempts to describe reality completely. For example, in order to give a full description of what exists, it seems that it will not be sufficient to mention every existing thing. What is needed in addition to this is the claim that the mentioned things are all the things that exist. This is a familiar Russellian point, see Armstrong (1997). This sort of holism seems more limited than the one Hawthorne and Sider argue arises from EBT.

In the next section, I will discuss a novel variant of EBT. The variant I have in mind is relevant in the context of the current chapter because it is explicitly developed to enable us to translate ordinary sentences that are ostensibly about materially coinciding objects into statements about universals. In that way, it can perhaps help us preserve the appearance of materially coinciding objects, while relieving the pressure to solve notorious problems concerning such coincidence, such as the grounding problem. However, I will argue that the theory is unsatisfactory, because the translations of some of the ordinary statements it provides are intuitively incorrect, and also because it is subject to the issues affecting previous versions of EBT.

4.2.1. New eliminative bundle theory

EBT has been given a new life recently by Markku Keinänen and Tuomas Tahko. What distinguishes their theory is the role that kind universals play within it. The eliminativist flavour of Keinänen and Tahko's bundle theory is obvious from the following:

> … we deny the existence of objects even as entities constituted by or dependent on universals. There are only *mere pluralities* of property universals taking some of the roles standardly assigned to objects.[126] (Keinänen & Tahko 2019, 839)

Though they are not quite specific about the role of ordinary objects that universals are supposed to play in their theory, it seems to me that what they have in mind is a role where objects like tables and organisms are taken to be in the domain over which our standard singular quantifiers range. In effect, according to Keinänen and Tahko, singular quantification over objects should give way to plural quantification over properties.

Assume that for every sentence that involves singular reference to or quantification over ordinary objects, there is a corresponding sentence involving only plural reference and plural quantification over the properties of such objects. Let us call the latter sentences 'plural counterparts' of the former. It is not clear whether Keinänen and Tahko want to say that sentences about ordinary objects are strictly speaking false, but still appropriately asserted in cases where their plural

[126] When Keinänen and Tahko talk of mere pluralities of properties, they of course are not saying that there is an entity which is a plurality of properties.

counterparts are strictly speaking true. Alternatively, they could accept that such sentences are true, but that their truthmakers are perspicuously expressed by their plural counterparts.[127] In any case, Keinänen and Tahko claim that they can make (perhaps in one of the two ways above) sense of our talk about objects such as tables and chairs, even if their theory strictly speaking eliminates such objects. In particular, they claim that even though there are no co-located statues and lumps of clay (because there are no statues nor lumps), their proposed theory can somehow capture the strict truth behind such apparent possibilities. This is why their theory seems like a potentially attractive (though a bit radical) approach to the grounding problem.

Following Lowe, Keinänen and Tahko make a fundamental distinction between two types of universals, namely property/relation universals and kind universals (Lowe 2006). This is the central part of their theory and is crucial for understanding of our ordinary talk which is ostensibly about coinciding concrete particulars. Property universals are just universals like redness or roundness, while kind universals are universals like doghood or tablehood. The intuitive difference between these is usually drawn by saying that kind universals tell us *what objects are*, while property universals tell us *what they are like*. Of course, the distinction between kinds and properties is somewhat technical. Ordinarily, we would also call universals like tablehood or doghood properties.

Keinänen and Tahko oscillate between treating their theory as a two-category ontology (because of the two distinct types of universals they admit) and treating it as a one-category ontology at the same time (they say of two types of universals that they 'may be understood as subcategories of one fundamental category of universals' (2019, 839)). According to their view, pluralities of property universals (which they call 'caboodles', and which are substitutes for eliminated concrete particulars) instantiate kind universals, where instantiation is a formal[128] relation relating universals from distinct categories:

> Since we introduce two fundamental categories of universals, we consider instantiation as the formal ontological relation between the two fundamental categories of universals that the proposed ontology includes. (Keinänen & Tahko 2019, 840-841)

[127] For this view, see for example Cameron (2008) and Heil (2003). For a criticism, see Schaffer (2008).

[128] In calling instantiation 'formal', Keinänen and Tahko follow Lowe (2006, ch. 3). It is not entirely clear what they mean by 'formal' relations, or more neutrally, formal predicates. It seems to be necessary for a predicate to be formal that there is no relation it expresses. For example, part of Lowe's reason for why the instantiation predicate is formal is that if there were an entity expressed by it, it could not belong to any of the fundamental ontological categories in his system of categories. However, it is not obvious that this is sufficient for a predicate to be formal. For example, even if there were no property expressed by the predicate 'being red or round', we would not say that that predicate is formal. At some places (ibid, 196), Lowe seems to suggest that formal predicates are those of which we know a priori that they do not express properties. I am not entirely sure, though, if this is sufficient.

Talk of a plurality of property universals instantiating a kind universal should not be understood to imply that there is any single entity that instantiates some kind universal. Property universals instantiate kinds in the collective sense, in the same way in which some persons might collectively carry a fridge, without there being a single thing they compose carrying a fridge. Also, there is strictly speaking no instantiation relation. The predicate 'instantiates' belong to the fundamental ideology of Keinänen and Tahko's theory, and it does not express a relation. I shall follow them in speaking as if there is a relation of instantiation because that sounds more natural.

How does Keinänen and Tahko's translation work? They propose that reference to objects be replaced with plural reference to their property universals instantiating some relevant kind. For example, reference to a table which is F, G, H… should be replaced with the plural reference to the property universals Fness, Gness, Hness… that collectively instantiate the kind universal tablehood.

As Keinänen and Tahko rightly notice, these resources are obviously not sufficient if we want to distinguish, for example, between a situation that involves a single table which has F, G, H…, and a situation containing two such duplicate tables. If the only thing we could say about each of the two situations is that some properties Fness, Gness, Hness… instantiate the kind tablehood, then there would be no way to distinguish between the situations. But, since these possibilities are different, they should be translated differently (that is, they should have different truthmakers). After all, if some possibilities could not be distinguished in the language that only involves plural reference to property universals instantiating kinds, then there is no reason to think that the possibilities really are different if the language in question serves to describe how reality ultimately is.

In order to distinguish between possibilities like the two discussed above, Keinänen and Tahko introduce another sort of *kind* universals, which they call locational universals. It is important to emphasise that locational universals are kind universals, because Keinänen and Tahko think that property universals could instantiate only kind universals.

Equipped with locational universals, they can say that in the situation that we would describe as containing a single table which has F, G and H, the property universals Fness, Gness and Hness instantiate the kind tablehood and a single locational (kind) universal (collectively, of course). On the other hand, in the situation that we would usually describe as containing two indistinguishable tables which are F, G and H, the property universals Fness, Gness and Hness instantiate the kind tablehood, but they also collectively instantiate *two* different locational universals. In general, there

are n indistinguishable objects of the kind Fness (or Fhood) only if some property universals instantiate the kind Fness and also instantiate at least n distinct locational universals (unless some are co-located, but this will be made clearer later).

While accepting locational universals enables us to distinguish among situations involving different numbers of indistinguishable 'objects', kind universals play the main role in perspicuously representing situations that we would usually describe as involving coincident objects of different kinds. Suppose that we have a lump of clay and a statue made of it. Keinänen and Tahko think that the statue and the lump of clay are indistinguishable when it comes to their (non-modal) property universals, but that they differ in kind:

> … the statue and the lump of clay that constitutes it are indeed interpenetrating and appear to share all their properties. But 'statue' and 'lump' evidently represent different kinds of material object and hence we can say that the statue would not, e.g., survive a change in its shape whereas the lump would. The same caboodle of property universals constituting the statue and the lump instantiates two distinct kind universals. (Keinänen & Tahko 2019, 846)

So, the situation apparently involving the coincident lump and the statue sharing their property universals, say Fness, Gness and Hness, should be described as really involving only the property universals Fness, Gness and Hness instantiating the kind lumphood and the kind statuehood (and some locational universal, of course). In other words, Keinänen and Tahko can account for the apparent multiplicity of coincident 'objects' by saying that some property universals (those that we would say are shared by coincident objects) instantiate more than one kind universal.

It should be noticed here that even if by 'properties' Keinänen and Tahko mean only non-historical and non-modal properties, it is doubtful that coinciding objects have to share their property universals. For example, as discussed at the beginning of this chapter, some philosophers who accept that there are coinciding objects think these could differ in their non-modal and non-historical properties. For example, if a person coincides with an organism without being identical to it, then it is not implausible to claim that only the person thinks, while the organism does not (actually, this is a widely held view in the literature). Let us, however, put these worries to the side and examine if Keinänen and Tahko's EBT could give us adequate translations even if we assume that coinciding objects have to share all their property universals.

We might wonder at this point about the status of relations in Keinänen and Tahko's version of EBT. As said, property and relational universals form one fundamental category of universals, while kind universals form another. Even though Keinänen and Tahko do not discuss relations in any detail, it seems to follow from what they say that there is no role for relational universals to play within their theory. Suppose Romeo loves Juliet. It seems that Keinänen and Tahko could not translate this into the statement that the property universals had by Romeo, on the one side, and the property universals had by Juliet, on the other, instantiate the relation of loving. This is because instantiation never relates (that is, 'instantiation' never applies to) property/relational universals to other property/relational universals. As Keinänen and Tahko emphasise, instantiation only relates universals from distinct categories of universals, in other words, property/relational universals to kind universals. It also seems implausible that the property universals had by Romeo together with *loving* instantiate the kind humanity (or personhood). So, it is not obvious how relational universals fit, because they are neither instantiated by property universals, nor do they seem to instantiate, together with property universals, kind universals. As said previously, Keinänen and Tahko follow Lowe in making a division between two fundamental categories of universals. Eliminating relational universals would be a further similarity to Lowe, who also tentatively argued that we do not need relational universals in our ontology (Lowe 2016). The new version of EBT is what we get when we eliminate from Lowe's four-category ontology the categories of objects and tropes (modes).

If there are no relations in the ontology of Keinänen and Tahko (or if they exist but do not play a role in the proposed translations of ordinary claims about concrete particulars), and if locational kind universals determine the spatial 'relations' among property universals,[129] then it seems that they have to accept some sort of Humean picture, according to which all truths are fixed by the distribution of intrinsic properties across (so to speak) space-time.[130]

4.2.2. Problems with translations

I will argue that it is doubtful whether Keinänen and Tahko's translations of some sentences concerning coincident objects are correct. Consider first the statue and the lump of clay. We do not

[129] According to Keinänen and Tahko, 'spatiotemporal relations between 'objects' are determined by locational kind universals that the bundles of universals instantiate.' (Keinänen & Tahko 2019, 843 (footnote 6))
[130] Lewis describes Humeanism as 'the thesis that the whole truth about a world like ours supervenes on the spatiotemporal distribution of local qualities.' See Lewis (1994).

think that when a lump of clay makes (or as it is sometimes said, constitutes) a statue, the fact that it makes a statue is necessitated by its intrinsic nature. We could have a scenario with two intrinsically indistinguishable lumps of clay, the first of which makes a statue, while the second does not. The difference might come out of the fact that the first lump was moulded into a statue shape by an artist, while the statue shape of the second is the result of some accidental natural process that does not include the intentional actions of persons.

In this scenario, we would say that only the first lump of clay coincides with the statue, while the second does not. Call the first lump 'Lump1', and the second 'Lump2'. Assume that the lumps are intrinsically indistinguishable (they are both F, G and H, let's say) and are located at R1 and R2, respectively. Lump1, which is located at R1, coincides with the statue, while Lump2, located at R2, does not coincide with the statue. How would Keinänen and Tahko describe this situation? Since there are a lump and a statue (which are F, G and H) located at R1, that means that the property universals Fness, Gness and Hness instantiate the kind universals lumphood and statuehood and the locational universal R1. Since there is an intrinsically indistinguishable lump at R2, namely Lump2, Keinänen and Tahko have to say that Fness, Gness and Hness also instantiate the locational universal R2. It follows, then, that Fness, Gness and Hness instantiate the kind universals lumphood and statuehood and the locational universal R2. But, that Fness, Gness and Hness instantiate lumphood and statuehood and the locational universal R2 is Keinänen and Tahko's way to account for the apparent fact that some lump and a statue coincide at R2, which contradicts our initial assumption that a lump and a statue coincide only at R1, and not at R2 as well. In short, Keinänen and Tahko's translation cannot capture the apparent fact that only one of the two indistinguishable lumps coincides with the statue. In other words, their translations could be correct only if the following incorrect principle about material objects were true, had there been such things:

> (P1) If some object x which is of a kind F coincides with another object y of a kind G, then any intrinsic duplicate of x coincides with an object of a kind G.

(P1) entails, for example, that if a piece of paper x coincides with a banknote, then any other piece of paper intrinsically like x coincides with a banknote. But this is obviously incorrect.

Could it be replied here that if one lump coincides with the statue, while the other does not, then even though Lump1 and Lump2 might be intrinsic duplicates, they could not have all the same relational properties? For example, could we say that only Lump1 has the property universal *being*

intentionally given a statue shape by a person, while Lump2 does not have this property? Given this, it would not be only Fness, Gness and Hness that instantiate the kind universals lumphood and statuehood, but Fness, Gness and Hness together with the relational property *being intentionally given a statue shape by a person*. So, because the two lumps would have different properties, we could not conclude that the properties had by Lump2 also instantiate the kind statuehood.

While it seems correct that the lump of clay that coincides with the statue differs relationally from an intrinsically indistinguishable lump of clay that does not coincide with a statue, it is not clear how relational differences in general could be captured by Keinänen and Tahko's translation manual. As I argued above, it does not seem like there is space for relations to do any work in Keinänen and Tahko's ontology. Relations are not instantiated by other property universals (because property universals instantiate only kind universals), nor can they plausibly be among the property universals instantiating kind universals. But if there is no space for relations in Keinänen and Tahko's theory, it is not clear at all how there could be space for relational properties. For example, it is not at all clear how there can be a relational property *being intentionally given a statue shape by a person* among the properties instantiating the kind statuehood, without the corresponding relation being instantiated by anything. As Hawthorne and Sider emphasise, 'relational properties are complex properties involving the instantiation of relations, and hence rely on a prior account of relations' (Hawthorne & Sider 2002, 55).

It is an interesting question what could be accomplished with Keinänen and Tahko's theory if they allowed property universals to instantiate relational universals in order to solve this problem. My guess is that this would not go far enough. Suppose Romeo loves Juliet. That means that *loving* relates Romeo's intrinsic properties to Juliet's intrinsic properties. Suppose that Ophelia is intrinsically just like Juliet. It follows that *loving* also relates Romeo's properties to Ophelia's properties. But this is wrong if Romeo loves only Juliet. Furthermore, we could not explain differences in the holding of the *loving* relation in terms of relational differences between Juliet and Ophelia, because the relational differences in question would also depend on Juliet and Ophelia standing in different relations to other things, and it is not clear how this can be if they are intrinsically the same.

4.2.3. Problems with ideology

Keinänen and Tahko's ambition is not merely to account for cases of coincidence involving different kinds of objects, but also for cases of coincidence involving the same kinds of objects.[131] While the cases of same kind coincidence do not raise the grounding problem (unless objects of the same kind could differ modally), their account of same kind coincident is worth discussing nevertheless. As already said, Keinänen and Tahko can account for the multiplicity of indistinguishable objects of the same kind by saying that some property universals instantiate more than one locational universal. However, since coinciding objects of the same kind occupy the same location, the above move is not available.

The cases they have in mind are cases involving co-located bosons. In setting the stage for their own proposal, they discuss and reject as too costly the proposal made by Laurie Paul (2017). According to Paul, the best route for bundle theorists in such cases is to reject the assumption that we have two distinct objects in the first place. Instead, we should say that 'the entire system' instantiates the basic property 2-boson-ness, or in general n-boson-ness, as the case may require.[132] These properties are basic in that they are not structured properties the possession of which consists in having two bosons as parts. Of this solution, Keinänen and Tahko say:

> 'But while this solution does of course do the trick, we find the cost of introducing further ontologically basic properties such as 2-boson-ness (and indeed n-boson-ness) to be rather high…' (Keinänen & Tahko 2019, 839)

Instead of resorting to such properties as two-boson-ness to account for same-kind coincidence, Keinänen and Tahko think they can account for this by saying that property universals could instantiate some locational universal twice or more times:

> '(...) a single property universal, in addition to multiple locations, can be multiply located in a *single spatiotemporal position.* Take, for instance, the universal for the elementary charge, *e*. We assume that a caboodle of property universals can instantiate a locational kind

[131] As is well-known, Davis Wiggins thought of such cases as impossible. See Wiggins (1968).
[132] One might immediately wonder if the instantiation of three-boson-ness entails the instantiation of two-boson-ness, especially given that these are supposed to be simple properties, according to Paul. Thanks to Eric Olson for raising this point.

> universal once, twice, or several times. The property universal of elementary charge is multiply located in a single spatiotemporal position if there is a corresponding caboodle of property universals (...) which instantiates the corresponding locational kind universal multiple (twice or more) times.'
>
> 'A caboodle of these universals [property universals had by an electron] instantiates the kind universal electron. Since the universals of the basic states of an electron are each located twice in that region of space-time, there are, in a manner of speaking, 'two electrons' in that region.' (Keinänen & Tahko 2019, 851)

According to Keinänen and Tahko, then, a situation that we would describe as containing two co-located electrons is actually such that it contains properties of an electron that collectively instantiate a certain locational universal twice. So, while the multiplicity of co-located objects of different kinds is accounted for by saying that some property universals instantiate more than one kind universal, the multiplicity of co-located objects of the same kind is accounted for by saying that some properties instantiate more than one locational universal.

There are a couple of potential objections to this move. First, Keinänen and Tahko's way of accounting for the coincidence of objects of the same kind seems to re-introduce the limited sort of holism that affected previous variants of EBT. For those who accept concrete particulars, it seems that facts about the total number of coinciding electrons at a certain place should supervene on facts about the individual electrons at that place. However, that some properties instantiate some locational universal twice does not seem to supervene on facts about the simple instantiation of that locational universal. For example, compare the situation in which we have a single electron at R1 with the situation involving two electrons at R1. In both situations, some properties instantiate locational universal R1. However, only in the second situation do those properties also instantiate the same locational universal twice. It follows that some complex truth about electrons does not supervene on simpler truths about electrons.

Secondly, the above way of accounting for the same-kind coincidence increases the ideological commitments (commitments to primitive concepts) of Keinänen and Tahko's theory. They can avoid accepting Paul's simple properties like 2-boson-ness, but, it seems, only at the cost of introducing new primitive predicates like 'instantiates twice'. While this predicate is syntactically complex,

consisting of a simple predicate and numeral adverb, it could not be defined in terms of 'instantiates'.[133] Furthermore, it is doubtful that we could meaningfully modify our ordinary notion of instantiation with a numeral adverb to get complex predicates like 'instantiates twice'. Even if there are such things like tables and chairs, what could it mean for a chair to instantiate solidity twice?

Of course, we know which situations Keinänen and Tahko would describe as involving some properties instantiating a locational universal twice. They are just those situations that non-eliminativists would describe as containing two objects *instantiating* the same locational universal. So, if we are allowed to quantify over objects, then we can define 'instantiates twice' in terms of simple instantiation. But eliminativists cannot quantify over objects in order to define their theoretical expressions. So the only option, it seems to me, is to take these expressions as primitive theoretical expressions, and so as a part of a primitive ideology. Of course, if these expressions are primitive, the question arises of how we can learn to use them. It seems that if we understand one of these predicates, we can understand all of them. For example, if we understand 'instantiates twice', we also understand 'instantiates thrice', etc. But it is mysterious how we are able to do that if these are primitive predicates (Lewis & Lewis 1970).

Furthermore, for those who accept concrete particulars, the sentence 'There are three electrons at R1' entails 'There are two electrons at R1'. To demonstrate this, it is enough to translate these sentences into the language of quantification and apply certain semantic rules. However, does it follow from the fact that some properties instantiate-thrice certain locational universals, that they also instantiate-twice those locational universals? These instantiation predicates being primitive, it seems like the possibility is open for this not to be the case. So, Keinänen and Tahko have to complicate their theory further in order to secure that whenever some properties instantiate-thrice a certain locational universal, they also instantiate that same locational universal twice.

One of the worries I mentioned is that accepting primitive predicates like 'instantiates twice' seems to incur further ideological commitments. However, it has been argued recently that the ideological commitments of a theory should not be judged by counting the number of primitive expressions of the theory, but by counting the number of ideological kinds.[134] By way of example, it is sometimes said that mereological expressions constitute one ideological kind, as well as modal expressions.

[133] For further instances of predicates like this, see Lewis & Lewis (1970). The authors criticise those who avoid commitments to holes by introducing a complex predicate like 'is perforated twice'.
[134] See for example Cowling (2013), Finocchiaro (2019), Sider (2011).

Keinänen and Tahko could perhaps reply that since instantiation predicates belong to the same ideological kind, accepting one is, from the standpoint of ideological economy, the same as accepting all of them. While this might be a promising route for Keinänen and Tahko to take, the notion of ideological kind requires further explanation. In addition, it is far from obvious that any workable account of ideological kinds should result in instantiation predicates belonging to the same ideological kind. For example, in working out what ideological kinds are, it seems that a condition of adequacy on any such account should be that mereological expressions end up belonging to the same ideological kind. But this is not the case for the instantiation predicates introduces by Tahko and Keinänen. There are no definitional connections among these predicates, nor is there an established usage of them. In addition, somebody might accept talk of simple instantiation, while thinking that predicates like 'instantiates twice' or 'instantiates thrice' are somewhat obscure, or not well understood. Contrary to this, mereological vocabulary comes as a package. If you think that talk of parthood is perfectly clear and well understood, then it is hard to complain about other mereological expressions.

In the next section, I will discuss a novel version of bundle theory which was also developed to deal with the grounding problem. The novelty of this version of bundle theory is that it does not take ordinary objects to be made of all the properties they have, but only of their essential properties. That is why the theory is called *essential bundle theory*. This seems to me to be the most promising version of bundle theory if we want to solve the grounding problem.

4.3. Essential bundle theory

Stephen Barker and Mark Jago (2018) recently offered an interesting account of the ontological structure of material objects, which is supposed to solve some traditional puzzles concerning these objects, and in particular the grounding problem. Barker and Jago are proponents of the bundle theory of material objects, according to which material objects are bundles or compounds of their properties. More specifically, they take material objects to be the mereological sums of their essential properties, where x is a mereological sum of some ys iff each of the ys is a part of x, and every part of x shares a part with at least one of the ys. Hence the name 'essential bundle theory'.

The idea that material objects are bundles of their essential properties is not entirely new. Again, something like this has been already discussed (and rejected) by van Cleve (1985). What is specific to Jago and Barker's theory is their account of property possession. I will argue that the account of property possession in question ultimately leads to some problems for their version of the bundle theory of material objects.

Let's take as an example Michelangelo's statue of David. Typically, bundle theorists consider the statue of David to be a sum of properties including, among others, the properties *being statue-shaped* and *being white*. The fact that the David-bundle (or simply David) has these properties as parts explains why it is true to say of it that it is white and that it is statue-shaped. Roughly speaking, what is true of David is a function of the properties David is made of. One way to express this dependence is the following:

(1) David is F iff the property *being F* is a part of David.

Some might find this principle too demanding, since it seems to require a distinctive property part of David corresponding to every predicate that can be truly applied to it.[135] For example, it is true to say of David that it is statue-shaped or blue; however, that does not obviously require the property *being statue-shaped or blue* to be a part of David (it does not even require the existence of such a property), especially if the property *being statue-shaped* is already a part of David. However, true ascriptions to David may still depend on which properties are parts of it. As a refinement of (1) that respects this last claim, but is less demanding than (1), we can have the following account:

(2) David is F iff there is some property that is a part of David on which David's being F depends.

According to (2), there might be more than one property on which David's being F depends. Even (2), however, might be too demanding, because some true ascriptions to David might depend not only on which properties are parts of David, but also on which properties are not parts of it. For example, it could be claimed that David is not an even number, not because there is a property *being non-even* that is a part of it, but because there is a property *being even* that is not part of it. A

[135] At least, it requires a distinctive property corresponding to every true ascription. Also, there could not be the property *x is such that it does not apply to itself* even if it is true of my table, for example, that it does not apply to itself, as the existence of such a property would lead to Russell's paradox.

general principle that respects this last idea could take the form of the following supervenience claim:

> (3) There cannot be two objects that have the same properties as parts (or have exactly similar tropes as parts), but that differ with respect to what is true of them.[136]

When it comes to David, (3) implies the following:

> (3') David is F if and only if there could not be a bundle composed of all and only the properties of which David is composed (or of the tropes that are exactly similar to those of which David is made) and which is not F.

(3) is a much less demanding thesis than (2) and (1). However, Jago and Barker argue that all of these principles concerning property possession are false, even when we restrict our attention to intrinsic and qualitative properties only. However, if Jago and Barker think that what is true of things can vary independently of which properties they have as parts (because they reject supervenience claims (3) and (3')), it might seem that not much is left of the main reason for accepting the bundle theory, that reason being an explanation of property possession.[137] If the possession of some properties by x is independent of which properties compose x (failure of supervenience implies independence), why not simply accept that the possession of all properties is independent of which properties objects have as parts, and thus abandon one of the main motivations for bundle theory?

The answer Jago and Barker give to this last question is ingenious, but at the same time, as I will argue, leads to some serious difficulties. They propose a view on which material objects are mereological sums of property instances. Property instances are understood as 'specific located instances of charge, or mass, or redness, or penguinhood…' (Barker & Jago 2018, 2971). They take property instances to be somehow made of properties, understood as universals and space-time regions, but they leave it open how exactly universals and space-time regions combine to form property instances. It seems that space-time regions could not be parts of property instances in the same sense in which property instances are parts of material objects. Otherwise, by the transitivity of parthood, spacetime regions would be parts of material objects, which, I suppose, many bundle theorists would be inclined to reject.

[136] Ignore for the moment possible relational differences. Let's take the possible values of 'F' to be intrinsic properties.
[137] Or of an object's character, as the possession of properties is called by Loux (2006).

What distinguishes Barker and Jago's account from other versions of the bundle theory that include at least one of (1), (2) or (3), is that they take material objects to be composed exclusively of the instances of their essential properties. For example, if David is essentially statue-shaped and white, has no other essential properties, and exists throughout space-time region r, then it will be made only of the instances of the properties *being statue-shaped* and *being white* that (exactly) occupy space-time region r. Since, according to Jago and Barker, material objects have all and only instances of their essential properties as parts, they accept the following principle:

(Nature Thesis) A material object x is essentially F if and only if an F-instance is a part of x.

The property instances that compose David reveal David's nature or essence. The fact that David is made only of instances of its essential properties helps Jago and Barker avoid one of the most common objections to bundle theories, namely that if material objects are bundles of properties (or property instances), then they cannot change their properties. This problem for traditional bundle theory arises if we combine one of (1), (2) or (3), each of which expresses the idea that what properties David (or any other object) possesses depends entirely on what properties it has as parts, with the principle that bundles cannot change their property parts. Without change in property parts, each of (1), (2) and (3) implies that what properties David has will remain fixed. Since Jago and Barker reject (1), (2) and (3), instead accepting (Nature Thesis), it follows from their theory that if David does not change its property parts, only its essential nature will remain the same, which, of course, is not objectionable.

But, what about David's accidental properties? What does David's accidental possession of some properties consist in, if it only has instances of its essential properties as parts?

Jago and Barker's account of the accidental possession of properties can be split into two parts, the first concerning intrinsic and the second concerning extrinsic properties. They account for the possession of intrinsic properties in the following way:

(INT) If *being F* is an intrinsic property, a material object x in region r is F if and only if there is an instance of *being F* occupying r.[138]

[138] Some of the principles are named differently in their paper, and some principles are formulated slightly differently because I have not followed Jago and Barker in using a special notation for referring to property instances.

Suppose David exists in region r and weighs 500kg (which seems like an intrinsic property). David weighs 500kg because there is an instance of *weighing 500kg* that occupies r. If this instance is a part of David, then David weighs 500kg essentially, if not, then it weighs 500kg only accidentally. Thus, a material object has some intrinsic property accidentally if and only if it is co-located with an instance of that property, but does not have it as a part.

When it comes to extrinsic properties, Jago and Barker's account is somewhat more complicated. Suppose David occupies r. Davis is obviously a work of art (which is an extrinsic property, because an intrinsic duplicate of David might fail to be a work of art).[139] Part of what makes it true that David is a work of art is that there is an instance of *being a work of art* that occupies r. However, it could be said that there is another material object existing at r, namely the lump of marble (call it 'Lump') of which David is made, which is not a work of art itself. Thus, David is a work of art not only because there is an instance of *being a work of art* occupying r, but also, according to Jago and Barker, because David is essentially of the appropriate kind or sort of object to be a work of art. Since Lump is not of the appropriate sort (it is, for example, neither a statue nor a painting, etc), it is not a work of art, despite the fact that there is an instance of *being a work of art* occupying the same region Lump occupies. According to Jago and Barker, some extrinsic properties are such that in order for something to possess them, it has to be essentially of the appropriate sort or kind. Let *being F* be such a property, and call *being G* 'an F-associated key sortal property' if for something to be F, it has to be G essentially. For extrinsic properties like *being F* the condition for possessing them is the following:

> (EXT) If *being F* is an extrinsic property whose key sortal property is *being G*, material object x in region r is F only if there is an instance of *being F* occupying r and there is an instance of *being G* occupying r that is a part of x.

Jago and Barker rely on our intuitive understanding of which sortal properties are associated with which extrinsic properties. *Being G* in our example is obviously *being a statue*.[140] Since only David has an instance of *being a statue* as a part, it is true to say of it that it is a work of art, while this is not true of Lump, because Lump does not have an instance of *being a statue* as a part. If an extrinsic property does not require of its possessors to be of the appropriate sort essentially (does not have

[139] I am relying here on Jago and Barker's example.
[140] Even though Jago and Barker do not discuss the issue in detail, it seems to me that their account implies that it is possible for an extrinsic property to have more than one associated key sortal property. After all, it is not only statues that are works of art.

an associated key sortal property), then the account of its possession is the same as for intrinsic properties.

By accepting (INT) and (EXT), Jago and Barker avoid the problem mentioned earlier, namely: if the possession of some properties by a bundle is not entirely a function of the properties (or property instances) that are parts of the bundle, why accept that the possession of any property depends on which properties compose that bundle? Their answer is that, even though the possession of some properties is not a matter of which properties a bundle has as parts, it is still a matter of which properties stand in an intimate relation to the bundle, the relation being occupying the same region. In the following sections, I will argue that their response has certain problems.

Jago and Barker's essential bundle theory also seems to solve the grounding problem. Recall, the grounding problem is the problem of how David and Lump could differ in various respects despite being made of the same material parts. According to Jago and Barker, while David and Lump are made of the same material parts, they differ when it comes to their ontological structure, and this difference grounds the difference in their modal and other properties. Only Lump can fail to be statue-shaped because only Lump does not have an instance of *being statue-shaped* as a part. Also, as I already discussed, Jago and Barker have an explanation of the extrinsic differences between David and Lump. Since some extrinsic properties require of their possessors to have instances of certain sortal properties as parts, then David and Lump could differ extrinsically because they differ in which instances of sortal properties they have as parts. Thus, Jago and Barker's essential bundle theory does not merely account for the modal differences between coincident objects, but also for the non-modal differences between them.

4.3.1. Principles of composition for property instances

Under what conditions do some property instances compose a material object? This is a variation on the well-known question posed by van Inwagen, namely, under what conditions some material objects compose a further material object (van Inwagen 1990). Jago and Barker (2018, 2973) accept that there are three conditions, each of which is necessary, and which are jointly sufficient, for some set of property instances to compose a material object:

> (SCQp) Property instances xs compose an object iff (i) the xs occupy the same spatio-temporal region r, (ii) the xs are consistent and (iii) the xs are truthmaker-closed.

A set of property instances that occupy the same spatio-temporal region r, and that are also consistent and truthmaker-closed, compose a material object. In order to explain this last condition, we first need to introduce the notion of truthmaker entailment. A proposition <A> truthmaker entails <B> iff whatever is a truthmaker for <A> is also a truthmaker for <B>. A plurality of property instances xs containing (possibly among others) instances of F_1, F_2,…,F_n is truthmaker closed only if for every Gness, if Gness is such that the conjunctive proposition <$F_1x \wedge F_2x \wedge \ldots F_nx$> truthmaker entails <Gx>, then an instance of Gness is one of the xs. This last condition boils down to the idea that when some property instances ground some further property instance as we would say of the same object, then if some bundle has the former property instances as parts, it also has the latter instance as a part. For example, since whatever is a truthmaker for the proposition ascribing the property *being red* to x is also a truthmaker for the proposition ascribing *being coloured* to x, if an x-bundle contains an instance of *being red*, then it also contains an instance of *being coloured*. In other words, according to Barker and Jago, since an instance of *being red* grounds an instance of *being coloured*, if some bundle has the first instance as a part, it will have the second instance, too. However, this still allows for some bundle to contain the property *being coloured*, without containing *being F*, for any colour property Fness. Such a bundle will be identified with an object which is essentially coloured, although it does not have any particular colour essentially.

I will argue that Jago and Barker's answer to the composition question for properties (SCQp), together with (Nature Thesis) and (EXT), leads to a contradiction. Recall Jago and Barker's central principles:

> (Nature Thesis) A material object x is essentially F if and only if an F-instance is a part of x.
>
> (EXT) If *being F* is an extrinsic property whose key sortal property is *being G*, material object x in region r is F only if there is an instance of being F occupying r and there is an instance of being G occupying r that is a part of x.

Let's take an instance of the property *being a work of art* that exists throughout r. Take this property instance together with all and only the other property instances that are grounded in it. The set of property instances obtained will satisfy Jago and Barker's truthmaker closure condition. Also, all the property instances in question will occupy the same spatio-temporal region r. Finally, these property instances are consistent. This means that the property instances that include an instance of the property *being a work of art*, together with all and only the property instances grounded in it, will

satisfy all three conditions ((i), (ii), (iii)) from Jago and Barker's answer to the composition question for properties. Since these conditions are sufficient for composition, it follows that there is a material object composed of the property instances in question. Call this object Tim. The most important premise in my argument is the claim that Tim does not have an instance of *being a statue* as a part. I find this claim plausible. Since Tim has as parts only the property instances that are grounded in an instance of *being a work of art*, Tim can have an instance of *being a statue* as a part only if that instance is grounded in an instance of *being a work of art*. However, this seems to be false. If anything, it seems like an instance of *being a work of art* is grounded in an instance of *being a statue*, and not vice versa.[141]

If you are not persuaded by this example, instead of the property *being a work of art*, take the property *being married* and its associated key sortal property *being a person*. (another of Jago and Barker's examples of an extrinsic property and its associated key sortal, see their 2018, 2970) Let Jones be an object made of some instance of *being married* together with all and only the instances grounded in this instance of *being married.* Plausibly, Jones does not have an instance of *being a person* as a part. If anything, it seems that our instance of *being married* is partly grounded in some instance of *being a person*, and not vice versa. So, both Tim and Jones are examples of objects that have instances of some extrinsic properties as parts, without having instances of their associated sortal properties as parts.

Let's go back to the example of Tim. Since Tim has an instance of *being a work of art* as a part, it is, according to (Nature Thesis), essentially a work of art. If something is essentially a work of art, then it is a work of art. Being a work of art is an extrinsic property with an associated key sortal property. To recall, an associated key sortal property for some extrinsic property is the sortal property, an instance of which something has to have as a part in order to possess the extrinsic property in question. In the case of the extrinsic property *being a work of art*, that role is plausibly played by the sortal property *being a statue* (and plausibly some other sortal properties as well). Thus, the following instance of (EXT) is true:

> (EXT work of art) Material object x in region r is a work of art only if there is an instance of *being a work of art* occupying r, and there is an instance of *being a statue* (or some related sortal property) occupying r that is a part of x.[142]

[141] That is, people have certain attitudes towards statues because they are statues, and not vice versa. See Olson (2001).
[142] Or an instance of some other sortal property associated with *being a work of art*, but let's ignore this for the time being.

Since Tim is a work of art, it follows, according to (EXT a work of art), that Tim has an instance of *being a statue* as a part (or some similar sortal property). However, this contradicts our previous claim that Tim does not have an instance of this last property as a part. We stipulated that Tim only has an instance of *being a work of art* as a part, together with all and only those instances that are grounded in it. Also, I suggested that no instance of *being a statue*[143] is grounded in an instance of *being a work of art* that is a part of Tim, and so Tim does not have an instance of *being a statue* as a part (the example with *being married* and *being a person* would also work to illustrate the point I want to make). Since Tim is essentially a work of art (which follows from (Nature Thesis) and the fact that Tim has an instance of *being a work of art* as a part), it follows that Tim is a work of art, from which it follows that Tim has an instance of *being a statue* (or of a similar sortal property) as a part, because having that instance as a part is, by (EXT work of art), a necessary condition for being a work of art. This is the contradiction.

Is there a way to fix this problem? One way would be to modify Jago and Barker's answer to the composition question for properties. We might require that bundles not only be grounding-closed, but also that they do not contain an instance of some extrinsic property Fness without also containing an instance of some F-associated key sortal property (if Fness has an associated key sortal property). Thus, it will be impossible for there to be anything which has an instance of *being a work of art* as a part, without also having an instance of some *being a work of art*-associated key sortal property as a part.

While this would avoid the problem, it should be mentioned that the above further restriction on qualitative composition, unlike the three conditions given by Jago and Barker, is not motivated by considerations concerning the notion of essence. In other words, while it is plausible, for example, that it is a part of the concept of essence that the essential properties of anything are closed under the relation of grounding, it is not a part of the concept of essence that if something is essentially a work of art, it is also essentially a work of art of a specific sort. It seems that we do not violate what is usually meant by the notion of essence if we think that there are things which are essentially works of art, but not essentially works of art of any specific sort. Thus, the further condition on qualitative composition that fixes the above problem could not be motivated by considerations pertaining to the concept of essence, but by the inner workings of Jago and Barker's theory.

[143] And plausibly no other sortal property.

Alternatively, Jago and Barker could modify (EXT) in the following way:

> (EXTa) If *being F* is an extrinsic property whose key sortal property is *being G*, material object x in region r is accidentally F if and only if there is an instance of *being F* occupying r that is not a part of x and there is an instance of *being G* occupying r that is a part of x.

Now, even though Tim is a work of art because it has an instance of *being a work of art* as a part, and thus is essentially a work of art (according to (Nature Thesis)), it will not follow that Tim has an instance of *being a statue* as a part because (EXTa) is an account of the possession of extrinsic properties merely accidentally. In other words, since Tim is essentially a work of art, it does not follow from (EXTa) that it has an instance of *being a statue* as a part, and so there is no contradiction anymore.

However, I think this last proposal should be resisted. The rationale behind (EXT) is that certain extrinsic properties are possessed only by objects that are essentially of a certain sort. The intuitive plausibility of this thought is the reason why Jago and Barker do not attempt to tell us more about what they mean by the phrase 'being an F-associated key sortal property'. For example, it is quite intuitive that *being married* is possessed only by objects that are essentially persons and not mere lumps, and that *being works of art* is possessed only by objects that are essentially sculptures (or works of art, more generally). However, (EXTa) would allow objects that are not persons essentially to be married, and objects that are not statues (nor any other sort of works of art) essentially to be works of art (like Tim), which undermines the whole rationale behind the idea that some extrinsic properties require of their possessors to be of a certain sort essentially.

To see more clearly how this creates a problem for Jago and Barker, imagine someone asking why David is a work of art (why it is appreciated by the art community, let's say), while the lump of marble of which it is made is not. If we accept (EXT), we have a persuasive answer, namely that only David is a statue by its essence, while the same is not true of the lump of marble. But note that if we accept (EXTa) this answer is not the right answer, because there are some objects that are works of art, like Tim, without being essentially statues. Relatedly, if there are objects that could be married without being persons, then we cannot rely anymore on an intuitive understanding of the phrase 'being an F-associated key sortal property'.

To sum up, objects like Tim serve to show a hidden tension within Jago and Barker's theory. Since every property is either intrinsic or extrinsic, their principles of property possession, namely (INT) and (EXT), should give us a complete account of property possession. However, (Nature Thesis) on its own gives another account, although not complete, of when an object possesses some property. Since (INT) and (EXT) are independent of (Nature Thesis), the possibility is open that there are cases where these principles pull in different directions, leading to contradiction. Of course, we could formulate our principles of composition for properties in a way that masks that tension. However, it is desirable to have a bundle theory whose consistency does not depend on an answer to the composition question for properties (apart from the minimal requirement that excludes inconsistent bundles and requires essential properties to be closed under grounding).

4.3.2. Modally indistinguishable worldly coincidents

We are usually pressed to distinguish among materially coincident entities on the basis of the modal differences between them. For example, it is sometimes said that the lump of clay making a statue could fail to be statue-shaped, while the same is not true of the statue itself. Other sorts of differences between the statue and the lump concern their temporal properties, namely how they are at other times. For example, if an artist makes a statue at 10pm on Wednesday out of the clay she bought a day ago, then, while the statue does not exist before 10pm on Wednesday, the lump of clay presumably does, and so they cannot be identical. However, temporal differences are not always available. If the lump of clay and the statue coincide throughout their entire existence, then there would obviously be no time at which one exists without the other. However, we could still say that the statue might exist when the lump of clay does not, and vice versa. Even if these sorts of differences enable us to draw a distinction between materially coincident objects, their existence is mysterious given how similar materially coincident objects are.

Essential bundle theories help explain how there can be objects that are permanently coincident while differing modally. Recall the central principle of Jago and Barker's theory:

> (Nature thesis) Material object x is essentially F if and only if an F-instance is part of the x-bundle.

Furthermore, Jago and Barker think that all bundles are truthmaker- or grounding-closed. We could formulate this in the following way:

> (Grounding closure) If an instance of Fness is grounded in some instances $G_1,\ldots,G_n$ already in the bundle, then Fness is in the bundle as well.

Take for example an object A which is essentially crimson coloured. Since A is essentially crimson, A has as a part an instance of *being crimson.* Because this instance grounds an instance of *being red*, A has an instance of *being red* as a part as well (according to (Grounding closure)). Now take another object, B, which coincides with A but is only essentially red, without being essentially crimson. That means that B only has the above instance of *being red* as a part. Imagine finally that A and B materially coincide throughout their entire existence and that they are crimson and red at every time. Even if they actually permanently coincide, B still might exist without A existing because B would survive turning into some other shade of red, while A would not. This is how essential bundle theory could deliver permanently coincident, yet modally different objects.

One possible worry is that essential bundle theory delivers excessively on this particular matter. It seems that not only can we have permanently coincident objects that differ modally, but we can have permanently coincident objects that do not differ even modally.[144]

Take object A which is essentially crimson. A has an instance of *being crimson* as a part (by (Nature Thesis)). Since this instance grounds an instance of *being red*, A also has that instance of *being red* as a part (on the basis of (Grounding closure)). Furthermore, it also follows that A has an instance of *being coloured* as a part, which is grounded in its instance of *being red*.

Plausibly, conditional properties like *being F if G* are grounded either in *being F* or in *being non-G* (since they are just the disjunctive property *being non-G or F*). So, since A has an instance of *being red* as a part, then it also has an instance of *being red if coloured* (*being red* grounds *being red if coloured*), and since it has an instance of *being crimson* as a part, it also has an instance of *being crimson if red* as a part. To sum up, A has at least the following property instances as parts:

-being coloured
-being red

[144] Not everybody would object to this, see for example Fine (2000; 2003).

-being crimson

-being red if coloured

-being crimson if red

Take another object, B, that only has the following of the above instances:

-being coloured

-being red if coloured

-being crimson if red

A and B are modally indistinguishable, and B is a proper part of A. Even though B does not have an instance of *being red* as a part, since it has an instance of *being coloured* and an instance of *being red if coloured,* it follows that B is necessarily red. This is an undesirable consequence. We wanted to know how worldly coincidents could differ modally. Essential bundle theory gave us both that and the possibility of worldly coincidents that do not differ even modally. Thus, essential bundle theory seems to deliver excessively. We intuitively recognise worldly coincidents that are modally indistinguishable, but somebody might object to worldly coincident objects that do not differ even modally.

Somebody might try to avoid this by saying that B also has to have instances of *being red* and *being crimson* as parts. The reason might be that, since B has as parts instances of *being coloured* and *being red if coloured*, then if these instances ground an instance of *being red*, B has to have that instance of *being red* as a part (according to (Grounding closure)). However, this would violate either the transitivity or the irreflexivity of grounding, features that are widely taken to govern the grounding relation. Let Δ and Γ refer to sets of property instances, and let us use '$\Rightarrow$' for grounding. Then, generalised irreflexivity[145] and transitivity[146] of grounding are the following principles:

(Iref) for no property instance p and a set Δ, is it the case that: p,Δ $\Rightarrow$p

(Trans) for every Δ, Γ, p and q: if Δ$\Rightarrow$p and Γ,p $\Rightarrow$q, then Δ,Γ$\Rightarrow$q

[145] Against the irreflexivity of grounding, see Jenkins (2011).

[146] Against transitivity, see Schaffer (2012) and Tahko (2013). Against grounding being a strict order, see Rodriguez-Pereyra (2015). See also Raven (2013).

As it was said, it seems that an instance of *being red* grounds an instance of *being red if coloured*:

being red ⇒ *being red if coloured*

But if instances of *being red if coloured* and *being coloured* ground an instance of *being red*, namely:

being coloured, *being red if coloured* ⇒ *being red*

then by generalised transitivity of grounding, we have:

being red, *being coloured* ⇒ *being red*

which violates the irreflexivity of grounding.

Jago and Barker could avoid some of the problems I have presented in this and the previous section by amending their answer to the composition question for properties. At the end of this chapter, I will present some further problems for their essential bundle theory, which I think could not be avoided in that way. But before that, I need to present another recent version of bundle theory that was also developed with the grounding problem in mind. The version in question is L. A. Paul's mereological bundle theory. I will argue that both essential bundle theory and Paul's mereological bundle theory could be objected to on common grounds.

4.4. Paul's mereological bundle theory

Since Paul's idea is to give a bundle-theoretic vindication of essentialism, I think I should say something more about what philosophers usually mean by essentialism. Essentialism is the idea that when some object is F, it also has a further property of either being F essentially or being F only accidentally. Roughly speaking, an object is essentially F only if it cannot exist without being F, while it is accidentally F if it is F, but could exist without being F.[147] Establishing a coherent distinction between having a property necessarily and having a property accidentally is only the starting point

[147] For some representative papers that discuss essentialism, see Cartwright (1968), Plantinga (1974), Yablo (1987), Fine (1994), Della Rocca (1996), Paul (2004) and Leslie (2011).

of essentialism, however. Some authors further require that objects have some of their properties essentially and some of their properties accidentally. According to these philosophers, somebody who thinks that the distinction is coherent, but that objects have all of their properties essentially, or that they have all of their (non-trivial) properties accidentally would not be classified as an essentialist.[148] In other words, many essentialists believe that things have some of their non-trivial[149] properties essentially, and some of their non-trivial properties merely accidentally. An intermediate view is that essentialism requires that some things have at least some of their non-trivial properties essentially. For example, according to Mackie (2006), the view according to which everything has all its properties essentially is still an essentialist view, but not the view according to which things have all but their trivial properties accidentally. Since it seems to me that Mackie's way of looking at the distinction is more intuitive, I will be working with Mackie's definition in the rest of this chapter.

Finally, and most importantly for the present discussion, essentialism involves the idea that whether something possesses a property essentially or accidentally does not depend on the way it is referred to or how it is categorised.

In this chapter, I discuss and criticise some recent attempts at giving a reductive account of essentialist attribution. In recent years, many authors have defended some version of the bundle theory of material objects by arguing that such theories offer the best account of how objects have properties essentially/accidentally. As representative of such attempts, I will take L. A. Paul's influential mereological bundle theory of objects, according to which objects are mereological sums[150] of their properties (Paul 2002; 2004; 2006). Paul develops her particular version of bundle theory with the explicit aim of giving a reductive account of modal properties like *being essentially F* or *being accidentally F.* In particular, she thinks that to have some property essentially or accidentally is just to be represented (in a way to be discussed later) by some other entities as being a certain way. Thus, for Paul, some modal property just is (reduces to) the property of being represented as being a certain way.

[148] The views that recognise the distinction, but do not treat it as discriminatory (treat all properties as essential to everything having them, or all properties as accidental to everything having them) are sometimes categorised as anti-essentialist, see Stalnaker (1979).
[149] What is meant by 'non-trivial' are properties which are unlike those that everything possesses, for example *being red if coloured*; unlike identity properties, for example *being identical to Socrates*; and unlike world-indexed properties, for example *being blue in* w_n. See Plantinga (1974, 60-61).
[150] According to the standard definition, y is a mereological sum of xs iff y has each of the xs as a part, and every part of y overlaps at least one of the xs.

Part of Paul's case for the mereological bundle theory lies in her critique of alternative attempts at reduction. In particular, she argues that non-bundle theoretic accounts violate one or another important tenet of essentialism, as opposed to her own proposal. Though I agree with Paul that other reductive accounts cannot accommodate all of the above-mentioned aspects of essentialism, while her account can, I will argue that her account cannot be properly classified as reducing *de re* modal properties to representational properties, as opposed to the theories she criticises.

It could come as a surprise to the reader familiar with the perplexing problems surrounding the bundle theory of objects that such a theory could serve to vindicate essentialism, understood as a discriminatory thesis about the ways that objects can have properties.[151] According to the traditional bundle theory, an object x is F iff Fness is in the bundle which is identical to x. Given the further assumption that bundles could not have different constituents (or parts), it follows that every bundle has its properties essentially. However, many essentialists believe that objects have some of their properties essentially, while others only accidentally. So, it seems that bundle theory, far from being the best framework to accommodate essentialism, entails some sort of ultra-essentialism (or anti-essentialism, according to certain ways of looking at the distinction). However, as it will be shown later, Paul's bundle theory (just like Jago and Barker's) is somewhat of a non-standard bundle theory, in that it does not involve the idea that an object x is F only if Fness is in the bundle identical to x. This will be of crucial importance in what follows.

4.4.1. Why look for reduction?

The standard way of both formal and informal rendering of essentialist claims is in terms of modal notions. I started this section by saying informally that essential properties are those that things have necessarily, while accidental properties are those they could possibly exist without. Formally, essentialist claims are taken to be equivalent to *de re* modal claims, in which a modal property is attributed directly to an object the claim is about. This effect is achieved either by using directly referring singular terms (like names) or by using definite descriptions outside the scope of modal operators. For example, 'Necessarily, Tom is tall' is a *de re* modal claim, as is a claim that has a description outside the scope of the modal operator, like 'The author of *On The Plurality of Worlds* is

[151] For a discussion of such problems with bundle theories, see in particular van Cleve (1985).

such that, necessarily it is a person'. If essentialists' claims are *de re* modal claims, then that x is essentially F just means that necessarily, x is F if it exists (or something similar).

I will be talking as if there are such properties as *being necessarily F*, and call such properties *de re modal properties*. If a modal idiom is a way to formally render the essentialists' claim, then *being necessarily F* and *being essentially F* are the same properties.[152]

Philosophers in the last couple of decades have been preoccupied with offering an account of modality *de re* in more perspicuous terms. The motivation for this should be obvious. In most cases, we can verify empirically which categorical properties some physical object has. For example, I can see that the table I am sitting at is white and wooden. If I had more skill and some tools, I could probably find out more about its scientific properties. But these properties seemingly do not exhaust all of my table's properties, because it also has *de re* modal properties, which concern how an object possesses its empirically apparent properties. Even though my table is both white and wooden, the ways in which it possesses these properties seem to differ. It is only accidentally white, while it is essentially wooden (or so it seems). This is where the trouble appears.

It seems that there is no way to verify empirically which properties my table has accidentally and which it has essentially. All I can say is that it is white, wooden, etc. But what makes *being made of wood* special, as opposed to *being white*? What determines that my table is essentially or necessarily wooden, as opposed to being only accidentally wooden? Other perplexing questions arise. For example, what about other white wooden tables? Could there be a table just like mine, except that it is essentially white and only accidentally wooden? And if so, are there two tables in front of me, both looking alike except for differing in *de re* modal properties? In general, we could ask what determines how modal qualifications are distributed over the categorical properties of my table, or any other physical object for that matter.

These are all difficult questions facing those who believe that the essential/accidental distinction carves the categorical nature of things in a way that does not depend on how we categorise and refer to these objects. But even beyond the need to answer these questions, there is something quite mysterious about properties which do not concern merely how something is in the actual world, but somehow 'point beyond that' (Sider 2003, 185).

[152] For an opposing view, see Fine (1994).

All this makes the search for an account of *de re* modality in more transparent terms even more important. That is, it seems that we could answer some of the above questions if we could explain what it is to have a property essentially or merely accidentally in further, non-modal terms. Further motivation for seeking an account of modality *de re* comes from some perplexing philosophical puzzles involving material objects that arise in connection with their essential properties. Most notably, many philosophers believe in the possibility (and in fact pervasiveness) of numerically distinct but materially and spatially coincident objects. Why believe in such a thing? The main motivation comes from differences between objects in *de re* modal properties. Take again the example involving a human-shaped statue and the lump of clay of which it is made. It seems that the lump of clay has modal properties which the statue lacks, for example, *being possibly spherical in shape*. Given the intuitive differences in modal properties between the statue and the lump of clay, it seems that we are compelled to conclude that the statue and the lump of clay are numerically distinct, despite being spatially and materially coincident.[153] As said at the beginning of this chapter, this raises many puzzles. One of the most persistent questions related to scenarios like this is how material objects could coincide in the first place, and how they could differ in *de re* modal properties, despite seemingly being so similar in other respects. Given that the numerical distinctness of the statue and the lump of clay follows from their modal difference, it is reasonable to expect that a better understanding of the basis of *de re* modal properties would help us make progress on problems like the above.

4.4.2. Modal properties and representational properties

The specific reductive base of *de re* modal properties that Paul has in mind comprises the qualitative properties that are involved in explaining how objects are represented as being in other possible worlds. The basic idea is that an object is accidentally F iff it is F and there is a world in which it is not F. On the other hand, an object is essentially F iff there is no world in which it lacks F.[154] What is true of an object x in some world is a matter of how that world represents x as being. That is, what is true in a world is just what the world represents. The crucial question at this point is how a world represents an object as being a certain way. The answer will obviously depend on the details of

[153] It should be noted that differences in modal properties are not the only differences philosophers rely on in establishing the numerical distinctness of materially coincident objects. See notably Fine (2000).
[154] This is equivalent to an object being F in every world according to which it exists. More precisely, this and the above account are equivalent under the assumption that there is no object x and world W such that x has some property according to W, without existing according to W. See Plantinga (1974, ch. 4).

someone's modal metaphysics. In particular, how we will answer the question about *de re* representation is usually influenced by which metaphysical status we accord to possible worlds.

According to David Lewis, who thought of other possible worlds as maximally spatio-temporally unified concrete wholes, other worlds *de re* represent how I am not by having me as a part, but by having some other objects as parts that resemble me in a relevant respect and to the required degree.[155] The sense of similarity is fixed by the context of utterance.[156] For example, some non-actual possible worlds represent me as being F, not by having me as a part, but by having a part which is my counterpart and which is F, where counterparthood is determined by qualitative similarity. In this respect, I am only accidentally F if I have counterparts which are not F, while I am essentially F if all my counterparts are F. It should be apparent why this view provides a reductive qualitative base for *de re* modal properties. Since me having the *de re* modal properties of being essentially F or only accidentally F depends only on what my counterparts are like, and since counterparthood is a matter of qualitative similarity in the relevant respect, it seems that once the contextually relevant sense of similarity is fixed, which *de re* modal properties I have is settled purely by how I and objects in other worlds are qualitatively.

Paul accepts that an account of the *de re* modal properties of objects should be given in terms of how their counterparts are. This, however, does not mean that she accepts Lewis's framework of concrete possible worlds and the idea that no concrete object is a part of two worlds. An important question that might be asked is whether someone who does not think of other worlds and their inhabitants as concrete entities could avail themselves of a qualitatively based counterpart relation in accounting for *de re* modal properties. In other words, could actualists who think of other

[155] See in particular Lewis (1986a) and (1971).

[156] This is Lewis's later version of the counterpart theory, unlike its early variant according to which there is a unique context-invariant similarity relation relevant for counterparthood. For the earlier view, see Lewis (1968). It is questionable whether this variant really demystifies *de re* modal properties. The reason, of course, it that it is not clear why there is a single privileged sense of similarity relevant for counterparthood. For further discussion, see Beebee & MacBride (2015). An interesting recent proposal by Buras (2006) is that similarity with respect to natural properties (as conceived by Lewis) can be the unique privileged sense of similarity relevant for counterparthood. Against this, it could be said that it is not clear how this applies to objects lacking perfectly natural properties. Assume that I lack perfectly natural properties. So, something counts as a counterpart of me if it is sufficiently similar to me with respect to properties that are natural only to some degree. But to what degree exactly? The only non-arbitrary answer, it seems, is that naturalness to any degree between 0 and 1 counts. But if that is the case, it is far from obvious that this similarity relation will give us anything resembling a determinate counterpart relation. This is especially so if we allow that disjunctive properties could be natural to some degree. In that case, what excludes the possibility that any two particulars share infinitely many somewhat natural properties (just assume that there are continuum-many mass properties and that the disjunction of any three is somewhat natural, so that a, which has m_1, and b, which has m_2, share infinitely many disjunctive properties like being m_1 or m_2 or m_k), and so that the counterpart relation based on this sense of similarity fails to be discriminatory? On a more principled basis, even if this gives us a unique counterpart relation, the question is why the naturalness-based similarity relation would be uniquely relevant for *de re* modal properties.

worlds[157] and individuals as abstract entities rely on qualitative counterparts in their approach to *de re* modal properties?[158]

Here is an obstacle to the actualist account of *de re* modality in terms of counterparts presented by Lewis (1986a, 238). Actualists think that other (non-actualised) worlds and individuals are abstract entities that somehow represent how concrete entities might have been. Thus, even if there are no non-actual world and individuals, there are actually existing surrogates for them that represent (in every minute detail, intrinsic or extrinsic) how things might have been. There are also abstract objects that represent how actually existing concrete things are. Thus, even if there are no otherworldly individuals to be our counterparts, there are abstract surrogates that could be counterparts of each other. But the surrogates are abstract and so they do not have the qualitative properties that we might think are relevant for counterparthood (they are not similar in a relevant qualitative respect). Perhaps we could say that two abstract surrogates are counterparts iff any two things that would actualise them would be similar in a relevant respect. According to Lewis, however, the worry is that most surrogates could not be jointly actualised, and so the above counterfactual would be vacuously true in most cases.

Recently, Theodore Sider and Richard Woodward have separately given accounts of how abstract surrogates could be counterparts that seem to avoid Lewis's objection.[159] If they are correct, then it seems like even actualists could avail themselves of counterpart theory. Paul thinks that her bundle-theoretic account of *de re* modality could be adopted both by counterpart theorists who are actualists and counterpart theorists who are Lewisian realists. In the following sections I will adopt Lewis's framework for ease of exposition. The issues I think arise for Paul's account do not depend on whether we are actualists or realists.

4.4.3. Varieties of shallow essentialism

Shallow essentialism is Paul's common name for the variety of views that could accommodate the truth of essentialist attributions, but that fall short of satisfying all the tenets of essentialism

[157] Actualists do not think that non-actualised worlds are non-existent. They exist, but they are not actualised.
[158] Of course, actualists could not give a full reductive account of modality because they accept some *de dicto* modal claims as basic.
[159] For a detailed discussion, see Sider (2006) and Woodward (2017).

mentioned at the beginning of this section (Paul 2006, 333). Recall that essentialism, as characterised before, is the view that there are two ways for objects to have properties, essential and accidental, where this distinction is independent of the manner in which objects are picked out. In addition to this, Paul says that the intuitive thought associated with essentialism is that an object's essential properties are somehow reflective of the nature of that object, of what it is. It is what is required of something in order to be the object in question. Shallow essentialism is essentialism only in name. It accommodates the truth of our essentialist assertions, but, according to Paul, it does not give proper essentialists all that they want.

The first variety of shallow essentialism is what Paul calls 'evaluative' essentialism. This view starts from the basic idea that an object's modal properties are determined by the way its counterparts are, where counterparthood is a matter of similarity in a relevant respect and to a relevant degree. What makes some particular respect and degree of similarity relevant for counterparthood? According to evaluative essentialism, it is the way we refer to objects, or the context of evaluation in general, that determines which respect and degree of similarity is relevant.[160] For example, in thinking of the human-shaped statue in front of me as a statue, the sense of similarity evoked could be one according to which all of its counterparts are human-shaped. That being the case, it will be true to say that the statue in front of me is essentially human-shaped. On the other hand, in calling the same thing a lump of clay, the sense of similarity relevant for counterparthood would be different, such that the thing in question has some counterparts which are not human-shaped. In that case, the utterance 'The lump of clay in front of me is only accidentally human-shaped' will be true. Given that the sense of similarity relevant for counterparthood varies with context, it seems that the modal properties of objects have to vary with context as well. Evaluative essentialism obviously reduces *de re* modality to representational properties. The trouble is that it does not satisfy our initial characterisation of essentialism, because it takes modal properties not to be absolute, but varying with context. The view is also rather mysterious, as it implies that we somehow affect, by deciding how to refer to an object, which modal properties it has, which can sound like an unwanted kind of idealism to many (Divers 2007).

Paul's second brand of shallow essentialism is anti-essentialist essentialism. According to this view, what counts as a counterpart of something does not vary with context. As I understand Paul, this brand of shallow essentialism takes counterparthood to still be determined by qualitative similarity

[160] For a much more detailed discussion of these matters, see Divers (2007; 2008).

in the sense that, if there is a respect of similarity according to which x counts as similar to y, then x just is a counterpart of y. In this sense, since we are not privileging any respects of similarity over others, almost everything will count as a counterpart of everything, given that it will always be possible to find a respect of similarity (even if very lenient) such that any x is similar to any y in that respect. This view still makes some essentialist attributions true, because, according to it, context operates in a way that restricts quantification over counterparts. Recall, the counterpart-theoretic content of 'x is essentially F' is 'x has no counterpart which is not-F'. In other words, this content involves quantification over counterparts. The utterance of 'x is essentially F' may very well be true in a context in which the counterparts of x that are not F are absent from the relevant restricted domain of quantification. So, this view gives 'lip service' to essentialism by making certain essentialist utterances true. However, strictly speaking, given that x will have (speaking without restrictions) some counterpart which is not F (because almost everything is a counterpart of everything), it will not have the *property* of being essentially F.[161] In general, for almost every non-trivial property Fness, nothing will be, strictly speaking, essentially F. But if that is so, then this variant violates one of the central tenets of essentialism, namely that for some non-trivial properties, some things could have them essentially. This also obviously reduces *de re* modal properties to representational properties; however, it seems extensionally inadequate to the extreme.

These varieties of shallow essentialism differ when it comes to how they answer the question of which properties are expressed by modal predicates. According to evaluative essentialism, a modal predicate expresses the same modal property in every context.[162] According to the anti-essentialist view, modal predicates express modal properties only in the context in which we quantify over counterparts without restrictions. Paul sums up the difference in the following passage:

> On both views, the truth of "O is essentially blonde" can vary with context, but it varies for different reasons. On the evaluative interpretation of shallow essentialism, the counterparts and thus the modal properties of an object are determined in part by contexts of description or evaluation, and so an object's modal properties can vary with context. On the

[161] Of this view, Paul says that it 'takes modal properties to be context independent, but takes modal predication to be context dependent.' (Paul 2006, 344) I take it that this means that modal predicates do not express modal properties in all contexts.

[162] I should note here that Paul does not discuss which conception of properties would be required for these views to be as she describes them. When it comes to the anti-essentialist variant, modal properties might just be sets of their actual and merely possible instances. According to this view, *being possibly F* is a set of individuals that have a counterpart which is F (where quantification over counterparts is not restricted). On the other hand, according to evaluative essentialism, since things change their modal properties form context to context, modal properties could not be sets of their instances. They could, however, be some sort of functions from the relevant features of contexts to sets of individuals.

> antiessentialist interpretation of shallow essentialism, the modal properties of an object are determined by context independent counterpart relations, but what modal predications we can make of an object (what counterparts we can truthfully ascribe to it) varies with context. (Paul 2006, 345)

There is also the possibility of a third view, namely, that modal predicates express different modal properties in different contexts. According to this view, there is no single modal property corresponding to every modal predicate, but which modal property is expressed by a predicate depends on the context.[163]

No matter which variant of shallow essentialism we pick, however, they all seem to end up violating one or the other tenet of essentialism. In the next section, I will present Paul's view, which starts from the same basic idea as the previous accounts discussed, namely that *de re* modal properties are determined by representation relations to other objects, where representation is a matter of qualitative similarity. As opposed to other versions of shallow essentialism, Paul's view seems to satisfy all the important tenets of full-blown essentialism. However, as I will argue, the view could not be properly classified as reducing *de re* modal properties to representational properties in any intuitive sense.

4.4.4. Bundle theory and essentialism

Paul accepts the basic idea of explaining modality *de re* in terms of how objects are *de re* represented as being, but thinks that the problems affecting shallow essentialism could be avoided by situating the representational account within the bundle theory of objects. The particular brand of bundle theory she accepts is called mereological bundle theory. According to mereological bundle theory, ordinary objects like organisms and tables are the mereological sums of properties.[164] The construction of ordinary objects out of their properties which is relevant for Paul's purposes of reducing *de re* modality to representational properties comes in two stages. Among the properties found in bundles that are ordinary objects, we first find what Paul calls core properties. Core properties are basic non-modal properties. For example, the core properties of my table are its

[163] As a matter of fact, I think this interpretation suits Lewis's late counterpart account of *de re* modality the best.
[164] Y is a mereological sum of the xs iff each of the xs is a part of y, and every part of y overlaps at least one of the xs.

colour, shape, etc. Furthermore, the core of my table, which is the sum of its core properties, stands in a represented-by relation to otherworldly objects, where standing in a represented-by relation to something is a matter of being similar to that thing. If x stands in a represented-by relation to an F, then we also have the relational representational property *being represented by a thing that is F (or being represented as F).* Thus, when things stand in the represented-by relation to other things, relational representational properties are somehow generated. Finally, these derived relational representational properties are further parts of my table that ground its *de re* modal properties according to the following principles:

(1) O is accidentally F iff O includes F as a part and includes the *de re* representational property of being represented as not-F.
(2) O is essentially F iff O includes F as a part and does not have as a part the *de re* representational property of being represented as not-F.

Suppose my table is essentially wooden. This means that it has the core property of being wooden as a part of it, and also that it does not have as a part the relational representational property of being represented as non-wooden.

This does not mean that the core of my table does not stand in the represented-by relation to something non-wooden. If this were the case, it would be possible to object that Paul's theory favours only certain respects of similarity as opposed to others. For example, it would be possible to object that it favours those respects according to which my table's core does not have non-wooden counterparts, as opposed to other respects according to which it has non-wooden counterparts. This sort of favouritism would be objectionably arbitrary (Paul 2006, 355). According to Paul, my table's core stands in the represented-by relation both to wooden and non-wooden things. This is because there is a sense of similarity according to which the core is similar to non-wooden things, and a sense of similarity according to which the core is similar to wooden things. That the core is represented both by wooden and non-wooden things in turn generates the relational representational properties *being represented as wooden* and *being represented as non-wooden.*

However, my table only has the first of these two relational properties as a part, while it lacks the second. The fact that it lacks the second explains why it is essentially wooden. There is also a second object present, one that has the same core as my table, but also has as a part the relational representational property *being represented as non-wooden.* Given that this object shares its core

with my table, it is non-modally just like it, but it differs from it in being only accidentally wooden. We can call this thing Quasi-table. In this way, in addition to avoiding arbitrariness (because it does not favour any respect of similarity over another), the bundle-theoretic account of modality *de re* makes modal properties absolute, as opposed to context dependent. No matter the context, my table is essentially wooden because it lacks the property *being represented as non-wooden* as a part. We might ask at this point, however, if Paul's bundle-theoretic account of modal properties along the representationalist line really reduces modality *de re* to representational properties? In the next section, I will argue that the answer is no.

4.4.5. Bundle theory and reduction

Could *de re* modal properties really be reduced to relational representational properties in the way Paul proposes? Take again my table and Quasi-table as examples. My table and Quasi-table share their core properties, and so are indistinguishable when it comes to their qualitative non-modal properties. The only difference between them is that my table is essentially wooden, while Quasi-table is not. Since they share a core, if the core of Quasi-table stands in the represented-by relation to something which is non-wooden, then so does, trivially, the core of my table. Given that it is the core of something in virtue of which it is represented as being a certain way,[165] it follows that if Quasi-table is represented as non-wooden, then so is my table. But given this, it seems like a trivial inference step to the conclusion that my table and Quasi-table both have the relational representational property of being represented by something non-wooden. The sort of inference I have in mind is an inference from the proposition that two things are related in a certain way, to the proposition that one of those things has a corresponding relational property. For example, from the proposition that Romeo loves Juliet, it seems like we can infer the proposition that Romeo has the relational property of loving Juliet (if such a property exists, of course). Similarly, from the proposition that my table is represented by something non-wooden, it is just a trivial inference step to the conclusion that my table has the property of being represented by something non-wooden (under the assumption that there is such a property, which is the central part of Paul's theory). More generally, the following principle seems hard to doubt: if x stands in R to something which is F, then x has the relational property of standing in R to something which is F (if such a property exists). But if

[165] This is so because *de re* representation by other things is a matter of qualitative similarity, and the core of something comprises the qualitative properties of that thing.

both Quasi-table and my table have the relational representational property of being represented by something non-wooden, how can it be that only Quasi-table has this relational representational property as a part, without my table having it as a part as well?

We can present this problem more precisely in the following form:

(1) Quasi-table and my table are both represented as being non-wooden.

(2) Quasi-table and my table both have the relational property *being represented as non-wooden*.

(3) Quasi-table and my table both have the relational property *being represented as non-wooden* as a part.

The problem I have in mind is that (2) seems to follow from (1), and (3) seems to follow from (2), where (3) contradicts the main idea of Paul's bundle theory, namely that my table and Quasi-table differ modally, because only one of them has the property *being represented as non-wooden* as a part.

As I have already explained, (1) is justified by the fact that both my table and Quasi-table share a core, where the core is responsible for how objects are *de re* represented by other objects. The core of both my table and Quasi-table stands in the represented-by relation to something non-wooden, which is just what (1) tells us. The transition from (1) to (2), as said, has the form of many trivial inferences, such as that from the proposition that Romeo loves Juliet, to the proposition that Romeo has the property of loving Juliet. Finally, the transition from (2) to (3) seems to be justified by accepting the mereological bundle theory. The main idea of the theory seems to be exactly that x has the property Fness iff x has Fness as a part.

Given that (1) just means that the shared core of the Quasi-table and my table stands in the represented-by relation to something non-wooden, the only way for Paul to resist this argument is to reject either the inference from (1) to (2), or the inference from (2) to (3).

Before I proceed further, a remark on (1) is in order. At one place, it seems that Paul denies (1) on the following basis:

> I stipulate that an object is de re represented as F in virtue of that object including the de re representational properties generated by its core standing in a de re represented-by relation to an ersatz individual that has a counterpart that is F. (A modal realist could stipulate that an object is de re represented as F in virtue of that object's including de re representational properties generated by its core standing in a de re represented-by relation to a counterpart that is F). (Paul 2006, 370, endnote 41)

If we accept this stipulation, it seems that we have to deny (1). According to Paul's stipulation, for something to be represented as F, it has to have the relational property *being represented as F* as a part. Since only Quasi-table has the relational property *being represented as non-wooden* as a part, while my table does not have this relational representational property as a part, it follows from Paul's stipulation that only Quasi-table is represented as non-wooden, while my table is not. This strikes me as highly implausible, as it would then follow that, despite my table standing in a represented-by relation to something non-wooden, it is not represented as non-wooden. We could only wonder how this generalises further. For example, suppose Romeo stands in the relation *loving* to Juliet. Does it follow from this that Romeo loves Juliet? Or does Romeo have to include the relational property *loving Juliet* as a part in order for it to be the case that he loves Juliet?

Things get even worse if we accept, as Paul does, that the relation of being represented-by is just being non-modally similar in a certain respect and to a certain degree (for short: being similar). Both my table and Quasi-table stand in such a relation to something non-wooden (because they share a core). Does it follow that they are both similar to something non-wooden? According to Paul's stipulation, this does not follow. Only Quasi-table is similar to something non-wooden, because only Quasi-table has the relational property *being similar to something non-wooden* as a part. But this sounds very implausible. If my table and Quasi-table are indistinguishable when it comes to their non-modal qualitative properties, then it seems if one of them is similar (in a non-modal respect) to something which is F, the other should be too. To say otherwise is akin to saying that for two red things A and B, in order for A to be similar to B in colour, it is not enough for them both to be red, but A also has to have the relational property *being similar in colour to B* as a part (where it is possible for some third thing to be red without having *being similar in colour to B* as a part).

Going back to the above argument, Paul has to deny either the step from (1) to (2), or the step from (2) to (3). Inferences like the one from (1) to (2) are sometimes denied on the basis that only (2) commits us to the existence of such abstract objects as properties. The proposition that Quasi-table

is represented as non-wooden does not commit us to the existence of properties, while the proposition that Quasi-table has a corresponding relational representational property does. However, given that the central part of Paul's theory is the idea that there are such things as relational representational properties, it seems that she could not deny the inference from (1) to (2) on the basis that only (2) commits us to the existence of such properties. Once relational representational properties are admitted, the inference from (1) to (2) seems safe. The only remaining option, thus, is to deny the step from (2) to (3). This means that despite both Quasi-table and my table being represented as being non-wooden, only one of them has the relational property of being so represented as a part, which explains why they are modally distinct.

We have seen that each variant of shallow essentialism involves a reductive account of modality *de re* to the qualitative representational base. Once the context of utterance fixes the respect and the degree of similarity relevant for modal ascriptions, the truth modal ascriptions becomes a matter of which things are similar to which in the relevant respect. However, this was also the source of the contextual variability of our modal judgments. If we think or talk of what is in front of us as a human-shaped statue, the relevant sense of similarity is such that all its counterparts are human-shaped. If we think of it as a lump of clay, the relevant sense of similarity is such that not all its counterparts are human-shaped. By making *de re* modal properties solely a matter of non-modal similarity in a relevant respect, these accounts make *de re* modal properties less robust than committed essentialists would want. This seems to be the price if we want to account for *de re* modal properties in terms of similarity. Paul's view does not imply any of this. Given that which relational representational properties something has as parts does not vary with context, its modal properties also do not vary with context.

However, it is no longer obvious that Paul's account genuinely reduces *de re* modal properties to how things are represented as being by other individuals. The picture of material objects that comes out of Paul's account is one according to which they might not differ in how they are represented (premise (1) above), while differing in which representational properties they have as parts (denial of (3)). Does this account reduce essential properties to representational properties? It seems to me that the answer is no. I think this can be seen if we compare Paul's theory to an alternative bundle-theoretic account of essential properties which, in my opinion, is obviously not reductive in the relevant sense. I will argue that if this second account is not reductive, then neither is Paul's.

The account I have in mind is the one proposed by Mark Jago and Stephen Barker under the label 'essential bundle theory', which I discussed in the previous chapter (Barker & Jago 2018). Jago and Barker's essential bundle theory accounts for the essential and accidental properties of objects in terms of which properties (understood as particular property instances, not universals) they have as parts. The central part of essential bundle theory is the following:

(Nature Thesis) Material object x is essentially F if and only if an F-instance is part of the x-bundle.

According to Jago and Barker, both Quasi-table and my table are wooden, but they differ in their essential properties because only my table has an instance of *being wooden* as a part. In general, the main idea of essential bundle theory is that two things might be F while differing in whether they both have Fness as a part. It seems to me that Paul's theory turns out to be very similar to essential bundle theory in this respect. According to Paul, both my table and Quasi-table are represented as being non-wooden (they have the same core standing in the *represented-by* relation to something non-wooden). But only Quasi-table has the corresponding relational property as a part. The difference is that Jago and Barker accept the idea that a thing can be F without having Fness as a part across the board. Paul, on the other hand, thinks that only for relational representational properties, something can be represented as F without having that relational property as a part.

Does Paul's theory involve the reduction of *de re* modal properties to representational properties? I think the answer to this question has to be the same as the answer to the question whether Jago and Barker reduce modal properties like *being essentially F* to the property *being F*. But it should be obvious that the answer to the last question is 'no'.[166] It would be absurd to say that Jago and Barker reduced the property *being essentially F* to *being F*. After all, both my table and Quasi-table are wooden. They only differ, according to Jago and Barker, when it comes to having an instance of *being wooden* as a part. This may very well account for why they differ in their modal properties. However, there is no suggestion that, if their account were successful, that would entail a reduction of the modal property *being essentially wooden* to the non-modal property *being wooden.*

I think that a similar story is true of Paul's theory. Both my table and Quasi-table are represented as being non-wooden. However, only Quasi-table has the relational property of being represented as non-wooden as a part. This could very well explain why they differ modally. But even if this explanation of *de re* modal differences between my table and Quasi-table is correct, it in no way

[166] I should note that it is not Jago and Barker's aim to say that *being essentially F* reduces to *being F*.

suggests that modal properties are representational properties. Shallow essentialists could say that their account is truly reductive in that according to them, *de re* modal properties are just representational properties. This is at the same time the source of numerous dissatisfactions that deep essentialists (like Paul) have with shallow essentialism. On the other hand, Paul's account is genuinely deep in that it treats modal properties as absolute and context dependent. However, this is not an account according to which *de re* modal properties are representational properties. Paul's theory perhaps reduces *de re* modal properties to the property of having certain relational representational properties as parts, but this is not the same reductive base of de re modal properties that other representationalist have in mind. It is not even clear if the reductive base is qualitative in the first place, as Paul claims. This is because it is not clear if having some specific entity (in this case, some relational representational property) as a part should be counted as a qualitative property in the first place. For example, that my table has this particular top as a part does not seem like a qualitative property of it.

Given all this, we might wonder, why should we not just accept Jago and Barker's simpler version of the essential bundle theory? In other words, given that *de re* modal properties are not representational properties, why should someone who accepts an essential bundle theory think that whether my table is essentially wooden depends on which relational representational properties it has as parts? It seems that Jago and Barker's account is simpler and works equally well. In the next section, I will argue that each version of essential bundle theory faces what could be called the arbitrariness problem. Before I continue, I want to discuss briefly how Paul's theory can accommodate the variability of our modal judgments.

Both Lewis and Quine were impressed by the extent to which our *de re* modal judgments could vary with context.[167] For Quine, this was the reason to repudiate such discourse. On the other hand, Lewis tried to accommodate this variability by taking the similarity required for representation to vary with context. Thus, for Lewis, the human-shaped statue in front of me is essentially human-shaped in a context in which it being a statue is somehow salient. If the context changes so that its lumphood is salient instead, it will not be true anymore that it is essentially human-shaped. Does this mean that the statue has changed its modal properties? The answer is, of course, no. What happened is that the property expressed by 'being essentially human-shaped' in one context is not the same as the property expressed in the other. Roughly, what is being expressed in the first context is the property of not having a statue-counterpart which is not human-shaped. On the other

[167] See Divers (2007) for a nice discussion of this.

hand, what is expressed in the second context is the property of not having a lump-counterpart which is not human-shaped.[168] There is no contradiction in having the first property without having the second.

Paul can accommodate variability in a different way. For her, what changes from one context to the other is not the property expressed by 'being essentially F', but the object to which we ascribe this property. The statue and the lump are different. Since the token of 'the statue in front of me' and the token of the 'lump in front of me' do not have the same reference, there is no contradiction in saying that the statue is essentially human-shaped, while the lump is not.

But what about cases in which the truth value of a single modal sentence varies with the context? To take a familiar example, in a context in which 'being a philosopher' is salient, it is true to say 'Saul Kripke is essentially a philosopher', while in a context in which biological origin is salient, it is not true to say this. Lewis's account of this is the same as above. However, Paul's account cannot be, as it would be implausible to say that the name 'Saul Kripke' changes reference from one context to the other. It seems that we should say that the name has indeterminate reference, which seems implausible. One way for Paul to avoid this is to deny that the truth value of 'Saul Kripke is essentially a philosopher' can vary across context. She can only accept a restricted degree in which the truth value of our modal judgments can vary with context, as opposed to Lewis.

4.4.6. Arbitrariness problems

In this subsection I want to give an argument against both Jago and Barker's essential bundle theory and Paul's variant of bundle theory. Take again Paul's clauses concerning *de re* modal properties:

(1) O is accidentally F iff O includes Fness as a part and includes the de re representational property of being represented as not-F.

(2) O is essentially F iff O includes Fness as a part and does not have as a part the de re representational property of being represented as not-F.

[168] This is the mark of what Harold Noonan calls 'Abelardian' predicates. See Noonan (1991).

We might ask at this point, under what conditions do some representational properties and a core compose something? This is what Paul calls the modal composition question. Paul's preferred answer to this seems to be universalism:

> The deep essentialist can hold that for any class of a core C and some of the de re representational properties it generates, there is a sum of the members of that class. In other words, if the sort of composition between a core and the de re representational properties it generates is unrestricted, then there is no ad hoc primitive restriction on which objects exist. (Paul 2006, 359)

However, I doubt that this is an answer a deep essentialist could accept. Take the following two representational properties: (i) *being represented as non-red* (ii) *being represented as non-crimson*. Take also my notebook, which is both crimson and red. Call the mereological sum of the non-modal properties of my notebook N_c. If universalism is true, then there is a sum of N_c and the property of being represented as non-red. By (1) above, it follows that the sum of N_c and the representational property of being represented as non-red is accidentally red. Since this sum does not have the property *being represented as non-crimson* as a part, while it has *being crimson* as a part, it follows by (2) that it is essentially crimson, while being only accidentally red. But this seems impossible.

Jago and Barker do not accept that any set of co-located property instances composes something, so the problem does not arise for them. If they accepted this, the problem would be even more apparent within their proposal. Recall the central bit of their theory:

(Nature thesis) Material object x is essentially F if and only if an F-instance is part of the x-bundle.

Take an object which is both crimson and red because (according to Jago and Barker's bundle theory) it coincides with an instance of crimson and an instance of redness. If the instance of crimson associated with this object is not identical to the instance of redness, then there will be an object that has an instance of crimson as a part, without having an instance of redness as a part (assuming that any set of co-located property instances composes something). It follows from (Nature thesis) that this object is essentially crimson, without being essentially red, so we come across the same problem as with Paul's theory.

Jago and Barker avoid the problem, as I mentioned already, by restricting composition. According to them, some set S of property instances composes a material object when S is closed under grounding. By this, they mean that if there is a property instance G grounded in the property instances belonging to S, then G is in S as well. For example, if S contains an instance of crimson, it has to contain an instance of redness because *being crimson* grounds *being red*. It follows from this that nothing could have an instance of crimson as a part, without having an instance of redness as a part. This avoids the above problem.

A similar restriction on property (or as Paul calls it, modal) composition could be adopted by someone following Paul's proposal. For example, we could say that if something is to have the property of being represented as non-G as a part, it has to have the representational property of being represented as non-F as a part, whenever *being F* grounds *being G*. Since *being crimson* grounds *being red*, nothing could have the property of being represented as non-red as a part, without having the property of being represented as non-crimson as a part.

At this point, I will argue that if we want to ground the modal profile of a concrete particular in its ontological structure, we are left with alternative ways to do it, each of which is suitable for the task. As said earlier, the ontological structure of a concrete particular is the structure concerning the properties that are parts of this object. Not everybody thinks that ordinary objects have an ontological structure, because not everybody agrees that ordinary objects have properties as parts in the first place. The main idea of essential bundle theories is to ground the modal profile of objects in their ontological structure. As said, I think that there are alternative ways to do this, each of which is equally suitable. This results in objectionable arbitrariness.

The sort of arbitrariness I have in mind is often exemplified in ascribing a set-theoretic structure to ordered pairs (or ordered tuples in general) in order to account for their identity conditions. For example, there is a feature of 'order' of the pair <a,b>. This feature is reflected in the identity conditions of ordered pairs: <a,b> = <c,d> iff a=c and b=d. How should we account for the identity conditions of ordered pairs? The most common proposal is by ascribing them a set-theoretic structure. We could say that <a,b> is just the set {a,{a,b}}, and that <b,c> is just {c,{b,c}}.[169] Given the identity conditions of sets, {a,{a,b}} is identical to {c,{c,d}} iff a=c and b=d. In this way, we have

[169] See for example the classical introductory text by Halmos (1974, section 6). For a detailed philosophical discussion, see Rodriguez-Pereyra (2002).

accounted for the feature of order of ordered pairs (that is, their identity conditions) by ascribing them a set-theoretic structure (by treating them as sets).

As is familiar, there are alternative set-theoretic reductions of ordered pairs that could account equally well for their ordering or identity conditions. Just as we could equate <a,b> with {a,{a,b}}, and say that the first element is the one which is always the member of the set in question, so we could also equate <a,b> with {{a,b},b} and say instead that the second element is always the member of the set in question. Given this, it is sometimes said to be arbitrary which set is picked for the set-theoretical reduction of ordered pairs. There is no more reason to treat the first set as identical to <a,b>, than there is to treat the second. It is further argued that this means that ordered pairs could not be sets if we are to avoid arbitrariness.

I think the same sort of arbitrariness affects both Jago and Barker's and Paul's account, as well as essential bundle theories in general. Suppose A is both essentially crimson and essentially red. According to Jago and Barker, A has this modal profile because it has an ontological structure including an instance of redness and an instance of crimson. But we could ascribe an alternative ontological structure to A which could equally well account for its modal profile. The following is the package of principles accepted by Jago and Barker:

(Grounding closure) If an instance of Fness is grounded in instances of $G_{1,\ldots,}G_n$, which are parts of an object x, then an instance of Fness is also a part of x.

(Nature thesis) Material object x is essentially F if and only if an F-instance is part of the x-bundle.

The principle (Grounding closure) describes the ontological structure of ordinary objects. (Nature thesis) accounts for their modal profile in terms of ontological structure. However, an alternative pair of principles is possible:

(Grounding non-redundancy) An instance of Fness is a part of x only if no instance of Gness is a part of x such that *being G* grounds *being F*.

(Nature thesis*) Material object x is essentially F iff an instance of Fness is a part of x, or for some properties $G_1,\ldots G_n$, the instances of $G_{1,\ldots,}G_n$ are parts of x, and they ground an instance of Fness.

According to (Grounding non-redundancy), if an instance of Fness is a part of an object, then no other instance of a property grounded in Fness is a part of the same object. For example, if an instance of crimson is a part of some objects, then no instance of being red is a part of the same objects, because *being crimson* grounds *being red*. According to this principle, ordinary objects never have redundant property instances as parts (redundant from the standpoint of their modal profile).

Given the alternative principle of composition, we have an alternative account of modal profile in (Nature thesis*). However, both packages of principles are equally adequate. Both can ground the modal profile of ordinary objects in their ontological structure. However, they pair the same modal profile with different ontological structures. According to the first package, an object which is essentially crimson has both an instance of crimson and an instance of redness as a part. According to the second package, this object has at most an instance of crimson as a part. Just as there are alternative set-theoretical ways to account for the identity conditions of ordered pairs, so there are alternative bundle-theoretical ways to account for the modal profile of concrete particulars. What could be the basis for choosing among these different structures the right one for accounting for a modal profile? As far as I can see, there is none.

Given that Paul also has to restrict composition, similar problems arise. Here is one package of views we could accept:

(Comp1) If something has the property of being represented as non-G as a part, it also has the representational property of being represented as non-F as a part, whenever *being F* grounds *being G*.

(1) O is accidentally F iff O includes Fness as a part and includes the *de re* representational property of being represented as not-F.

(2) O is essentially F iff O includes Fness as a part and does not have as a part the *de re* representational property of being represented as not-F.

According to (Comp1), if something has the property of being represented as non-red as a part, then it also has as a part the property of being represented as non-crimson, because *being crimson* grounds *being red*. Given (Comp1), as I discussed before, (1) and (2) will not open up the possibility

of there being a thing which is essentially crimson and accidentally red. However, an alternative package is possible:

(Comp2) If something has the property of being represented as non-G as a part, then for no property Fness, such that *being F* grounds *being G*, does the object have the property of being represented as non-F.

(1') O is accidentally F iff O includes Fness as a part and includes the *de re* representational property of being represented as not-F, or the *de re* representational property of being represented as non-G for some property Gness grounded in Fness.

(2') O is essentially F iff O includes Fness as a part and does not have as a part the *de re* representational property of being represented as not-F nor the de re representational property of being represented as non-G for some property Gness grounded in Fness.

According to (Comp2), if an object has as a part the property of being represented as non-red, it does not also have the property of being represented as non-crimson (or as non-F for any other determinate shade of redness) as a part. When it comes to accounting for the modal profile of the object in question, the property of being represented as non-red is sufficient. Principles (1') and (2') serve to, so to say, read the modal profile off of the ontological structure of objects constructed according to (Comp2). As with Jago and Barker's account, the situation is the same. Both packages of views seem equally adequate.

However, both packages pair different ontological structures with the same modal profile. So, it seems like we should choose only one package. However, it is doubtful whether there is any basis for that choice. It should be added that not only are we faced with the pair of options for each version of essential bundle theory, but these options add up. There are at least two ways to account for modal properties based on Jago and Barker's proposal, and at least two ways based on Paul's proposal. How should we choose between these four (or more)? Again, I can think of no principled way to do this.

There is perhaps one way to eliminate some options. Let's focus on Jago and Barker's theory. We are faced with choosing either:

(Grounding closure) If an instance of Fness is grounded in instances of $G_{1,\ldots,}G_n$, which are parts of an object x, then an instance of Fness is also a part of x.

(Grounding non-redundancy) An instance of Fness is a part of x only if no instance of Gness is a part of x such that *being G* grounds *being F*.

One might propose the following way to choose (Grounding closure) here. Suppose I can weigh 100kg or more, but cannot weigh less than that as a matter of necessity. So, for every a<100, I essentially weigh more than a kg. But for every a<100, I cannot have *weighing more than a kg* as a part, because that would be pre-empted by me having *weighing more than b kg* as a part for some b such that a<b<100, since *weighing more than b* grounds *weighing more than a* if b>a. The same reasoning shows that I cannot have *weighing more than c* for any c<100. But, by assumption, I have all these properties essentially and seemingly have no other property as a part that grounds them all (contrary to (Nature thesis*)). So something seems wrong with (Grounding non-redundancy) if I can weigh 100 kg or more, but not less. There are no similar problems with (Grounding closure).

However, the response to this is simple. The proponent of (Grounding non-redundancy) can just say that I have as a part the property *weighing 100kg or more.* Weighing 100kg or more grounds weighing more than a for any a<100. So I do not need to have any of these properties as parts (except *weighing 100kg or more*) in order to essentially weigh more than a for every a<100.

I cannot think of any other way to choose between the alternative principles of property composition. But if that is the case, then both Jago and Barker's essential bundle theory and Paul's theory are faced with some arbitrary choices.

The main upshot of the section four is that in order for bundle theorist to account for the modal profile of ordinary objects and thus to offer a viable solution to the grounding problem, they have to tell us more about the principles on the basis of which properties compose ordinary objects. However, I doubt that this can be done in a general and principled way.

5. Qualitative persistence

In this final chapter I will discuss an argument for the existence of tropes proposed by Douglas Ehring (1997, ch. 4; 2011, ch. 2). According to Ehring, only if we posit enduring tropes can we account for the phenomenon he calls qualitative persistence – briefly, the phenomenon of objects keeping their qualitative profile when they are not interfered with. The significance of Ehring's argument is in its seeming potential to (to some extent) resolve the dispute between the proponents of properties conceived as universals and the proponents of properties conceived as tropes. Ehring argues that some familiar arguments for the existence of tropes do not in fact favour the existence of tropes over the existence of entities made of universals and particulars. Contrary to this, he argues, when it comes to qualitative persistence, only enduring tropes could do the job.

Why is this relevant for the debate between relational and constituent ontologists? First, most influential trope theorists defend a constituent ontology, according to which tropes are parts or constituents of concrete particulars.[170] To the extent that it is a short step from accepting tropes to accepting a constituent ontology, Ehring's argument could be seen as going some way towards resolving the dispute between relational and constituent ontologists as well. Ehring himself, after giving his argument for the existence of tropes, goes on to construe his own version of trope-based constituent ontology. Secondly, as already mentioned, Ehring thinks that some traditional arguments for accepting tropes do not in fact favour the existence of tropes over the existence of universals (Ehring 1997, 91-93). He thinks that these arguments require only the existence of particulars with simple qualitative natures, but that tropes are not the only category of entities that satisfy this description. Beside tropes, entities that are *exemplifications-of-universals-by-particulars* are also particulars that involve simple qualitative natures. However, relational ontologists might accept the existence of these exemplifications, and so the traditional arguments for the existence of tropes, as thought of by Ehring, do not in fact favour constituent ontology over relational ontology, even if we assume that tropes, if they existed, would have to be parts or constituents of ordinary particulars. On the other hand, Ehring's argument, as opposed to traditional arguments for the existence of tropes, seems to favour the existence of tropes over exemplifications of universals, and so it promises to (at least partly) resolve the issue between relational and constituent ontologies. Thirdly, even if tropes could exist without being parts or constituents of ordinary particulars, non-constituent trope ontology seems to belong to the same family of theories to which the standard

[170] See Williams (1953) and Campbell (1990). Not all philosophers who accept tropes are constituent ontologists, see Martin (1980) and Lowe (2006).

constituent trope theory belongs. After discussing his original (and non-exhaustive) classification of ontologies into relational and constituent (which was discussed in chapter 2), Peter van Inwagen introduced a more encompassing classification of theories that might be thought of as being the basis for his original classification and as explaining the interest in making the original classification. According to van Inwagen, forming the natural genus with constituent ontologies are the theories of Jonathan Lowe and L. A. Paul:

> '…in Lowe's view, universals cannot enter into causal relations and therefore cannot be perceived. Unlike Lowe, Paul does think that some universals can be perceived. But Lowe and Paul agree that some properties can be perceived. Lowe is a constituent ontologian, and I think that all his fellow constituent ontologians would agree with him and Paul on this point — and that New Bundle Theorists [eliminative bundle theorists], if there ever are any, should agree with him and Paul on this point. And this, I suggest, is the "common characteristic" in virtue of which it is natural and intuitive for the taxonomist of ontologies to assign Paul's ontology and the New Bundle Theory and the constituent ontologies to the same genus.' (van Inwagen 2011, 401-402)

Van Inwagen is not quite correct when he says that Lowe is a constituent ontologist, because Lowe explicitly rejects the idea that his modes or tropes are anything like parts of ordinary objects (Lowe 2006, 27). But van Inwagen might be right in thinking that the more basic division behind his original one is the division between theories according to which properties could be perceived, and those according to which they could not be perceived. If this is so, then even non-constituent trope theory forms a natural genus with the more standard constituent ontologies (because even non-constituent trope theorists believe tropes could be perceived), and so, even if Ehring's argument for the existence of tropes might not be an argument for constituent ontology, it is at least an argument for a theory that belongs to the same group of theories to which standard constituent ontologies belong.

5.1. Nonsalient qualitative change

Ehring starts his discussion by stating that qualitative change comes in two varieties, one quite common, and the other not that common, but logically possible. One sort of qualitative change is the familiar one, where an object has some property at one time, and lacks the same property at

another time. If my table is white and I paint it red at t, then it is white before t without being white at t. The other sort of qualitative change Ehring has in mind is far from ordinary. The kind of change Ehring has in mind is such that my table could change in this way at t even if it is qualitatively the same immediately before and after t. Ehring calls this sort of change 'nonsalient qualitative change' and argues for the possibility of such change on the basis of the following thought experiments:

> *Immaculate Property Replacement* There is a machine that eliminates all electrical charge from objects without a trace and no other effect on the object. A second machine instantly generates electrical charge in objects. Suppose that these two machines, directed at the same particle, are set to activate at just the same moment t'. The second machine is set to generate an electrical charge in the particle of exactly the same magnitude that the particle previously exhibited. As a result, there is no apparent shift in electrical charge in the particle from t to t'.
>
> *Property Persistence* The particle undergoes no transformation by way of any machines, but retains its electrical charge over this same time period. (Ehring 2011, 50)

The typical sort of change that occurs when, for example, my table goes from being white to not being white is salient qualitative change. Salient qualitative change does not have to be perceptually manifest to us. Speaking in terms of the instantiation of universals, we have a salient qualitative change when an object first instantiates some universal, without later instantiating it.

When it comes to *nonsalient* qualitative change, if something is subject to such change at t, there need not be any universal it instantiates before t that it does not instantiate after t. What can result in such change is what Ehring calls 'immaculate property replacement'. In the scenario presented above, he invites us to imagine two machines, one of which is set to destroy a charge in a particle, while the other is set to generate it. If the machines are activated at the same time, so that the time at which the first machine eliminates the charge in the particle (let's call this time 't') is the time at which the second machine generates it, there will be no salient qualitative change in the particle. If the particle did not change in another respect, then there are no two instants t_1 and t_2 closely before or after t (including t) such that at t_1 the particle instantiates some universal F, while at t_2 the particle does not instantiate F. So, immaculate property replacement could eventuate in a change that is not

a salient qualitative change. Thus, Ehring argues, if there is a qualitative change in this scenario, it has to be a nonsalient qualitative change.

Scenarios like the one Ehring envisages are familiar from the literature on the persistence of ordinary objects. Most notably, David Armstrong and Chris Swoyer have argued on the basis of such scenarios that qualitative and spatio-temporal continuity are not sufficient for the identity of objects through time.[171] Suppose we have an object x existing at t_1 and an object y existing at t_2. The question of identity through time is the question of what is required for an object x that exists at t_1 to be identical to an object y that exists at t_2. One answer is that, roughly, there has to be a continuous spatio-temporal path from the location of x at t_1 to the location of y at t_2 such that every 'slice' of that path is occupied by some object, and the objects occupying slices that are temporally close to each other are qualitatively very similar. This is the crux of the idea that spatio-temporal and qualitative continuity are at the core of our notion of identity through time.[172] Thus, for example, the car that was parked in front of my house on Monday at noon is identical to the car that was parked there on Wednesday at noon because there is a continuous spatio-temporal path connecting the location of the first car on Monday to the location of the second car on Wednesday, such that every slice (or temporal part) of that path is occupied by something, and the objects occupying adjacent slices are very similar to each other.

Armstrong and Swoyer argue against this account by relying on scenarios similar to Ehring's. They ask us to imagine two machines, one of which could instantly destroy a car, while the other can instantly create a (qualitatively the same) car. If on Tuesday at noon, both machines are activated and directed towards the car parked in front of my house, then the car that exists on Monday will be replaced by a numerically different, but qualitatively the same car existing at the same place. When the two machines operate in this way, they preserve spatio-temporal and qualitative continuity, yet the car existing before Tuesday at noon is not identical to the car existing after Tuesday at noon, because the first car seems to be destroyed on Tuesday at noon, while the second seems to be created on Tuesday at noon.

One worry somebody might have is that the scenarios Ehring, Swoyer and Armstrong envisage are physically impossible, and so there might not be a reason to think they can reveal much of interest

[171] See Armstrong (1980) and Swoyer (1984). The theory of identity through time in terms of spatio-temporal continuity is developed in most detail in Hirsch (1982).

[172] Notions of spatio-temporal and qualitative continuity are discussed in great detail in Hirsch (1982). It should be noted that Hirsch's account is more complicated than this, because it includes considerations about kinds or sorts, in addition to spatio-temporal and qualitative continuity.

for the persistence of objects. Ehring answers by claiming that his thought experiment 'reveals a genuine possibility', a possibility that should be taken seriously because it reveals a new sort of qualitative change which is unlike ordinary, salient qualitative change (Ehring 2011, 51). Swoyer claims the following:

> To be sure, the replacements in our first examples seem to violate conservation laws… Such details aren't critical here, however, for the point of the example is not really that such machines are metaphysically possible but that it is not an a priori truth that they are not; hence, it is not a conceptual truth that spatiotemporal continuity (of the appropriate sort) is either necessary or sufficient for the transtemporal identity of physical objects. (Swoyer 1984, 598)

In the rest of this chapter, I will first present Ehring's argument for the claim that only if we posit enduring tropes can we account for the phenomenon he calls 'qualitative persistence'. Contrary to him, I will argue that enduring tropes are not sufficient for qualitative persistence.

5.2. Qualitative persistence and enduring tropes

According to Ehring, there are two ways for some object x to change at t with respect to some property Fness. One way is for x to be F until t, without being F after t.[173] This is a salient qualitative change with respect to Fness. Another way for x to change with respect to Fness at t is for x to be a subject of immaculate replacement of Fness at t by machines like those in Ehring's scenario. Let's say that x qualitatively persists with respect to Fness from t_1 to t_2 iff at no time in the interval from t_1 to t_2 does x change with respect to Fness, either in a salient or in nonsalient way (it does not undergo immaculate property replacement of Fness).

Following Ehring, when I talk of qualitative persistence with respect to Fness, by 'Fness' I always have in mind some maximally determinate property. Thus, 'redness' is not an appropriate substitution for 'Fness', while a term referring to some determinate shade of red is. The reason for this is that an object might in some sense change with respect to a determinable property, like

[173] Somebody might ask if x has or lacks Fness at t, the time of change? This depends on whether, when x ceases to be F at t, t is the last moment of x's being F, or the first moment of x's not being F. For an interesting discussion of these matters, see Hudson (2001).

redness, without ceasing to be red or without being subject to immaculate replacement of redness. For example, if something changes from being crimson to being scarlet, then it continues to be red, and it is not subject to immaculate replacement of any property. But this object does not intuitively qualitatively persist with respect to redness. I will limit my discussion here only to maximally determinate properties.[174]

What is it for an object to persist qualitatively with respect to Fness from t_1 to t_2? Suppose, argues Ehring, that we believe in something like a substance-attribute theory, according to which the fundamental description of reality should be given in terms of which objects instantiate which universals. Suppose for the moment that the colour *snow white* is an ultimate determinate of being white. Let us imagine a scenario (call it scenario one) in which my table is snow white from t_1 to t_2, and in which at some moment t in that interval it is subject to immaculate property replacement of snow whiteness, that is, a pair of machines operate on my table at t so that one of them eliminates show whiteness from my table, while the other generates it, so to speak. This means that, in scenario one, my table does not persist qualitatively with respect to snow whiteness from t_1 to t_2. Let's now imagine scenario two, which is just like scenario one except that my table is not subject to immaculate property replacement. In this scenario, my table qualitatively persists with respect to snow whiteness from t_1 to t_2.

If we believe only in universals, how can we account for the fact that only in scenario two we have qualitative persistence of my table with respect to whiteness from t_1 to t_2? According to Ehring, this seems hard to do if we have only universals at our disposal. In scenario two, where my table persists qualitatively from t_1 to t_2, it instantiates snow whiteness at every moment in that interval. But this is also the case in scenario one, in which my table does not qualitatively persist with respect to snow whiteness. The fact that in scenario one my table is subject to immaculate property replacement does not mean that in that scenario there is a moment in the interval from t_1 to t_2 at which my table does not instantiate snow whiteness.

Believers in universals could respond that only in scenario two there exists a causal connection between my table instantiating snow whiteness before t and my table instantiating snow whiteness after t, while there is no such causal connection in scenario one where the two machines operate. However, Ehring argues that we might think of the two machines in scenario one as being such that the activation of the first machine causes the activation of the second, so that even in that scenario

[174] For more on the determinate/determinable distinction, see Funkhouser (2006).

we would have a causal connection between my table being snow white before t and my table being snow white after t, despite immaculate property replacement (Ehring 1997, ch. 4). Suppose, for example, that the first machine acts on things that are snow white at some point in time, and that at the same time it causes the activation of the second machine that makes things the same shade of white. In that case, there would be a causal connection between the object instantiating snow whiteness before and after the machine operates. Furthermore, Ehring argues that believers in universals could not just say that the causal connection has to be appropriate, because the only way to say what we mean by an appropriate causal connection in this context is by referring to qualitative persistence (Ehring 1997, 98).

If we believe in enduring tropes, on the other hand, it seems that we can account for the difference between the two scenarios. In scenario one we do not have qualitative persistence of my table with respect to snow whiteness because the snow whiteness trope that characterised my table until t has been destroyed and replaced by an exactly similar, but numerically distinct snow whiteness trope. Immaculate property replacement involves the replacement of one trope with another, exactly similar, trope. In scenario two, where there is no immaculate property replacement, there is a single snow whiteness trope that characterises my table during the interval from t_1 to t_2.[175] So, if there are enduring tropes, we can have the following account of qualitative persistence:

> An object x qualitatively persists from t_1 to t_2 with respect to Fness iff there is an enduring F-trope that characterises x from t_1 to t_2.

In the rest of this chapter, I will suggest that being characterised by an enduring trope is not sufficient for qualitative persistence. Before that, I want to summarise what I have discussed thus far. Though Ehring is not entirely explicit on what exactly he is giving an account of, I think this is a charitable reconstruction of his main strategy. Qualitative persistence with respect to Fness during some interval is introduced as a matter of being F during that interval and not being subject at any time in that interval to immaculate property replacement of Fness caused by the operations of 'destroyer' and 'creator machines'. We could treat this description as if it fixes the reference to the sort of phenomenon Ehring has in mind when he talks of qualitative persistence.

[175] It should be noted that even some universalists could avail themselves of an account similar to this. For example, Gonzalo Rodriguez-Pereyra recently argued for the coherence of numerically distinct, yet indiscernible universals. If there are such universals, immaculate property replacement could be seen as involving the replacement of some universal with another, indiscernible universal that is numerically different from the first. See Rodriguez-Pereyra (2017).

Ehring then asks what the nature of qualitative persistence through time is. His answer is that an object qualitatively persists with respect to Fness during some interval if and only if it is characterised by an enduring F-trope during that interval. This explains why immaculate property replacement of Fness affects qualitative persistence with respect to Fness: one machine destroys one F-trope, while the other creates a numerically different F-trope, and so there is no single F-trope characterising an object which is the subject of immaculate property replacement.

What is important to notice here is that immaculate property replacement is not defined as just a matter of one trope being replaced by another. Immaculate property replacement is what happens in the scenario when the destroyer and creator machines operate on something at the same time. The intuition is that immaculate property replacement somehow affects qualitative persistence, and the explanation Ehring offers for this is that, since to qualitatively persist with respect to Fness is to be characterised by an enduring F-trope, immaculate property replacement affects qualitative persistence because it leads to the replacement of one trope with another.

5.3. Enduring tropes are not sufficient for qualitative persistence

Recall my reconstruction of Ehring's account of qualitative persistence:

> An object x qualitatively persists from t_1 to t_2 with respect to Fness iff there is an enduring F-trope that characterises x from t_1 to t_2.

I will now argue that this principle is false from right to left.

My argument against the sufficiency of enduring tropes for qualitative persistence is fairly short. Imagine that some enduring F-trope is created at t by a creator machine (Creator). This F-trope endures for some period of time until t', at which moment it travels back in time to some moment t'', which is before t. It then endures from t'' to t, at which point it is destroyed by a destroyer machine (Destroyer). Let's also assume that there is an object x existing between t'' and t' (an interval of time including t) which is characterised by this F-trope throughout that time. This means that x is subject to the operations of Creator and Destroyer at t. While Destroyer destroys an F-trope at t, the Creator creates an F-trope at the same time. Since the two machines operate at t, it seems

that x does not exhibit qualitative persistence with respect to Fness from t'' (which is before t) to t' (which is after t). However, there is only one F-trope characterising x from t'' to t'. This F-trope is created at t by Creator, endures for some time until t', travels back in time to t'', and then endures until t just to be destroyed by Destroyer.[176] This means that the F-trope destroyed at t is the same F-trope that is created at t. So, there is a single enduring F-trope characterising x from t'' to t'. However, it seems obvious that x does not persist qualitatively from t'' to t' with respect to Fness. It does not seem to matter that the trope destroyed by Destroyer is the same as the trope created by Creator. The mere operation of the machines is sufficient to affect the qualitative persistence of x with respect to Fness.

Is the supposition of time traveling enduring tropes any more fanciful than the idea of machines that can instantly create and destroy charges in elementary particles? Enduring tropes that travel back in time do not seem obviously metaphysically impossible. Many authors mention the possibility of time traveling tropes as threatening the influential Aristotelian way of drawing the distinction between universals and particulars, according to which only universals could be multiply located at the same time.[177] If tropes (or particulars in general) were to travel back in time to meet their previous 'versions', we would have particulars multiply located in space, which would imply that the Aristotelian characterisation is either entirely wrong or that it requires further refinements. So, many authors do not think that time traveling tropes are impossible. This, of course, does not mean that such tropes are possible. I think, however, that the burden of proof here is on Ehring. This is especially so since he is allowed to rely on such things as the creator and destroyer machines operating at the same time in his argument for the possibility of nonsalient qualitative change. The assumption here, it seems, is that we are allowed to entertain all sorts of strange scenarios as long as such scenarios are not obviously metaphysically impossible. I think that time traveling tropes are not obviously metaphysically impossible, and so they seem to pass the above test.

[176] Ehring thinks that causation is a matter of the transference of tropes from one object to another (1997). With this in mind, it would even be possible to elaborate more on the example. Imagine that the Creator creates an F-trope of object A at t. The F-trope is later transferred to object B. B travels back in time to the time before t. At some time before t, the F-trope is transferred from B to A. The F-trope is destroyed by Destroyer at t just to be created by Creator at the same time.
[177] See Ehring (2011, 28) and MacBride (1998). It should be mentioned that MacBride wants to stay neutral on the possibility of time travel.

6. Conclusion

The recently offered variants of the bundle theory of ordinary objects present a significant step forward compared to traditional bundle theories. The reason for this is that these recent versions have been developed with the explicit aim in mind of accounting for the possibility of materially coincident objects that differ in all sorts of respects. This topic has predominantly been the preoccupation of relational ontologists, who do not ascribe anything like an ontological structure to ordinary objects (that is, they do not think that ordinary objects have entities belonging to other categories as parts or constituents). The interest of these developments has been that constituent and relational ontologies could be compared in respect of their capacity to account for the same sort of phenomena. This is not always the case. For example, one of the primary questions asked among constituent ontologists, and in particular bundle theorists, has been whether it is possible for there to be two numerically distinct objects made of the same properties, and so which versions of constituent ontology have the unpalatable consequence of entailing a suitably restricted principle that indiscernible objects are identical. This question is obviously of no interest for relational ontologists because they reject the main assumption behind such a question, namely that ordinary objects are made of properties in the first place.

However, when it comes to some of the problems raised by the possibility of material coincidence, matters are very different. Here, constituent ontology seems to offer us new resources to tackle some of the traditional problems that have mostly preoccupied relational ontologists. If constituent ontology could live up to the promise of solving what has been called the 'grounding problem', then relational ontologists who accept the possibility of materially coincident objects might consider changing their mind and accepting a constituent ontology.

The three recent versions of bundle theory I have presented are eliminative bundle theory, essential bundle theory and mereological bundle theory. While eliminative bundle theory is not strictly speaking a constituent ontology, it is still a variant of bundle theory whose main variants are constituent ontologies, and so it seemed to me that it was worth discussing along with the essential bundle theory and mereological bundle theory. I offered some considerations against all these variants. When it comes to the eliminative bundle theory recently developed by Tahko and Keinänen, I argued that this theory wrongly entails that for any pair of intrinsically indiscernible objects, they either both materially coincide with other objects, or neither does. However, it is not evident that philosophers who accept coincidence would welcome this consequence, because they

usually think that intrinsic duplicates could differ when it comes to whether they coincide with something. Against mereological and essential bundle theory, I have argued that they both face the problem of there being alternative ways to account for the modal profile of ordinary objects in terms of their ontological structure, and so that to choose one way over others is to make an arbitrary choice.

While my considerations are not bound to persuade everyone interested in these matters, I think they offer us some compelling reasons to be suspicious of the capacity of constituent ontologies to solve the grounding problem. Admittedly, there might be some other variants of the bundle theory which can avoid some of the problems I discuss. I have no principled reason to think that no such variant can be offered. In the absence of such a reason, the next best thing to do seems to be to focus on those variants that have actually been worked out. Whether there could be some principled objections to the capacity of any bundle theory to solve the grounding problem is a topic for some further research.

In the section preceding my discussion of constituent ontologies in relation to grounding problems, I discussed some general questions that arise if ordinary objects are taken to have both ontological and mereological structure. Again, it seems to me that constituent ontologists often focus their efforts on working out the details of the ontological structure of ordinary objects, while neglecting many questions that arise from the fact that ordinary objects also have a common-sense mereological structure. I tried to develop the intuitive idea that the ontological structure of ordinary objects grounds their mereological structure. I proposed that the best way to do this is to accept that there are two kinds of parthood relations, one basic parthood relation that we could call qualitative parthood, and which relates properties to ordinary objects, and the other, spatial parthood, which is defined in terms of qualitative parthood and which relates concrete particulars to each other. Some questions remained unanswered, though. For example, I have not shown that spatial parthood satisfies certain formal conditions we expect of a parthood relation. Without this, somebody might have doubts about whether spatial parthood is parthood at all. This is a research question that I would like to address further.

The question of what makes some relation a kind of parthood relation or akin to a parthood relation is of utter importance for constituent ontologies. Many constituent ontologists often think that properties are parts or constituents of concrete particulars, but not in the same sense in which concrete particulars are parts of other concrete particulars. The crucial question here, it seems to

me, is why the relation these constituent ontologists invoke in describing to ontological structure of concrete particulars, should be treated as more similar to ordinary parthood than to the relation of instantiating as relational ontologists think of it. Without answering this question, constituent ontologists who think properties stand to concrete particulars in a relation which is merely similar to ordinary parthood face the tough question of how their theory differs from relational ontologies.

Finally, I have argued that one interesting recent argument for the existence of tropes is not persuasive. I have in mind Douglas Ehring's argument for the existence of tropes. According to Ehring, only if we accept the existence of enduring tropes can we account for the phenomenon he calls qualitative persistence. The importance of Ehring's argument is that if it were successful, it would be a significant step towards some version of constituent ontology. To be more precise, to the extent that accepting the existence of tropes moves us closer to adopting a constituent ontology, Ehring's argument could be seen as an argument for constituent ontology.

I have argued that enduring tropes cannot account for qualitative persistence. I argued that being characterised by an enduring trope is not sufficient for qualitative persistence. My argument for this rests on the possibility of time traveling tropes. While in itself controversial, this assumption, it seems to me, is no more controversial than the thought experiments Ehring relies on in arguing for the existence of enduring tropes.

I do not believe that there are such things as properties. Furthermore, if there were properties, I doubt that they would be anything like parts of ordinary objects like chairs and tables. I have examined what seem to me to be some of the most interesting and most developed recent variants of constituent ontology, and have found them problematic for various reasons. While I have not shown that a respectable constituent ontology could definitely not be developed, I hope that the reader can get a sense of the many obstacles that lie ahead of anyone who wants to indulge in that kind of formidable project.

Bibliography

Allaire, Edwin. "Bare particulars." *Philosophical Studies* 14.1/2 (1963): 1-8.

Alston, William. "Particulars--bare and qualified." *Philosophy and Phenomenological Research* 15.2 (1954): 253-258.

Armstrong, David. *Universals and scientific realism Vol. 2*. Cambridge: Cambridge University Press, 1978.

Armstrong, David. 'Identity through time', in Peter van Inwagen (ed.) *Time and cause: Essays presented to Richard Taylor* (Dordrecht: Reidel, 1980): 67-78.

Armstrong, David. *Universals: An opinionated introduction.* Boulder: Westview Press, 1989.

Armstrong, David. *A world of states of affairs*. Cambridge: Cambridge University Press, 1997.

Audi, Paul. "How to rule out disjunctive properties." *Noûs* 47.4 (2013): 748-766.

Audi, Paul. 'A clarification and defense of the notion of grounding', in Benjamin Schnieder and Fabrice Correia (eds.) *Metaphysical grounding* (Cambridge: Cambridge University Press, 2014): 101-121.

Baker, Lynne. "Unity without identity: A new look at material constitution." *Midwest Studies in Philosophy* 23 (1999): 144-165.

Baker, Lynne. *Persons and bodies: A constitution view.* Cambridge: Cambridge University Press, 2000.

Barker, Stephen, and Mark Jago. "Material objects and essential bundle theory." *Philosophical Studies* 175.12 (2018): 2969-2986.

Beebee, Helen, and Fraser MacBride, 'De re modality, essentialism and Lewis's Humeanism', in Barry Loewer and Jonathan Schaffer (eds.) *A companion to David Lewis* (Oxford: Wiley Blackwell, 2015): 220-236.

Bennett, Karen. "Spatio-temporal coincidence and the grounding problem." *Philosophical Studies* 118.3 (2004): 339-371.

Bennett, Karen. "Having a part twice over." *Australasian Journal of Philosophy* 91.1 (2013): 83-103.

Black, Max. "The identity of indiscernibles." *Mind* 61.242 (1952): 153-164.

Buras, Todd. "Counterpart theory, natural properties, and essentialism." *The Journal of Philosophy* 103.1 (2006): 27-42.

Burke, Michael. "Copper statues and pieces of copper: A challenge to the standard account." *Analysis* 52.1 (1992): 12-17.

Cameron, Ross. "Truthmakers and ontological commitment: or how to deal with complex objects and mathematical ontology without getting into trouble." *Philosophical Studies* 140.1 (2008): 1-18.

Campbell, Keith. *Abstract particulars.* Oxford: Basil Blackwell, 1990.

Cartwright, Richard. "Some remarks on essentialism." *The Journal of Philosophy* 65.20 (1968): 615-626.

Casullo, Albert. "A fourth version of the bundle theory." *Philosophical Studies* 54.1 (1988): 125-139.

Connolly, Niall. "Yes: bare particulars!." *Philosophical Studies* 172.5 (2015): 1355-1370.

Cowling, Sam. "Ideological parsimony." *Synthese* 190.17 (2013): 3889-3908.

Cowling, Sam. "Instantiation as location." *Philosophical Studies* 167.3 (2014): 667-682.

Dasgupta, Shamik. "Individuals: An essay in revisionary metaphysics." *Philosophical Studies* 145.1 (2009): 35-67.

Dasgupta, Shamik. "On the plurality of grounds." *Philosopher's Imprint* 14.20 (2014): 1-28.

Della Rocca, Michael. "Essentialists and essentialism." *The Journal of Philosophy* 93.4 (1996): 186-202.

deRosset, Louis. "What is the grounding problem?." *Philosophical Studies* 156.2 (2011): 173-197.

Devitt, Michael. "'Ostrich nominalism' or 'mirage realism'?." *Pacific Philosophical Quarterly* 61.4 (1980): 433-439.

Divers, John. *Possible worlds.* New York: Routledge, 2002.

Divers, John. "Quinean scepticism about de re modality after David Lewis." *European Journal of Philosophy* 15.1 (2007): 40-62.

Divers, John. "Coincidence and form." *Aristotelian Society Supplementary Volume*. Vol. 82. No. 1. Oxford, UK: Oxford University Press, 2008.

Donnelly, Maureen. "Using mereological principles to support metaphysics." *The Philosophical Quarterly* 61.243 (2011): 225-246.

Edwards, Douglas. *Properties.* Cambridge: Polity Press, 2014.

Ehring, Douglas. "Mental causation, determinables and property instances." *Nous* 30.4 (1996): 461-480.

Ehring, Douglas. *Causation and persistence*. Oxford: Oxford University Press, 1997.

Ehring, Douglas. *Tropes*. Oxford: Oxford University Press, 2011.

Evnine, Simon. *Making objects and events: A hylomorphic theory of artifacts, actions, and organisms*. Oxford: Oxford University Press, 2016.

Fine, Kit. "Essence and modality." *Philosophical Perspectives* 8 (1994): 1-16.

Fine, Kit. "Things and their parts." *Midwest Studies in Philosophy* 23 (1999): 61-74.

Fine, Kit. "A counter-example to Locke's thesis." *The Monist* 83.3 (2000): 357-361.

Fine, Kit. "The question of realism." *Philosopher's Imprint* 1.2 (2001): 1-30.

Fine, Kit. "The non-identity of a material thing and its matter." *Mind* 112.446 (2003): 195-234.

Fine, Kit. "Coincidence and form." *Aristotelian Society Supplementary Volume*. Vol. 82. No. 1. Oxford, UK: Oxford University Press, 2008.

Fine, Kit. "Towards a theory of part." *The Journal of Philosophy* 107.11 (2010): 559-589.

Finocchiaro, Peter. "The explosion of being: Ideological kinds in theory choice." *The Philosophical Quarterly* 69.276 (2019): 486-510.

Fisher, A. R. J. "Instantiation in Trope Theory." *American Philosophical Quarterly* (2018): 153-164.

Forrest, Peter. "Ways worlds could be." *Australasian Journal of Philosophy* 64.1 (1986): 15-24.

Funkhouser, Eric. "The determinable-determinate relation." *Noûs* 40.3 (2006): 548-569.

Garcia, Robert. "Bundle theory's black box: gap challenges for the bundle theory of substance." *Philosophia* 42.1 (2014): 115-126.

Garcia, Robert. "Tropes as character-grounders." *Australasian Journal of Philosophy* 94.3 (2016): 499-515.

Gibbard, Allan. "Contingent identity." *Journal of Philosophical Logic* 4.2 (1975): 187-221.

Gilmore, Cody. "Sider, the inheritance of intrinsicality, and theories of composition." *Philosophical Studies* 151.2 (2010): 177-197.

Goodman, Nelson. 'The new riddle of induction', in *Fact, fiction and forecast* (Cambridge, Mass.: Harvard University Press, 1983): 59-83.

Guillon, Jean-Baptiste. "A common sense defence of ostrich nominalism." *Philosophia* 49.1 (2021): 71-93.

Halmos, Paul. *Naïve set theory.* New York: Springer, 1974.

Hawley, Katherine. *How things persist*. Oxford: Oxford University Press, 2001.

Hawley, Katherine. "Mereology, modality and magic." *Australasian Journal of Philosophy* 88.1 (2010): 117-133.

Hawthorne, John, and Theodore Sider. "Locations." *Philosophical Topics* 30.1 (2002): 53-76.

Heil, John. *From an ontological point of view.* Oxford: Oxford University Press, 2003.

Hirsch, Eli. *The concept of identity.* Oxford: Oxford University Press, 1982.

Hoffman, Joshua and Rosenkrantz, Gary. *Substance: Its nature and existence.* London: Routledge, 1997.

Hudson, Hud. *A materialist metaphysics of human persons.* Ithaca, NY: Cornell University Press, 2001.

Jenkins, Carrie. "Is metaphysical dependence irreflexive?." *The Monist* 94.2 (2011): 267-276.

Johnston, Mark. "Constitution is not identity." *Mind* 101.401 (1992): 89-105.

Keinänen, Markku, and Tuomas Tahko. "Bundle theory with kinds." *The Philosophical Quarterly* 69.277 (2019): 838-857.

Kim, Jaegwon. "Concepts of supervenience." *Philosophy and Phenomenological Research* 45.2 (1984): 153-176.

Kim, Jaegwon. "Making sense of emergence." *Philosophical Studies* 95.1/2 (1999): 3-36.

Kim, Jaegwon. *Physicalism, or something near enough.* Princeton: Princeton University Press, 2008.

Kleinschmidt, Shieva. "Multilocation and mereology." *Philosophical Perspectives* 25 (2011): 253-276.

Kleinschmidt, Shieva. "Shaping up location: Against the Humean argument for the extrinsicality of shape." *Philosophical Studies* 172.8 (2015): 1973-1983.

Koslicki, Kathrin. *The structure of objects*. Oxford: Oxford University Press, 2008.

Koslicki, Kathrin. "Towards a hylomorphic solution to the grounding problem." *Royal Institute of Philosophy Supplements* 82 (2018): 333-364.

Lafrance, Jean-David. "A bundle of universals theory of material objects." *The Philosophical Quarterly* 65.259 (2015): 202-219.

Leslie, Sarah-Jane. "Essence, plenitude, and paradox." *Philosophical Perspectives* 25 (2011): 277-296.

Lewis, David. "Counterpart theory and quantified modal logic." *The Journal of Philosophy* 65.5 (1968): 113-126.

Lewis, David, and Stephanie Lewis. "Holes." *Australasian Journal of Philosophy* 48.2 (1970): 206-212.

Lewis, David. "Counterparts of persons and their bodies." *The Journal of Philosophy* 68.7 (1971): 203-211.

Lewis, David. "New work for a theory of universals." *Australasian Journal of Philosophy* 61.4 (1983): 343-377.

Lewis, David. *On the plurality of worlds.* Oxford: Basil Blackwell, 1986a.

Lewis, David. "Against structural universals." *Australasian Journal of Philosophy* 64.1 (1986b): 25-46.

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

Lewis, David. "Humean supervenience debugged." *Mind* 103.412 (1994): 473-490.

Lewis, David. "Tensing the copula." *Mind* 111.441 (2002): 1-14.

Longenecker, Michael Tze-Sung. "Non-concrete parts of material objects." *Synthese* 195.11 (2018): 5091-5111.

Loux, Michael. *Substance and attribute.* Dordrecht: Reidel, 1978.

Loux, Michael. 'Beyond substrata and bundles: A prolegomenon to a substance ontology', in Stephen Laurence and Cynthia Macdonald (eds.) *Contemporary readings in the foundations of metaphysics* (Oxford: Blackwell, 1998).

Loux, Michael. *Metaphysics: A contemporary introduction, 3rd edition.* New York: Routledge, 2006a.

Loux, Michael. 'Aristotle's constituent ontology', in Dean Zimmerman (ed.) *Oxford studies in metaphysics 2* (Oxford: Oxford University Press, 2006b): 207-250.

Loux, Michael. 'An exercise in constituent ontology', in Gabriele Galluzzo and Michael Loux (eds.) *The problem of universals in contemporary ontology* (Cambridge: Cambridge University Press, 2015): 9-45.

Lowe, Jonathan. *The four-category ontology*. Oxford: Oxford University Press, 2006.

Lowe, Jonathan. 'There are probably no relations', in Anna Marmodoro and David Yates (eds.) *The metaphysics of relations* (Oxford: Oxford University Press, 2016): 100-112.

MacBride, Fraser. "Where are particulars and universais?." *Dialectica* 52.3 (1998): 203-227.

MacBride, Fraser. "Four new ways to change your shape." *Australasian Journal of Philosophy* 79.1 (2001): 81-89.

MacBride, Fraser. "The particular–universal distinction: A dogma of metaphysics?." *Mind* 114.455 (2005): 565-614.

Mackie, Penelope. *How things might have been.* Oxford: Oxford University Press, 2006.

Magidor, Ofra. "Category mistakes", *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2020/entries/category-mistakes/>.

Markosian, Ned. "Brutal composition." *Philosophical Studies* 92.3 (1998): 211-249.

Martin, Charles. "Substance substantiated." *Australasian Journal of Philosophy* 58.1 (1980): 3-10.

McDaniel, Kris. 'Compositional pluralism and composition as identity', in Donald Baxter and Aaron Cotnoir (eds.), *Composition as identity* (Oxford: Oxford University Press, 2014): 130-142.

Merricks, Trenton. *Objects and persons.* New York: Oxford University Press, 2001.

Nolan, Daniel. "Hyperintensional metaphysics." *Philosophical Studies* 171.1 (2014): 149-160.

Noonan, Harold. "Indeterminate identity, contingent identity and Abelardian predicates." *The Philosophical Quarterly* 41.163 (1991): 183-193.

Nozick, Robert. *Philosophical explanations.* Cambridge: Harvard University Press, 1981.

Oliver, Alex. "The metaphysics of properties." *Mind* 105.417 (1996): 1-80.

Olson, Eric. "Material coincidence and the indiscernibility problem." *The Philosophical Quarterly* 51.204 (2001): 337-355.

Olson, Eric. "Review of Hud Hudson, *A materialist metaphysics of human persons*." *Notre Dame Philosophical Reviews* 2002.4.

Olson, Eric. 'Properties as parts of ordinary objects', in John Keller (ed.) *Being, freedom, and method: Themes from the philosophy of Peter van Inwagen* (Oxford: Oxford University Press, 2017): 62-79.

Olson, Eric. "The zombies among us." *Noûs* 52.1 (2018): 216-226.

O'Leary-Hawthorne, John, and Andrew Cortens. "Towards ontological nihilism." *Philosophical Studies* 79.2 (1995): 143-165.

O'Leary-Hawthorne, John, and Jan Cover. "A world of universals." *Philosophical Studies* 91.3 (1998): 205-219.

Paul, Laurie. "Logical parts." *Noûs* 36.4 (2002): 578-596.

Paul, Laurie. "The context of essence." *Australasian Journal of Philosophy* 82.1 (2004): 170-184.

Paul, Laurie. "In defense of essentialism." *Philosophical Perspectives* 20 (2006): 333-372.

Paul, Laurie. 'A one category ontology', in John Keller (ed.), *Being, freedom and method: Themes from van Inwagen* (Oxford: Oxford University Press, 2017): 32-61.

Pickavance, Timothy. "In defence of 'partially clad' bare particulars." *Australasian Journal of Philosophy* 87.1 (2009): 155-158.

Pickavance, Timothy. "Bare particulars and exemplification." *American Philosophical Quarterly* 51.2 (2014): 95-108.

Plantinga, Alvin. *The nature of necessity.* Oxford: Oxford University Press, 1974.

Raven, Michael. "Is ground a strict partial order?." *American Philosophical Quarterly* 50.2 (2013): 193-201.

Rea, Michael. "Supervenience and co-location." *American Philosophical Quarterly* 34.3 (1997): 367-375.

Rea, Michael. "In defense of mereological universalism." *Philosophy and Phenomenological Research* 58.2 (1998): 347-360.

Robb, David. "Qualitative unity and the bundle theory." *The Monist* 88.4 (2005): 466-492.

Rodriguez-Pereyra, Gonzalo. *Resemblance nominalism.* Oxford: Oxford University Press, 2002.

Rodriguez-Pereyra, Gonzalo. "The bundle theory is compatible with distinct but indiscernible particulars." *Analysis* 64.1 (2004): 72-81.

Rodriguez-Pereyra, Gonzalo. "Grounding is not a strict order." *Journal of the American Philosophical Association* 1.3 (2015): 517-534.

Rodriguez-Pereyra, Gonzalo. "Indiscernible universals." *Inquiry* 60.6 (2017): 604-624.

Rosen, Gideon and Cian Dorr, 'Composition as a fiction', in Richard Gale (ed.) *The Blackwell guide to metaphysics* (Oxford: Basil Blackwell, 2002): 151-174.

Rosen, Gideon. 'The limits of contingency', in Fraser MacBride (ed.), *Identity and modality* (Oxford: Oxford University Pres, 2006): 13-39.

Rosen, Gideon. 'Metaphysical dependence: Grounding and reduction' in Bob Hale & Aviv Hoffmann (eds.) *Modality: Metaphysics, logic, and epistemology* (Oxford: Oxford University Press, 2010): 109-136.

Russell, Bertrand. *Problems of philosophy.* Oxford: Oxford University Press, 1912.

Sattig, Thomas. "Compatibilism about coincidence." *Philosophical Review* 119.3 (2010): 273-313.

Sattig, Thomas. "The paradox of fission and the ontology of ordinary objects." *Philosophy and Phenomenological Research* 85.3 (2012): 594-623.

Sattig, Thomas. *The double lives of objects: An essay in the metaphysics of the ordinary world*. Oxford: Oxford University Press, 2015.

Saucedo, Raul. 'Parthood and location', in Karen Bennett and Dean Zimmerman (eds.) *Oxford studies in metaphysics 6* (Oxford: Oxford University Press, 2011): 225-285.

Schaffer, Jonathan. "The problem of free mass: Must properties cluster?." *Philosophy and Phenomenological Research* 66.1 (2003): 125-138.

Schaffer, Jonathan. "Two conceptions of sparse properties." *Pacific Philosophical Quarterly* 85.1 (2004): 92-102.

Schaffer, Jonathan. "Truthmaker commitments." *Philosophical Studies* 141.1 (2008): 7-19.

Schaffer, Jonathan. 'On what grounds what' in David Chalmers, David Manley & Ryan Wasserman (eds.) *Metametaphysics* (Oxford: Oxford University Press, 2009): 347-383.

Schaffer, Jonathan. 'Grounding, transitivity and contrastivity', in Fabrice Correia and Benjamin Schnieder (eds.) *Metaphysical grounding: Understanding the structure of reality* (Cambridge: Cambridge University Press 2012): 122-138.

Schaffer, Jonathan. "Monism", *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition), Edward N. Zalta (ed.), URL = https://plato.stanford.edu/archives/win2018/entries/monism/

Sidelle, Alan. "Does hylomorphism offer a distinctive solution to the grounding problem?." *Analysis* 74.3 (2014): 397-404.

Sider, Theodore. "Sparseness, immanence, and naturalness." *Noûs* 29.3 (1995): 360-377.

Sider, Theodore. "Global supervenience and identity across times and worlds." *Philosophy and Phenomenological Research* 59.4 (1999): 913-937.

Sider, Theodore. *Four-dimensionalism: An ontology of persistence and time.* Oxford: Oxford University Press, 2001.

Sider, Theodore. "Review of Lynne Rudder Baker, *Persons and bodies*." *Journal of Philosophy* 99.1 (2002): 45-48.

Sider, Theodore. 'Reductive theories of modality', in Michael Loux and Dean Zimmerman (eds.) *Oxford handbook of metaphysics* (Oxford: Oxford University Press, 2003): 180-200.

Sider, Theodore. "Beyond the Humphrey objection." *Unpublished manuscript* (2006).

Sider, Theodore. "Parthood." *The Philosophical Review* 116.1 (2007): 51-91.

Sider, Theodore. *Writing the book of the world.* Oxford: Oxford University Press, 2012.

Sider, Theodore. 'Against parthood', in Karen Bennett and Dean Zimmerman (eds.), *Oxford studies in metaphysics* 8 (Oxford: Oxford University Press, 2013): 237-293.

Simons, Peter. *Parts: A study in ontology*. Oxford: Clarendon Press, 1987.

Simons, Peter. "Particulars in particular clothing: Three trope theories of substance." *Philosophy and Phenomenological Research* 54.3 (1994): 553-575.

Sosa, Ernest. "Subjects among other things." *Philosophical Perspectives* 1 (1987): 155-187.

Stalnaker, Robert. "Anti-essentialism." *Midwest Studies in Philosophy* 4 (1979): 343-355.

Swoyer, Chris. "Causation and identity." *Midwest Studies in Philosophy* 9.1 (1984): 593-622.

Swoyer, Chris. "Theories of properties: From plenitude to paucity." *Philosophical Perspectives* 10 (1996): 243-264.

Tahko, Tuomas. "Truth-grounding and transitivity." *Thought* 2.4 (2013): 332-340.

Thomson, Judith Jarvis. "The statue and the clay." *Noûs* 32.2 (1998): 149-173.

Toner, Patrick. "Emergent substance." *Philosophical Studies* 141.3 (2008): 281-297.

van Cleve, James. "Three versions of the bundle theory." *Philosophical Studies* 47.1 (1985): 95-107.

van Cleve, James. "Mind--dust or magic? Panpsychism versus emergence." *Philosophical Perspectives* 4 (1990): 215-226.

van Cleve, James. "Predication without universals?: A fling with ostrich nominalism." *Philosophy and Phenomenological Research* 54.3 (1994): 577-590.

van Cleve, James. 'The Moon and sixpence: A defence of mereological universalism', in Theodore Sider, John Hawthorne & Dean W. Zimmerman (eds.) *Contemporary debates in metaphysics* (Oxford: Blackwell, 2008): 321-340.

van Inwagen, Peter. "Two concepts of possible worlds." *Midwest Studies in Philosophy* 11 (1986): 185-213.

van Inwagen, Peter. *Material beings.* Ithaca, NY: Cornell University Press, 1990.

van Inwagen, Peter. 'A theory of properties', in Dean Zimmerman (ed.) *Oxford Studies in Metaphysics* 1 (2004): 107-138.

van Inwagen, Peter. "Relational vs. constituent ontologies." *Philosophical Perspectives* 25 (2011): 389-405.

van Inwagen, Peter. 'What is an ontological category?', in *Existence: Essays in ontology* (Cambridge: Cambridge University Press, 2014): 183-201.

van Inwagen, Peter. 'Against ontological structure', in Gabriele Galluzzo and Michael Loux (eds.) *The problem of universals in contemporary ontology* (Cambridge: Cambridge University Press, 2015): 46-64.

Vander Laan, David. "A relevance constraint on composition." *Australasian Journal of Philosophy* 88.1 (2010): 135-145.

Wasserman, Ryan. "The standard objection to the standard account." *Philosophical Studies* 111.3 (2002): 197-216.

Westerhoff, Jan. *Ontological categories.* Oxford: Oxford University Press, 2005.

Wiggins, David. "On being in the same place at the same time." *The Philosophical Review* 77.1 (1968): 90-95.

Williams, Donald. "On the elements of being: II." *The Review of Metaphysics* 7.2 (1953): 171-192.

Williams, Donald. "Universals and existents." *Australasian Journal of Philosophy* 64.1 (1986): 1-14.

Wolterstorff, Nicholas. "Bergmann's constituent ontology." *Noûs* 4.2 (1970): 109-134.

Woodward, Richard. 'Ersatz counterparts', in Karen Bennett and Dean Zimmerman (eds.) *Oxford studies in metaphysics* 10 (2017): 235-260.

Yablo, Stephen. "Identity, essence, and indiscernibility." *The Journal of Philosophy* 84.6 (1987): 293-314.

Yablo, Stephen. "Abstract objects." *Philosophical Issues* 12 (2002): 220-240.

Zimmerman, Dean. "Theories of masses and problems of constitution." *The Philosophical Review* 104.1 (1995): 53-110.

Zimmerman, Dean. "Coincident objects: could a 'stuff ontology' help?." *Analysis* 57.1 (1997): 19-27.

Zimmerman, Dean. "Persons and bodies: Constitution without mereology?." *Philosophy and Phenomenological Research* 64 (2002): 599-606.

Zimmerman, Dean. 'Material People', in Dean Zimmerman and Michael Loux (eds.) *The Oxford Handbook of Metaphysics* (Oxford: Oxford University Press, 2005): 491-530.