Character, Objects and Properties

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Signed Declaration

I, Rory Clive Jubber confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

To my mom Rose,

my uncle Rob,

my mentor Emma and

that non-human animal Mable.

Abstract:

The thesis sets out to accomplish three related tasks at different levels of generality. The first is articulating and defending two problems: The Problem of Resemblance and The Problem of Character, pushing for a shift of focus to the latter. The second level is to consider a general approach to dealing with these problems, the constituent ontology, with a focus on The Problem of Character. I argue that the constituent ontology is a valuable and coherent general approach to giving an answer to these problems. Finally, at the last level of the greatest degree of specificity, I consider particular versions of the constituent approach: one that takes properties to be non-mereological constituents of objects and the other that takes properties to be ontological parts of objects operating under a property mereology. I argue for the latter, which is known as the mereological bundle theory. I argue that this version of the constituent ontology offers a powerful theory of exactly how properties and objects are related by proper ontological parthood. I take the mereological bundle theory to offer the best systematic metaphysics of properties and objects, one that is not only metaphysically coherent but also one that accords well with empirical considerations on the nature of spacetime in physical science. If I am correct, then the world is nothing but a world of properties and fusions of those properties.

Research Impact Statement:

The work contained in this thesis sets out to articulate and defend the general framework of the constituent ontology and then to articulate and defend a particular variant of it that I argue is the best, namely the mereological bundle theory. The constituent ontology has received little explicit focus until recent years. The aim of chapter 2 is to provide a framework to understand the rule of the game by which the constituent ontology is playing. Besides my own work, only Michael Loux has attempted to explicitly engage in this. Chapter 2 therefore contributes to the discussions in articulating the general framework of the constituent ontology. Chapter 3 then sets out to defend the constituent ontology. In particular I clarify Van Inwagen's charge of incomprehensibility against the constituent ontology followed by my own defence against this charge. This introduces some new avenues in the defence of the constituent ontology. In chapter 5 my work on the mereological bundle theory offers some interesting contributions to the literature. The mereological bundle theory , has received less attention than it should have, with Laurie Paul being the primary exponent of the view. I argue in chapter 5 that not only does the mereological bundle theory offer a precise answer to the Problem of Character via properties being proper ontological parts but if offers a novel solution to the Problem of Resemblance. This solution takes properties to be universals but does not require properties to be wholly present at their instances. In addition, amongst other contributions to the topic, I also offer novel arguments that exponents of the mereological bundle theory should be fictionalists about spatiotemporal parts, that mereological bundle theory need not commit itself to any particular view on the nature of spacetime and I give a discussion around what I call the Problem of Indiscernible Fusions.

From each of these novel elements of the thesis contained throughout I intend to prepare for publication a total of seven manuscripts intended for publication in eminent philosophy journals and continue to deliver these papers at philosophy conferences. In terms of future work on the topics contained in the thesis I intend to work to understand how properties as ontological parts feature in modality, causation , the laws of nature and dispositions. The mereological bundle theory has not received enough attention in the literature even with Laurie Paul's publications on the topic. It often receives indirect

citation in discussions on properties and composition but too infrequently is more deeply explored. My intention , starting with this thesis, is to explore that space of metaphysical possibility.

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<u>Introduction</u>

   The world is populated it seems by particular things. There is a great deal many of these particular things around you right now as you read this sentence. These are the things that can be called material objects; as you examine the environment around you right now you are surrounded by them and on many theories of personal identity you are one of those things yourself. They are the ordinary sized material objects that you take to populate the study, the garden, the living room or the library and any other environment you may happen upon. They are also some of the things that in first order logic we quantify over. Those particular things, the material objects, also have character and it is this character that allows you to distinguish any particular material object from its surrounding environment. Not only does the character of objects allow you to pick them out in the environment but it also allows us to group together objects that more or less resemble eachother; with some objects resembling other objects a great deal, and others resembling eachother to a lesser degree. The character of objects, indeed of anything at all, allows us to say of any particular object that it is different from the world around it and also that it resembles other objects in the world. That this is the case is obvious with just a simple example.

Take the object which is a part of my American Bulldog Mable. That white but partly brown, squarely shaped, powerfully jawed, distinctly underbiten, well-built object which is Mable's head. What is it about that object that allows us to distinguish it not only from the environment around it but also from the rest of Mables body; and thence to what the appropriate relation is between Mables head and

the rest of her body? What also allows us to say that her head resembles the head of other bulldog breeds to a greater extent than German Shepherds, and to a lesser extent the head of actual bovines? The answer is clearly that it is the character of this object that allows us to say of this object that it is more or less similar to other objects, while at the same time that this character is particular to this object. This thereby allows us to pick it out and place it correctly in the world both in terms of where it should be situated relative to other objects in the environment (like where Mable's head is correctly situated relative to her body) but also into kinds of objects similar to it (so that she is classed in a particular breed of dogs, in a biological species *etcetera*). What applies for Mable applies for all material objects; there are objects and objects have character.

However, what is it for any object to have some character and is an object's character separate or somehow a part or inherent in that object. And, what makes it the case that numerically distinct objects can more or less resemble eachother? The aim of this thesis will be primarily aimed at answering two questions, given in the form of problems, that are generated from these most basic considerations about the world. These considerations about the world are so basic that in fact answers and explanations for these questions are in my view mandatory for any systematic metaphysical view of the world; constituting perhaps the most general questions that could be asked about material objects at all since answers to these questions will take us most of the way to a metaphysical view of what material objects fundamentally are and how distinct material objects can more or less be alike. Clearly these are not new questions and have, as of yet, not found a satisfactory answer. However, because they are not new and

have lingered on for so long without adequate solution it does not follow that they are no longer interesting or theoretically important. Indeed, getting a grip on these fundamental questions and problems and attempting to give solutions will get us some way in the process of grounding other questions regarding the world of objects, namely causation amongst the objects, the laws of nature that involve objects of various kinds, how those objects are disposed to behave under certain conditions and what is necessary and contingent about those objects. All of these issues will presuppose that there are objects and that objects have certain characters; hence getting a grip on both the character of objects and how objects resemble is mandatory for any systematic metaphysics.

It is typically the properties , qualities or attributes of objects (I will use the term 'property' from here on when referring to those entities typically picked out by the predicates in our natural languages and in first order logic) that are taken to ground the metaphysical explanations of the character of objects and also then grounds explanations of how any object more or less resembles other objects. Answering how it is that objects have character can only be given if we can provide an explanation of how objects and properties can be related at all. In turn, we will only be able to account for how numerically distinct objects resemble eachother in terms of their character if we understand how those objects can be said to have properties in common; where those properties are related to some objects resembling some other objects in the same way; i.e. we take it that the resembling objects have or instantiate the same properties.

The way I will formulate these questions of character and resemblance, following the first problem setting chapter of thesis, will therefore be as such:

The Problem of Character (PC): Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.

The Problem of Resemblance (PR): Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.

The Problem of Resemblance is in effect the problem of universals restated. The problem of resemblance has historically taken the lion's share of the focus. It was a problem that of course beset the ancients and classics, and then along with concerns over the deity drove a great deal of medieval philosophy. In the 20th century but particularly in the later 20th century the problem re-emerged following the analytic rebirth of metaphysics after the demise of logical positivism and the advent of Quinian ontological commitment, Kripke's work on reference, Lewisian concerns over how to privileged the so-called the natural properties and David Armstrong's work across the late seventies, eighties and nineties that rejuvenated the use of a theory of immanent universals to account for resemblance. This led to a real rebirth in the literature of considering how to appropriately account for resemblance. This included novel attempts to avoid ontological commitment to properties at all best seen in Michael Devitt's attempts

to paraphrase away ontological commitment to properties, to trope theory, that is to say views that reify property instances and unify them together as properties using a primitive relation of exact resemblance between property instances, to interesting and novel attempts to reinvigorate resemblance nominalism that accounts for resemblance in terms of classes of exactly resembling objects. The trope theory in particular has spawned a massive amount of work around what tropes are, how they are related to objects and how they account for resemblance. Then secondary questions about how properties as universals or tropes figure in causation, laws, dispositions and even how they account for issues in the philosophy of mind have arisen adjunct to the more fundamental question of resemblance.

But the problem of character is more fundamental since at least intuitively the problem of resemblance presupposes that particular objects have some qualitative character in the first place. If it is accepted that it is the having of properties that accounts for an object character the problem faced is how to account for the relation that obtains between an object and the properties which we take it to have. The focus of **chapter one** will be problem setting. There I will set the two adjunct problems: The Problem of Resemblance and the more fundamental Problem of Character. I will consider reason why the problem is well motivated and in need of serious metaphysical explanation and solution. There are, if we take the Problem of Character seriously, two main approaches to explaining how objects relate to the properties which they have. When identifying the properties that some object is taken to have, we can, firstly, take those properties to be something immanent in the object or we can take

those properties to be something that exists apart or separate from that object. The later approach which takes properties to exist apart or separate from objects has become known in recent literature, perhaps clumsily since all accounts are relational in a general sense, as Relational Ontologies. The first approach has come to be known as the Constituent ontology, in contrast to Relational Ontologies, since it takes an objects properties to in some sense be ontological parts or constituents of that object; accounting for how an object's properties can be thought of as immanent within or inhering in an object. The relational approach has probably been the most dominant in accounting for how objects are said to have or instantiate properties. The distinguishing feature being that the Relational Ontology takes the relation that obtains between an object and its properties as external to that object. Falling under this approach is therefore a wide range of theories of properties that differ greatly; from the class nominalism best seen in Quinton and Lewis, to accounts of properties as transcendent universals seen in Plato, Russell and more recently Hale, Platinga and van Inwagen to the resemblance nominalism of Rodriguez-Pereyra. Properties are abstract entities, in no sense understood to be in objects; properties are entities necessarily apart from the things which have or instantiate them. But the relational approach will not be one of the focuses of this thesis.

It will be the first approach, the constituent approach that will be focused on. **Chapter two** will focus on accounting for how properties may be said to be immanent within, inhere in or be constituents of the objects which have or instantiate those properties and why, in virtue of this, properties may be said to give objects their character. It has become, at least so far as it is recognized as a means to answer the

Problem of Character a much neglected and maligned approach. There is dare I say ,in my experience, a tendency to reject it out of hand as a remnant of medieval philosophical tendencies or to reject it on the grounds that it is a confused and incoherent approach to understanding how material objects , or things in general, have properties at all. But this later concern on the incoherence of the approach rests on a conception of properties that asserts that for every well-formed predicate there is some corresponding property. If that were the case then the constituent ontology would be in trouble since there is no sense, as we shall see, in taking the very abundant properties that this would generate to be ontological parts or constituents of the objects that would instantiate such properties. To the first charge against medieval philosophy I simply assert that it is the result of historical chauvinism that has built up since the scientific revolution and enlightenment against medieval philosophy. If medieval philosophy showed an interest, which it did, on these fundamental metaphysical questions then so much the better for medieval philosophy and its Aristotelian presuppositions.

Another issue is that the focus on the problem of resemblance has given us many versions of the constituent ontology but little recognition that they all adopt the same constituent approach to understanding how properties relate to objects. That this is the case is clear if we consider that Armstrong's conception of properties as immanent property universals takes those properties to somehow inhere in the objects which instantiate them, later reverting to objects being compounds of fact like entities, or states of affairs , that are non-mereological constitutions of particular objects and properties. Nearly all of the trope theories also take tropes, property instances, to be in

the objects that are taken to instantiate some particular property. This is clear in the works of the two founding fathers of modern trope theory, Williams and Campbell, who both take objects to be bundles of co-located tropes. The problem is therefore one of grouping of theories; the family resemblance between theories having not been noted because the focus has often been on the differences of the theories in dealing with the Problem of Universals (what I term the Problem of Resemblance) and not the similarities of theories in terms of dealing with the Problem of Character. Hence, when outlining the constituent ontology here, I give a general framework as a set of concepts that all constituent ontologies must broadly accept in line with their similarity in approach in dealing with the Problem of Character. It is from this general framework which I set out in **chapter two**, that I then go on to defend the constituent ontology from a number of major charges against it in **chapter three**. These are charges that have appeared in the recent literature and some of which I have formulated myself regarding how constituent ontologies are to account for quantitative properties being ontological parts or constituents of objects. This **third defensive chapter** will show that adopting the constituent ontological approach is, from the start, a worthwhile metaphysical approach. Following this, in **chapter four and five**, I will put two quite different versions of the constituent ontology forward. The first is one that takes properties and objects to merge in a non-mereological form of constitution; namely as fact like entities that have come to be known as states of affairs following the work of David Armstrong. This will be the focus of **chapter four**. After considering attempts to substantiate what this non-mereological form of constitution amounts to and problems concerning the need for primitive individuating properties (*haecceities*) and so-called bare

particulars I then move on to a version of the constituent ontology that I take to be superior.

The second, and the version of the constituent approach that I consider best, is the version that takes properties to explain instantiation, immanence, a-property-inhering-in and a-property-being-a-constituent of as literal mereological parthood. The theory has come to be known as the mereological bundle theory. The mereological bundle theory will be the focus of **chapter five**. First proposed and developed by Laurie Paul, the theory takes properties to literally to be a part of the objects which instantiate them; they are what I call the ontological parts of objects. This is the case so long as it is understood that only an elite set of properties are understood to be capable of being such ontological parts of objects. With a theory of ontological parthood in place the mereological bundle theory will be shown to be able to account for both the particular character that objects have and how objects, ontologically composed of properties, can explain how numerically distinct objects resemble eachother to greater or lesser extents. In what follows in this thesis it will be advocated that they are best understood as the only parts that objects have against an alternative conception of the mereological bundle theory that takes objects to be constituted by both ontological parts and spatiotemporal parts defined by spacetime regions. This alternative conception I call the Substantival Mereological Bundle Theory. However, a major deficiency of this view is that it requires the postulations of substantival space as an ontological category over and above the ontological category of property. A major strength of Paul's version being that it has the flexibility built in to cover difficult conceptual variance as to the nature of spacetime given by theoretical and

empirical considerations from physical science. Testament to its ontological parsimony it can do this as a one category ontology of material objects as fusions of properties. At the end of **chapter five** I will argue that the mereological bundle theory can avoid the classic problem of qualitatively indiscernible objects that besets most versions of the bundle theory if properties are understood to be immanent universals. It can provide an answer therefore to what I call the problem of indiscernible fusions of properties.

The thesis as a whole sets out to accomplish three related tasks at different levels of generality. The first is setting the two problems of resemblance and character, pushing for a shift of focus to the latter. The second level is to consider a general approach to dealing with these problems, the constituent ontology with a focus on the problem of character. Finally, the last level, at the greatest level of specificity, is to consider particular versions of the constituent approach; settling on some one specific version which is deemed best. The first chapter motivates that we should take questions of the character and resemblance of objects seriously. Then the second and third chapters consider the general framework of the constituent ontology; with the third chapter defending the constituent approach from major problems that take the whole framework to be ill motivated and incoherent. The final chapters four and five consider the most specific versions of the constituent ontology, with chapter five articulating the specific version which I take to be the best, namely, the mereological bundle theory.

Chapter 1. Resemblance and Character:

1.1 Introduction: Two problems of objects and their properties

This first chapter has a very express purpose: to motivate and defend the two questions that any systematic metaphysics of the world should consider. It is in this sense a problem setting chapter. The problems that I motivate are what I call the Problem of Resemblance (PR) and the Problem of Character (PC) formulated as:

The Problem of Resemblance (PR): *Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.*

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

This chapter will start with a defence of the problem of resemblance since it is the far better covered of the two problems; being the subject of much metaphysical thought since Plato. I will then move on to the

somewhat more neglected, albeit more fundamental question of what it is for any object to have or instantiate a property at all. The problem of resemblance is in fact so well covered that it is often only after solutions to the problem have been put forward that the question of how properties relate to object at all, as in the Problem of Character, is then considered. However, the error in this is to formulate your theory of properties to account primarily for how it is that numerically distinct objects resemble eachother; and then only a subsequent matter does it occur how objects are related to properties at all. It is likely the better methodology in a metaphysical theory of properties and objects to always run the Problem of Resemblance with its sister, the Problem of Character. Theories of predication do attempt to give some account of the relation , but they are often formulated explicitly on semantic as opposed to metaphysical grounds and therefore often do not have the metaphysical machinery built into the theory to account for some of the nuances required for a robustly metaphysical account of an objects character. The thesis will aim to give one such account of character, this will constitute the more interesting part of the thesis, but before this lets first be clear about the Problem of Character's much more famous sister, the Problem of Resemblance.

1.2 The Problem of Resemblance

1.2.1 The One over Many

Often the problem of resemblance is not clearly set out before a solution to it is proposed. This is understandable in the sense that the issue at hand is so well trodden; it could be called the problem

of universals. I refer to it rather as the problem of resemblance since calling it the problem of universals presupposes one of the myriad solutions to the problem. Calling it the problem of resemblance makes it clear what the phenomena is that needs explanation without referring to one of the solutions in the mere naming of the problem. The issue of naming aside those who work on the problem often feel the need to get onto the work of providing the explanations without always being precisely clear what the problem is. Therefore, in this chapter I will state what the problem of resemblance is, defend it from charges that it is a pseudo question and gesture at some solutions. Carrying out this problem setting work is critically since it will influence what form resolutions will take.

Let's start with the first form of the problem as it introduces us to the issues in the broadest sense. This is the traditional problem of the one over many. Consider some facts about my current surroundings: a book to my left and another book to my right are both of the same hue of blue, two jerseys in my room have both given me an electric shock when I touched them, the two candles are both white and are both melting when heated by a flame. Such facts can be taken as reports of sameness between numerically distinct things **(Armstrong 1997a, 102)**.When I say that two books resemble eachother I am saying that there is some respect in which they resemble, in the case of the blue books they both resemble eachother in respect of being blue. There are of course many respects in which I can say they are similar. In addition to being blue they are also rectangular, have similar masses and both have a similar bookish odour. There are also many respects in which the two books do not resemble. They have a different number of pages, a different subject matter and are composed of different materials.

However, the respects of resemblance between the two books allows one to say that they resemble eachother more than either resemble the desk upon which they rest. If I were to buy another copy of one of the two books, I would then be able to say, of the two copies of the same book, that the two copies are more similar to eachother than either is to the other book. They both share more respects in which they are similar, given that they are exact copies produced in the same factory.

Not only do numerically distinct objects resemble but that resemblance comes in degrees. For instance, any African lion resembles any Asiatic lion more than either resembles any tiger. This is the case in virtue of African and Asiatic Lions resembling in more respects to eachother than either one does to any tiger. In other examples protons are more like neutrons than electrons in virtue of resembling neutrons in more respects than either resemble electrons. Hence a 3-placed relation predicate 'x is more similar to y than to z' can be introduced to account for degrees of resemblance. The facts of degrees of resemblance are very useful when it comes to classification. Consider the example of our *pantherine* species above. The reason we are able to classify lions of different species together as lions and not place tigers into the genus 'Lion' is that particular individuals of either of the species of lions share more respects of resemblance to eachother, and also individuals of other species of lion, than either does to any tiger. The fact that things resemble in degrees allows us to carve the world up into groups where we can assert of any object in that group that it resembles other objects in that group more than objects classed outside of that group[1].

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[1]At least in so far as grouping individuals into natural kinds goes.

Another way to think of resemblance in the same respect is in terms of recurrence **(Bigelow 1988, 18-27)**. Numerically distinct objects cannot reoccur in different places at the same time; one particular book cannot be both on the left- and right-hand side of my desk at the same time. For instance, consider near exact duplicate copies of the book *Great Expectations*. Being nigh on duplicate they resemble in many respects, including their mass. The first copy weighs 800g and the second copy weighs 800g, they therefore resemble in respect of both weighing 800g; and as near exact copies resemble in a great many other respects. Now it seems to be the case that although the two books are numerically distinct objects , nevertheless there is recurrence at both in regards to their weight. That is 800g reoccurs at both copies of *Great Expectations*. Both books resemble eachother in respect of weighing 800g.

Armstrong **(1978a, 11-16; 1997a, 102)**,Lewis **(1983, 355)** and Rodriguez- Pereya **(2002, 15)** have asserted that such respects of resemblance, similarity or reoccurrence between distinct things are Moorean truths[2], such that to deny them would constitute a massive deviation from common sense. Given this, the truth of facts of resemblance between numerically distinct objects is an example of what could be called differential certainty. That is to say there is a greater degree of certainty in the truth of the claim that objects resemble than a denial that objects resemble at all. We do not need to establish the absolute certainty of the claim that a particular object can resemble other numerically distinct objects in the same respect or respects. If claims to Moorean truth are accepted, then the query now

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[2] Moore's famous example was his challenge to the sceptic to deny the truth of "this is a hand". For greater discussion see Moore's original "Proof of an External World", **(1962, 144-148)**, "Some Main Problems of Philosophy", **(1953).** For a critical defence of Moorean truths see Baldwin **(1990, 269-274)**.

is why does this fact of the resemblance of numerically diverse objects constitute a problem at all?

Rodriquez-Pereyra **(2000, 257-258; 2002, 18-19)**, in an interesting take on the problem of the one over many[3], thinks that the problem can take the general form of,

1) Given some specific truth X how is it possible that X is the case given another specific truth Y that is also the case, where X and Y are incompatible?

Y is what Nozick **(1981, 8-11)** would call '*an apparent excluder*' of X. If X and Y are taken to both be true then the conjunction of the truth of X and Y is a puzzling situation in need of explanation. To show that X and Y can in fact both be true we need to show that Y is only an *apparent* and not a *real excluder* of X. If Y is a *real* excluder of X then either the possibility of X must be eliminated or the possibility of Y must be eliminated. To get a sense of this consider certain incompatible shapes. For instance, if an object is spherical at a given time then this is a *real* excluder of that same object being cuboid at that time. In this case X and Y would logically exclude eachother such that they could not both be true. An *apparent* excluder would only give the putative appearance of exclusion. For instance, in the debate on freedom of the will, compatibilism is an attempt to show that causal determinism is only an *apparent, not a real excluder* of free will. The

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[3] Rodriguez-Pereyra **(2002, 43-52)** in fact takes the problem of properties to be rather what he calls the many over one problem, not the one over many. The central thought being that given the multiplicity of properties that most particular objects have, for any given object that object cannot be the truthmaker alone for propositions such as 'as if F' or 'a has the property F'. **(2002,46)** I think this is a good question to ask but I think the deeper problem is, how do objects have properties at all. This in effect will be what I formulate as the problem of character.

problem of the one over many can follow this notion of exclusion in the form of,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

If Y and X are Moorean truth then, at least putatively, the exclusion must only *apparent* since we have two truths that need to be accepted. In the case of 2 we have the Moorean truth,

X) Multiple objects can resemble eachother in the same respect/s.

And the other Moorean truth,

Y) Any two or more objects are numerically distinct; they are not one and the same object.

Let's be clear about why X) and Y) are *apparent* excluders? Y) asserts that the world is made up of numerically distinct objects. Pick out any one of these objects, *a*. To assert that *a* is numerically distinct from *a* would be assert a necessarily false assertion; to make an obviously contradictory claim. In addition, it could not be asserted that if *a* is numerically distinct from *b* then *a* is identical to *b*; a could only be identical to *b* if *a* and *b* are in fact numerically identical. Exceptionally obvious stuff that give us the Moorean quality of Y. But X) appears to introduce identity into Y). For if *a* and *b* resemble eachother in the same respect then *a* and *b* appear to be identical in some respect. For instance, they are identical in some respect *F*, namely *a's being F* and *b's being F*. But how can there be numerical identity in numerical diversity; the numerical identity of *a* and *b* in respect of both being *F* is excluded by the Moorean fact of Y that *a=a, b=b and a≠b*.

Consider the following example. Let it be the case that a=b, for instance that *a* is Clark Kent and *b* is Superman. It is not hard in this case to explain why Clark Kent and Superman resemble in respect of *being superhumanly strong*, this is the case because Clark Kent is Superman. But now consider Clark Kent's identical twin Mark. In virtue of being from the same planet Clark and Mark are superhumanly strong. But how do we now explain the fact that both Clark and Mark resemble in the same respect of being superhumanly strong cause Clark is not numerically identical to Mark. Explaining how Mark and Clark are somehow identical in so far as both are superhumanly strong yet are at the same time numerically distinct objects seems problematic. At least apparently so. Only apparently so because if the facts of resemblance given by X, and the facts of the numerical identity of objects given by Y are both Moorean truths then we must show that somehow the exclusion here is only *apparent*. Therefore X) and Y) taken together give us the problem of the One over Many in terms of *apparent* exclusion.

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

Before proceeding onto a defence of the problem of resemblance in its one over many guise , it worth giving some an overview of the solutions to the problem of resemblance where the having of properties accounts for resemblance of numerically distinct objects.

1.2.2 A brief review of solutions

1.2.2.1 Realism on properties as universals

The problem of the one over many can be formulated as,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

It has been taken to constitute an argument for an addition of entities to our ontology over and above just particular objects. Particular objects are all the things that cannot be located at different places at the same time. Putative examples include individual books, tables , persons, protons and grains of sand. To account for resemblance the new entities on the contrary are capable of location at different places at the same time. Recall the notion from the last section about reoccurrence where two particular books can each weigh the same, they both weigh 800g. Here there is reoccurrence of 800g at book 1 and at book 2. These new entities, like being 800g, explain why book 1 and book 2 are the same in respect of weighing 800g. Namely book 1 has the property of *being 800g* and book 2 has exactly the same property of *being 800g*. *Being 800g* is , unlike particular objects, capable of reoccurring at two different places at exactly the same time. Traditionally these entities are called 'universals' in that they are capable of somehow being at different places simultaneously. On this

account properties are identified as universals and in virtue of this are taken to explain how different particular objects can resemble eachother in exactly the same respect. For if any two objects share the same property universal, say redness, it follows that those two particulars will resemble eachother. Typically, it is said that for different objects to have the same property is for them to both instantiate one and the same universal. Properties are thus construed as real universals. The world is therefore constituted ontologically at the most fundamental level as being a world of particular objects and universals; a substance/attribute ontology.

There are many historical antecedents to this view. Plato, Aristotle and Boethius are notable ancient advocates of different versions. The debate on universals later reached its zenith in the middle ages, tending towards the view that universals are only nominal, that they have only a linguistic existence. The most notable advocate of realism in this period was John Duns Scotus who argues for the existence of universals from his own refined version[4] of the One over Many. In the early 20th century the most notable advocates are Russell and Moore. The archetypal realist in the later 20th century and 21st century is David Armstrong **(1978a, 1978b, 1983, 1989a, 1989b, 1997a ,1997b, 2004a, 2004b)** , but there are many others. For instance, Tooley **(1977, 1987)**, Lowe **(2006)** and Loux **(1978)** explicitly advocate universals, often to account for the regularity of lawlike relations. Many Dispositionalists also advocate universals to do similar work, for instance Mumford **(2004)** , Bird **(2007)** ,Tugby **(2013, 2015)** and Vetter **(2015)**.

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[4]Scotus' argument is very broadly something like this, 'If things resemble eachother in terms of natural kinds , there are common natures; things do in fact resemble eachother in terms of natural kinds; therefore there are common natures, the common natures being universals'. **(Spade 1994, 101-102; Bates 2010, 12)**

Two general forms of theories of universals can be distinguished by the acceptance or denial of something like the following principle,

Principle of the Necessity of Instantiation (PI$_N$): It is necessary that for each property universal *P* there is some particular object *x* such that *x* is *P*.

The theory of the immanence of universals is the affirmation of such a principle **(Armstrong 1978a, 113-114)**. It asserts that for every universal there is some particular object such that this object has that universal as a property. Universals are immanent in the sense that they are always had or instantiated by particular objects; and they exist in virtue of being had or instantiated by objects. For instance, if *whiteness* is a universal then *whiteness* exists *iff* there is some particular white object. Transcendent realism on the other hand is the denial of the necessity of instantiation of universals. We could read transcendent realism to rather be the affirmation of the following principle,

Principle of the Contingency of Instantiation (PI$_C$): It is contingent that for each property universal *P* there is some particular object *x* such that *x* is *P*.

Under this principle the theorist of properties as universals can countenance the possibility that there are universals such that they never are instantiated by any particular object. So, for *whiteness* to exist there need not be any particular white objects. *Whiteness* exists if there are some white objects and *whiteness* exists if there are no white objects at all. There can therefore be uninstantiated universals. For this to be the case, Russell **(2003a, 126; 1912, 57)** for instance distinguishes between the existence of particular objects and the being of universals.

Property universals in this transcendent sense therefore exist as properly abstract entities, wholly separate from the objects that may instantiate them. Property universals, unlike in the immanent conception, have a peculiar reality to objects. Universals subsist rather than exist in the manner that particular objects have reality. This is explained in virtue of universals being timeless and unchangeable[5].

Whether we accept immanence or transcendence the having of property universals explains the resemblance of particulars that share those universals. The problem that any realism about universals whether transcendent or immanent will have to face is how are we to account for how universals relate to the particulars that instantiate them. In this thesis I will primarily focus on those theories that taken an immanent conception of universals where universal are somehow understood to be ontological parts or constituents of the objects which instantiate them. Transcendent universals being wholly 'separate' from objects cannot be conceived in any sense as being constituents of objects, they cannot be in any conceivable sense 'within' objects[6].

1.2.2.2 Realism on properties with primitive resemblance

There are two forms of realist theories of properties that are nominalistic when it comes to taking properties to be universals. Both account for resemblance in terms of a relation of primitive exact resemblance. These are known generally as trope theory and

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[5] Other exponents of transcendent universals for varying reasons include Hale **(2013)** , **Moore (1953, 288- 305)**, Tooley **(1977; 1987)** Tugby **(2013; 2015)**, Platinga **(1974; 2003)** and van Inwagen **(2004)**.
[6] For reasons why I think this is the case see section 2.4 of this thesis.

resemblance nominalism. I will focus only on the former. The reason I focus only on the trope theory in this brief survey is that while both can be taken to be realist theories of properties , on the resemblance nominalist account properties are taken to be sets of resembling objects and therefore cannot be construed in any sense as being ontological parts or constituents of the objects which instantiated them[7]. Resemblance nominalism is therefore a variant form of what I call Relational Ontology and cannot be a constituent ontology. Since one of the focuses of this thesis is on constituent ontologies, I will not survey resemblance nominalism[8] here.

Theories of properties as tropes, or property instances, can take these entities to be constituents of objects. To motivate trope theory, consider the following ordinary particular objects: books, tables, persons, protons and grains of sand. The trope theorist[9] adds to the list of particulars, she adds particularized properties or property instances such as *the blueness of this book, the hardness of this table, the risibility of this person, the positive charge of this proton* and *the mass of this grain of sand.* For each example we can specify that the trope, or property instance, belongs only to the particular object for which we are speaking of. Hence, unlike universals, tropes exist at only one location at a time. Tropes are property instances or rather

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[7] As in the case of transcendent universals, see last footnote 6.

[8] For a modern defence of Resemblance Nominalism in light of these difficulties and others see Rodriguez-Pereyra **(2002)** and Paseau **(2012, 2015).** In particular Rodriguez-Pereyra offers a novel modal realist version of resemblance nominalism to answer another challenge, namely the co-extension difficulty. Bird **(2003)** challenges this utilisation of the full Lewisian panoply of concrete *possibilia*. Rodriguez- Pereyra *(2003)* offers a response to the challenge. Yi **(2014a)** argues that that Rodriguez- Pereyra's form of resemblance nominalism cannot account for truths involved in the predications of abstract nouns. Rodriguez-Pereyra **(2015)** responds to this.

[9] Prominent trope theories include Williams **(1999)**, Campbell **(1981, 1990)**, Martin **(1980)**, Simons **(1994)** and Bacon **(1995)**.

particularized properties. For most trope theorist's, although not all[10], particular objects like books or persons are less fundamental than tropes. Tropes are the one and only fundamental building block of the world. As Williams **(1999, 215)** puts it they are the 'alphabet of being'. Tropes are those entities out of which all objects are constituted or composed; objects are fundamentally bundles[11] of compresent, collocated, concurrent or consubstantiated tropes. Trope bundle theories of substance fair better than universal bundle theories because tropes are necessarily particular. Therefore, trope bundle theories automatically do not entail false versions of the Principle of the Identity of Indiscernibles. This is why most trope theorists are also bundle theorists regarding objects. Differences between a theory of properties as universals or tropes aside there is also an important convergence. Both an immanent theory of universals and trope theory are non-reductive about particular objects things having properties, they are both realist theories of properties. They both take properties to give a fundamental ontological category, that is not a subcategory of any other ontological category **(van Inwagen 2015, 46-50)**.

Both universals and trope theories assert that there really are respects in which objects resemble, however the trope theorist denies that properties are entities capable of simultaneous multi-location. A theory of universals asserts that objects resemble eachother in exactly the same numerical respect; where we have resemblance in the same respect in two or more objects, we have exactly the same universal

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[10] E.J. Lowe **(2006)** for instance argues that there are four fundamental categories of being, trope or as he prefers to call them, modes, being one of the four fundamental categories. Interestingly he also argues that there are property universals in addition to tropes, tropes being instantiations of property universals.

[11] While it is the case that most trope theorists subscribe to a bundle theory of substance , there are those that maintain a traditional substance/attribute view. Notable among them is Martin **(1980)** and Denkel **(1996)** .

present at each object. The trope theory denies this. So, for instance, given that properties conceived as tropes cannot repeat in the way they would if they were universals how do we then account for two books being blue? Under the trope theory, for the two books to be blue they must both be composed of at least some exactly resembling tropes. The entity that is the one that exists over many particular objects is not a single entity present at each object. Rather objects resemble in the same respect because they are each composed of some tropes that are members of the same resemblance class of tropes where each member resembles every other member exactly. Exact resemblance between tropes (respects) is not up for analyses, rather exact resemblance is primitive. In the case of *blueness*, instead of *blueness* being a universal rather *blueness* is a resemblance class; that is to say the class of all *blue tropes* where each member of the class exactly resembles every other member. The class of all exactly resembling blue tropes can be taken as an equivalence class. This is because while the relation of resemblance is symmetric it is not transitive, while the relation of exact resemblance is symmetric and transitive. The issue around transitivity is clear if we consider it by example. Consider some breeds of dog. If the French Bulldog resembles the Boxer closely and the Boxer resembles the Mastiff closely it does not follow that the French Bulldog resembles the Mastiff closely. In this case the French Bulldog and Mastiff do not resemble eachother closely because the Mastiff is ten times the mass of the French bulldog, but the French Bulldog resembles the Boxer because they are both brachycephalic (short faced). So close resemblance is not transitive. Here trope theory can come to the rescue because rather than speaking of the resemblance of the objects overall, we can pick out respects in which objects exactly resemble. If the French bulldog exactly resembles the

Boxer, in virtue of them both *being brachycephalic*, it follows that the French Bulldog will resemble some qualitative duplicate of the boxer exactly in respect of *being brachycephalic*. The degree of resemblance is always preserved between objects that exactly resemble in some respect, in this case the particularized property the *French Bulldog being brachycephalic* exactly resembles the *being brachycephalic* tropes of the duplicate Boxers[12].

Let's sum up how trope theory answers the problem of the one over many as given in,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

If any two particular objects resemble in the same respect it is because they are both composed of some tropes, those tropes between the two objects being members of a class of exactly resembling tropes. If those same objects differ in other respects that is because they are not composed entirely of tropes that in every case primitively resemble eachother. Tropes can, it seems, do the job the realist intends universals to do, without resorting to entities like universals.

1.2.3 A pseudo -problem?

So, it seems solutions to the problem of the one over many leads us to postulate entities like universals or tropes to explain the resemblance

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[12] Treat this as a toy example for purposes of illustration. It is highly unlikely that instances of *being brachycephalic* genuinely exactly resemble*.

of numerically distinct objects. However, is there any reason to suspect that the one over many is no problem at all, in need of no distinctly metaphysical solution. Michael Devitt[13] **(2010a)** famously attempted in the spirit of Quine **(1980, 9-11)** to deny that the one over many is such a problem in need of a metaphysical explanation. If there are properties, either as universals or tropes, the one over many is not a real problem that should leads us to either. As Devitt **(2010b, 24)** states,

"… the basic case against Armstrong and the One over Many is that the "identity in nature" of red houses and sunsets need not commit us to the universal redness. We accept that the houses and sunsets exist and explain away their "identity in nature" as simply a matter of their all being red. No more need be said. The One over Many is a pseudo problem and to adopt Realism about universals because of it is, indeed, to be a Mirage Realist."

Consider the problem of the one over many with X and its apparent excluder Y.

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

Devitt does not deny the apparent excluder Y since for Devitt the world is constituted only of numerically distinct objects. That is all that is needed in an ontological picture of what there is in the world. Rather he denies that the truth of X) leads us to posit in our ontology anything other than particular objects. It is the objects alone that suffice to explain the truth of X. If he is correct, then it is obvious that 2 is a

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[13] Bruce Aune **(1973)** and to a lesser extend Jame's van Cleve **(1994)** endorse something like Devitt's view on the One over Many.

pseudo-problem for X and Y in no conceivable way exclude eachother. To do this Devitt **(2010a)** channels the spirit of Quine[14].

Devitt asserts that typically if we accept something like resemblance in the same respect, as in X , then we usually assent to statements like,

i) book one and book two have the same property *blueness*.[15]

In a theory of universals, we posit some third entity, the universal *blueness* , that book one and book two both have to account for the truth that both resemble in the same respect. In trope theory we posit some primitive relation of exact resemblance between the respective tropes, *blueness-trope-at-book-one* and *blueness-trope-at- book-two* to account for the resemblance in the same respect. If we subscribe to something along the lines of a criterion of ontological commitment[16], then we are committed to the existence of all the entities that must exist for the sentences we accept to be true. The variables we use in quantification, 'something' and 'everything' range over all of the ontology we choose to accept as true. To be committed to some entity's existence that entity must be counted among the things which the variables range over **(Quine 1980, 13)**. Consider Quine's example 'some dogs are white'. The assertion here is that 'some things that are dogs are white'. In order for this to be true the entities over which the bound variable 'somethings' range must include at least one white dog. Thus, if we are committed to the truth that some dogs are white we are committed to there being at least one white dog. But perhaps

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[14] See in particular Quines *Word and Object* **(1960)** in particular chapter 3 *The Ontogenesis of Reference* **(1960, 80-124)** and also chapter 6 *Flight from Intension* **(1960,191 – 232)**. In his *On What There Is (***1980a, 1-19)** see specifically **(1980a , 9-19)** and in his *Logic and the Reification of Universals* **(1980b, 102 -129)** see specifically **(1980b ,107-117)**.

[15] I use the example of books being blue for purposes of illustration. Devitt **(2010a, 14-15)** uses the canonical notation of particulars *a* and *b having F*. Subsequent paraphrases he gives are in that form.

[16] For a theory of ontological commitment see the references in footnote 14.

we are unhappy with the ontological commitment a sentence pushes us towards for independent reasons. For instance, perhaps the entities the sentence commits us to don't accord well with Ockhamic principles of parsimony[17]. For instance, true sentences about 'averages' should be paraphrased such that we are not committed to there being *averages* in addition to the particular entities from which we derive the averages. Ontology so it goes should be a lot like the sciences, particularly physics. We should only adopt conceptual schemes that are both reasonable and as simple as possible. We should avoid positing entities surplus to the task of giving the truth of statements. The less the better.

Now consider the statement,

i) book one and book two have the same property *blueness*.

This statement on the face of it seems to commit us to some extra entity, *blueness*. Can this be avoided? I will focus on the universals, but the same reasoning against postulating tropes could be followed *mutatis mutandis*. Devitt **(2010a, 15-19)** argues that i) can be sufficiently paraphrased without loss of meaning as,

ii) book one and book two are both blue.

Of course, advocates of universals can remain perplexed. It may be asked, in virtue of what are *book one* and *book two* both blue? There must be something that makes both blue. So, some account of the sameness in diversity between *book one* and *book two* is still required. But Devitt **(2010a, 15-16)** then offers two statements sufficient for the truth of ii,

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[17] For a critical discussion of Ockhamic Principles in relation to properties see Oliver **(1996, 5-9)**.

iii) book one is blue.

iv) book two is blue.

The problem given by,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

now appears to dissolve away. iii and iv can be true without any recourse to either primitive relations of exact resemblance between tropes or an identity in universals shared between the objects. This is the case because *iii* is true *iff* there exists an x such that 'book one' designates *x* and 'blue' applies to *x* and *iv* is true *iff* there exists a *y* such that 'book two' designates *y* and 'blue' applies to *y*. After this all we need for the truth of *i* is that there are two distinct objects *x* and *y*. That is, given the problem of the one over many in 2, all we need is the entities of the apparent excluder *Y* in the case of *i* the numerically distinct things *x* and *y*. There is nothing left to account for X, in this case *blueness* that may give rise to any exclusion *apparent* or otherwise between the resemblance referred to in X and the numerical difference referred to in Y. Neither do we need to posit primitive relations of exact resemblance between the blue books to analyse their resemblance in respect of their *blueness*. The problem of the one over many seen in,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

is therefore according to Devitt **(2010a)** a pseudo- problem.

This is because the fact that book one and book two resemble in the same respect is nothing more than the fact that the predicate 'blue' applies to both book one and book two. We are no longer committed to anything over and above the particular objects, the two blue books. Resemblance in the same respect is therefore analysed just as the proper application of predicates to objects and this in no way, even apparently, is excluded by the numerical distinctness of those objects.

1.2.4 The failure of paraphrase

The purpose of what is to follow is not to offer a knock down argument against Devitt's dismantling of the one over many. Rather I shall just point to reasons why we may consider the problem of the one over many as given in,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

to be intact. The project for Devitt will be to offer successful paraphrase for each and every statement taken as true, avoiding commitment to any entities over and above particular objects. It should be clear however that just one example of the failure of paraphrase, at least for the time being, is sufficient to cast severe doubt on Devitt's project. Lewis (**1983, 349**) too is critical of the project," *…even if such paraphrases sometimes exist – even if they always exist, which seems unlikely – they work piecemeal and frustrate any systematic approach to semantics".* The worry here is twofold. Firstly, there seems to be a reasonable sense in which we should assume it to be highly unlikely that each true statement will be susceptible to paraphrase such that

the bound variables will only ever range over particular objects. Secondly, the project of paraphrase can only be successful if we consider each statement one at a time; therefore, there can be no generalized method of paraphrase.

I will focus on the first worry by offering some troublesome statements for paraphrase, the examples will be drawn from Pap **(1959, 1960)** and Jackson **(1997)** and were used later in response to Devitt by Armstrong **(1997a)**. I will then discuss another interesting example given by van Inwagen **(2004).**

Consider the following set of statement kind: Statements of resemblance of properties like 'Red resembles orange more than red resembles blue ', statements of higher order predication like 'Blue is a colour' and statements of resemblance between natural kinds like 'Spiders share some of the anatomical features of insects'. Armstrong **(1997a, 105)** argues that statements like these cannot be paraphrased such that ostensible reference to properties dissipates. Let us briefly go through each to see this.

Statements of the Resemblance of Properties.

Consider a true statement of resemblance among colour properties,

i) 'Red resembles orange more than red resembles blue.'

Here perhaps Devitt could offer a paraphrase of *i* like,

i') 'For every particular x,y and z , if x is red and y is orange and z is blue , then x resembles y more than x resembles z.'

But notice that i) is not equivalent to i'). This is obvious if we realise that any x,y or z may resemble eachother in respects other than colour. **(Pap 1959, 334; Jackson 1997, 90)** For instance, a red book resembles a blue book more than it resembles an orange cat. Given this Devitt needs to supply us with another paraphrase.

i'') 'For every particular x, y and z, if x is red and y is orange and z is blue then x colour resembles y more than x colour resembles z.'

But if Devitt performs this then he would have introduced a new predicate 'colour resembles' into the statement. Now it seems further analyses of 'colour resembles' would be problematic as it would set up a four-term relation of resemblance holding between objects *x*, *y*, *z* and the new predicate of 'colour resembles'. This is in virtue of *x* colour resembling *y* more than either colour resembles *z*. With this we would have ostensible reference to the property universal *being coloured* accounting for how objects resemble in respect of colour. One could also take *colour resembles* as a primitive resemblance relation. However, with either of these options we have ontological commitment to something over and above the particular objects or the positing of a new primitive resemblance relation. Namely there is ontological commitment to the property universal *being coloured* or the postulation of a primitive resemblance relation of colour resemblance between objects that explains the application of colour predicates in statements like i). It seems therefore that if paraphrase is not available then, by the principle of ontological commitment, we should accept either the property universal *being coloured* or posit a primitive resemblance relation. Adequate paraphrase, of at least this statement of the resemblance of properties, to avoid commitment to entities over and above particular objects is not available.

Statements of higher order predication

Consider the true statement,

ii) 'Blue is a colour**.'**

Here we could offer the paraphrase,

ii') 'For every object, x, if x is blue, then x is coloured. '

Clearly here ii) entails ii') for necessarily everything red is coloured. Jackson **(1997, 89-90)** shows however that the reverse entailment does not hold. To do this he asks us to consider the following purportedly necessary truth,

ii*) 'For every object, x, if x is blue, then x is spatial.'

So equally if ii') entails ii) then equally ii*) should entail,

ii**) 'Blue is spatial.'

But ii**) is clearly false for it is not necessarily true that blue is spatial. Given at least the remote possibility of non-spatial blue objects, we should not countenance that to be blue is to be spatial. Therefore, it seems that the assertion that ii) 'blue is a colour' says something about blue not analysable purely by saying something only about blue objects. For while it may be true that all blue objects are spatial it does not follow that blue is spatial. Therefore, we cannot paraphrase away the apparent singular term 'blue' in the subject position. It seems therefore that we still ostensibly refer to something that is not clearly a first-order particular object. Again, in this case it appears we cannot give sufficient paraphrase to avoid ostensible reference to properties.

Statements of Resemblance between Natural Kinds

Consider the true statement of invertebrate biology,

iii) 'Spiders share some of the anatomical features of insects.'

iii) seemingly is a statement that arachnologists and entomologists would both assent to. Van Inwagen **(2004, 114)** points out that trying to imagine quite what an anatomical feature or characteristic would be other than it being a property would be very odd. For instance, *having an exoskeleton* is one such shared anatomical feature; a respect in which spiders resemble insects. So, at first glance we can ask what does iii commit us to if it does not commit us to properties over and above particular objects? But perhaps to avoid commitment to properties we can paraphrase *iii* as,

iii') 'There are anatomical features that insects have and spiders also have'.

Or canonically,

iii'') 'Something is an anatomical feature and insects have it and spiders also have it'.

Consider now that the something here is the property *having an exoskeleton*. Devitt would struggle to offer paraphrases to avoid commitment to a property like *having an exoskeleton* and account for the truth of statements like *iii*. The reason for this is that the terms 'spiders' and 'insects' are both plural terms, referring to all of the members of the two natural kinds or classes. The best he could do here is perhaps follow Quinton **(1957)** and Lewis **(1983, 1986)** and say that 'spiders' and 'insects' designate the classes of all spiders and all insects

with the predicate ' having an exoskeleton' . That is to say designating the class of all sets of objects to which the predicate having an exoskeleton applies. Quine would say that examples such as this, if they are in fact not susceptible to paraphrase in terms of just first order objects, commit us to the existence of classes. We cannot eliminate ranging our bound variables over abstract objects like classes/ sets in cases like this. A similar issue will arise if we try to use concepts to do this. We will add to our ontological repertoire by adding abstract objects like sets or concepts. But the point of paraphrase in this context was to avoid doing this.

However perhaps there is a rejoinder to this. Consider this paraphrase of iii as,

iii*) Spiders and insects are in some respects anatomically similar.

First of all to maintain the thesis that the problem of the one over many is a pseudo problem one has to paraphrase away reference to 'things are similar in at least some respects' for this will lead to further questions whether things are similar in at least some of the same respects, i.e. any insect is similar to any spider in that they are similar in the same respect of *having an exoskeleton*. Why is this the case? Well because our bound variables will have to now range over respects or ways things are.

As Van Inwagen **(2004, 119-120)** shows statement iii*) which speaks of respects of similarity or ways can be read in a grammatically cumbersome manner as,

(For ways) It is true of some thing that it is such that it is a way in which a thing can be like a thing and it is anatomical and spiders are like insects in it.

(For respects) It is true of some thing that it is a respect in which things can be similar and it is anatomical and spiders and insects are similar in it. **(van Inwagen 2004, 119)**

It could be responded that the word 'some' in both of the above should not be taken as a quantifier. The statements should thus not be taken to show that there exists ways or respects in which objects are alike or similar. The statements that speak of ways or respects in which things are alike or similar should rather be taken as the result of the linguistic conveniences of ordinary life when we compare pairs of ordinary objects. Such statements do not then significantly refer, and given this do not need to refer to entities that may be construed to be properties. But this is not correct, we have to view the variable 'some' as having literal significance when we speak of ways/ respects in which object are similar or resemble. That is, we cannot prevent our quantifiers from ranging over ways or respects. Consider the similarity or resemblance of two objects again. For instance, the statements 'x is like y in some physiologically relevant ways' and 'x is like y in some anatomically relevant ways'. How is one to explain the relation between these statements? Van Inwagen suggests that there must here be some logical, structural or syntactical relation here. For instance we could supply the relation by reading the former as 'something z is a way in which a thing can be like a thing and z is physiological and x is like y in z' and the latter as ' something z is a way in which a thing can be like a thing and z is anatomical and x is like y in z'. Van Inwagen **(2004, 120)** pushes us to show how it could be the case that if there is no logical structure between 'x is like y in some physiologically relevant ways' and 'x is like y in some anatomically relevant ways' can we then account for the obviously valid argument:

Either of two female spiders of the same species is like the other in all anatomically relevant ways, therefore an insect that is like a given female spider in some anatomically relevant ways is like any other female spider of the same species in some anatomically relevant ways.

If one insists that the premise here has no logical structure, that we are not literally quantifying over ways, then one is going to struggle to account for how the argument above is valid. From this Van Inwagen **(2004, 120-121)** argues we should assert the following condition of adequacy on paraphrases. No adequate use of paraphrase should allow for us to not have an account of the logical relations between predicates that are obviously logically related such that we can no longer account for the validity of obviously valid arguments. If we need properties to do this, then so be it. We should jettison Devitt's paraphrasing project if such paraphrases cannot account for this adequacy condition. The lesson from examples i-iii is this. Quantification over properties inherently pervades our discourse in ordinary life and in science. In higher order predications paraphrase into statements that commit us ontologically to only first order particular objects seems highly improbable in many cases. This seems good reason to suspect Devitt's nominalistic project will fail, and if it does, we should suspect that the one over many may not be a mere pseudo-problem.

1.2.5 Resemblance and Natural Properties

1.2.5.1 Natural, Sparse and Abundant Properties

It is clear from the last sections that at the very least if those of Devitt's ilk wish to give adequate paraphrases of true higher order statements, they will need to make recourse, at least, to classes of objects to make sense of their claims. Quinton **(1957)** and more famously Lewis **(1983, 343- 345, 1986, 50-53)** take properties to be classes or sets of objects. So, for instance take the property of *being blue*. In this case the property of *being blue* is just the set of all instances of particular blue objects, like blue books, blue birds and blue cars. To be a blue object having the property of *being blue* is therefore just to be a member of the set or class of blue objects. Putatively this seems to be a solution to the one over many. If it is queried why any multitude of numerically distinct objects can resemble in respect of *being blue*, the answer is that all of the respective objects are members of the set of all the blue objects. Resemblance is accounted for in terms of set or class membership. To have or instantiate a property at all is to be a member of the appropriate set or class of objects[18].

Properties construed as sets are thus 'spread out', partly present wherever there is a blue object **(Lewis 1983, 344)**. The most obvious objection to this is the famous problem of co-extensive properties. We

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[18] In effect this is how the class nominalist account for what I call the Problem of Character; at least in so far as it accounts for how objects are related to properties by instantiation.

do not want to say that the property of *having a heart* and *having a kidney* are identical. But if we take the property *having a heart* to be the set of all objects with hearts and the property *having a kidney* to be the set of all objects with kidneys then it seems likely that the two properties have the same extension since all particular organisms with hearts have kidneys. Given this same extension the properties are identical. Obviously, this cannot be the case because a) any particular heart and any particular kidney are distinct objects and b) there could have been a creature with a heart but devoid of kidneys. Lewis' **(1986, 50-52)** famous, or infamous solution depending on your taste for ontological inflation, comes from his modal realism. Accidentally coextensive properties as above are not coextensive when we range our quantifiers over all concrete possible worlds. So now when we consider other worldly creatures the sets of objects are no longer co-extensive, they are just co-extensive at our world. For Lewis properties are sets of their particular instances taken across all of 'modal space'.

However, if properties are taken as classes or sets of objects, even with the plentiful resources of modal realism, we can now longer answer the problem of the one over many. The reason for this is that properties as classes or sets are incredibly, if not infinitely, abundant **(1983, 346-345)**. Any class or set of particular objects, no matter how miscellaneously disjunctive, extrinsic, gruesome, and superfluous to the task of characterising what there is in all or any one of the worlds, is nevertheless, a property[19]. The sharing of properties between objects can therefore play no role in capturing the facts of resemblance that the problem of one over many originally implores us to do. They

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[19] To see a discussion of the abundant properties in the context of their application in a constituent ontology see section 2.6 of this thesis on the naturalness of constituent ontologies.

cannot play the role that the one over many sets out for properties because any two particular objects share infinitely many properties and equally may fail to share an infinite number of properties. Lewis pushes the point even further by noting that properties are as numerous as the sets themselves because for any set whatsoever there is the property of being a member of that set! **(Lewis 1986, 60)** Class nominalism ,cannot, therefore account for the facts of objective resemblance that the one over many demands we give an account of.

Is there anything that can give us such an account? Yes. There are a sparse minority of properties that make for resemblance; the natural properties. The sharing of such properties , " *makes for qualitative similarity , they carve nature at the joints, they are intrinsic , they are highly specific , the sets of their instances are ipso facto not entirely miscellaneous, there are only just enough of them to characterise things completely and without redundancy*". **(Lewis 1986a, 60)** The domain of discourse we likely quantify over such sparse, natural properties is in the physical science, but primarily in physics[20]. Physics is the attempt to provide a minimal list of the fundamental properties with the aim of characterising the world completely and without redundancy. Lewis suggests that a complete physics would describe what he calls the perfectly natural properties, if the world does in fact bottom out at genuinely fundamental properties had by fundamental objects. The

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[20] It has been suggested to me that other sciences also attempt to provide a list of sparse, natural properties with the intent of characterising their domain of discourse completely, given that physics alone will not be adequate to such a complete task. For instance, if chemistry is in fact not reducible to physics then it follows that there is need to quantify over the natural properties of chemistry. If this is the case I welcome it, for it gives more reason to take the facts of resemblance seriously. A view similar to this has been given by Jonathon Schaffer **(2004)** where he argues that sparse properties should be drawn from all the 'levels' of nature that are the domains of different scientific disciplines. I.e. the domain of natural physical properties, the domain of natural chemical properties *etc*. In sections 2.6.3 and 2.6.4 of this thesis I distinguish these two accounts of the naturalness of properties as the graded and the non-graded view of natural properties.

naturalness of properties would then admit of degree[21] such that the more natural a property the less complex the chains of derivability are from the perfectly natural properties **(1986, 61)** For instance, colours would be less natural properties than chemical properties given that the chemical properties would be derivable from the perfectly natural properties by less complex chains of derivation. *Grue*, *bleen* and all the vagaries of miscellaneous disjunction would be even less natural than the colour properties. Given this we therefore must have an adequate distinction between the abundant properties and the special, numerically more sparse, natural properties. It must be a distinction that accounts for the genuine respects of resemblance between numerically distinct objects referred to not only in ordinary discourse, but more importantly in scientific discourse. If we take the statements of science to be true it seems we will need to commit ourselves to more than just objects, and classes of those objects, to account for this distinction between the natural and abundant properties.

1.2.5.2 Qualitative Sameness and Naturalness

The challenge is to account for the natural properties. This is where we can take our queue from the problem of the one over many. Given the need to distinguish between abundant and natural properties, because it is only the natural properties that can be taken to genuinely

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[21] That naturalness comes in degrees is up for dispute. Mellor **(2012, 402- 404)** for instance argues that properties depend for their identity conditions on contingent laws of nature they will vary between worlds where the same laws do not hold. Given this property taken as anything less than perfectly natural will not ground the objective resemblances between objects. If Mellor is right, it does not affect my view since the natural properties just become the very sparse perfectly natural properties.

account for resemblance, it follows that our solutions to the problem of the one over many given in,

2) How is it possible that X) many objects can resemble eachother in the same respect or respects given that Y) they are not the same object, since they are numerically distinct objects?

needs to be given in terms of sparse, natural properties. The vast majority of the abundant properties do not make for resemblance, so no theory that posits properties only in the abundant sense can be a solution. Theories of universals or tropes **(Lewis 1986, 63-69)** can account for naturalness[22]. Lewis asserts against Devitt when considering the Moorean facts of resemblance,

"If we attend to the modest, untransformed One over Many problem, which is no mirage, we will ask about a different analysandum: a and b have some common property (are somehow of the same type) in which it is not said what a and b have in common. This less definite analysandum is not covered by what Devitt has said. If we take a clearly Moorean case, he owes us an

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[22] Resemblances classes of objects can also do the work. Resemblance nominalism as, advocated by Rodriguez- Pereyra **(2002)** is the best exemplar of last option. It can do this because it posits primitive resemblances between members into the mix that the class theory of properties provides. To each perfectly natural property we assert we assert that each member of the perfectly natural property exactly and overall resembles every other member of that perfectly natural property. We should note that it seems that the last option would *prima facie* be the best account for Lewis **(1986, 63)** given his willingness to take naturalness itself as primitive. In effect the resemblance nominalists does not need to carry the extra ontological weight of either universals or trope theory, for all she requires for the perfectly natural sets are fundamental objects that overall exactly resemble eachother and the set of all such objects. This is in effect why I view Rodriguez-Pereyra's **(2002, 50-52; 99-104)** account to be an extension of Lewis project of accounting for naturalness for he supplements Lewis' class theory with primitive resemblances across all possible worlds construed as concrete possible worlds. The danger with this view is that it seems likely that it will entail the falsity of infinite complexity. This seems likely because if we want a coherent notion of overall exact resemblance between particulars those particulars can only be the most fundamental particular entities, each exactly resembling every other overall. However as previously noted, resemblance nominalism will not be considered given that it still takes properties to be classes of object, albeit with a primitive resemblance relation thrown into the mix. With properties taken as classes there is no sense in saying that properties then can be ontological parts or constituents of objects. The effect of this is that resemblance nominalism cannot be a variant of constituent ontology. To see why properties cannot be taken as ontological parts of constituents of objects if they are sets or classes of objects see section 2.4.2 of this thesis.

account: either an analysis or an overt resort to primitive predication of resemblance." **(Lewis 1983, 355)**

Let's see how solutions to the problem of the one over many can do the work of accounting for naturalness. To each perfectly natural property we assign either a universal or a set of exactly resembling tropes. Consider for instance the *colour charges* posited as the properties of subatomic particles to account for strong interactions. Let's assume that the colour charges *blue*, *green* and *red* are genuinely perfectly natural properties **(Guigon 2014, 394-396)**. These perfectly natural properties are instantiated for incredibly short periods by subatomic particles. Any colour charge is instantiated by particular subatomic particle during strong interactions between those particles. Consider a blue charged particle, say a blue charged quark. Wherever there is a blue charged quark there is the universal *blue charge* wholly present, or one of the *tropes of blue charge* is present. Theories of properties as immanent universals or tropes both purport to account for the unity of the natural property taken as a class or set of all the *blue charged* particles.

In the case of the instantiation of the universal *blue charge* if two quarks have blue charge then each has some ontological part or constituent that is identical in virtue of being wholly present at both of the two quarks. Exactly the same universal *blue charge* reoccurs at each distinct quark; the property universal *blue charge* is a genuinely shared ontological common part or constituent of both quarks. With trope theory this recurrence vanishes. If the *blue charge* of either one of the two quarks is a trope then there are two tropes, the *blue-charge-trope-at-quark$_1$* and the *blue-charge-trope-at-quark$_2$*. These tropes are distinct but are primitively exactly resembling ontological parts or

constituents of the two quarks. In Lewis' terms they are *duplicate* tropes such that they exactly resemble eachother, but both fail to resemble any red charge trope. Each account will unify the set of instances of a perfectly natural property in a way that the set of instances of an abundant property are never so unified. A theory of universals will unify the class of all and only those objects that instantiate an appropriate universal, by having that appropriate universal as an ontological part of constituent of each and every object in that class. Two numerically distinct objects resemble in some respect because they have exactly the same universal as an ontological part or constituent. Trope theoretic accounts unifies the set of objects taken as a natural class since every object that is a member of that natural class will have an appropriate trope, from a set of primitively exactly resembling tropes, as an ontological part or constituent of it. While both theories differ in terms of how the problem of resemblance is explained, they both very similar in so far as how they account for how any objects have properties at all, both taking what I term a constituent approach[23] where properties are ontological parts or constituents of objects.

On either account a substantive answer to,

The Problem of Resemblance (PR): *Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.*

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[23] Chapter two and three will deal with the constituent ontology in detail.

is given. Accounting for the distinction between the natural and the abundant properties draws on the resources given to us by solutions to the of the problem of the one over many. The facts of objective resemblance among numerically distinct objects needs to be accounted for and this can be done by positing that there are immanent universals or tropes in addition to objects. But confronting the problem of resemblance leads straight into considering an even more general question, since it utilises the notion that in some sense universals and tropes are within objects as ontological parts or constituents of objects. This more general question asks what is it for any object whatsoever to have character? In terms of properties, what is it for any object to have or instantiate its properties? We are therefore led into what I have called the Problem of Character. My own view is that any systematic account of objects and their properties must provide answers to both the Problem of Character and the Problem of Resemblance. The next section will motivate the Problem of Character.

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

1.3 The Problem of Character

1.3.1 The Character of Ordinary Objects

Given the prior sections of this chapter it should be clear that the fact of objective resemblance of distinct objects requires some form of substantive metaphysical answer. That is to say, the Problem of Resemblance needs an answer. But there is a more fundamental issue that needs further clarification and explanation. To see this, consider some object, any particular material object. Now consider that one object in isolation from all other objects, forgetting for instance the fact that it may or may not resemble other objects. What will remain true is that the object under consideration, whether we are thinking about the object or perceiving it, will have a certain form of character. With familiar, ordinary objects this form of character will be given to us in perception as a variety of forms of character, a multiplicity of characteristics that together constitute the overall character of that particular object. For instance, any particular daffodil, pen, or lion will have multiple characteristics that taken together are said to characterise any one of those particular objects. It is these characteristics of the familiar objects of experience that give us the truth conditions of propositions about those objects in ordinary discourse. For instance, if we say that 'this daffodil is yellow' the proposition is only true if one of the perceived characteristics of the

particular daffodil is the yellowness of its flower. And what goes for the familiar objects of perception goes for the unobservable entities of physics. When we think of subatomic particles for instance, we postulate that they have certain characteristics that explain why those entities behave the way they do. The fact that such unobservable objects are not given to the senses does not preclude such entities from having certain characters. That this is the case is clear if we realise that we are able to distinguish unobservable objects in terms of their causal powers; i.e. we may not be able to observe them but we are able to detect the effects that they have on objects around them that are observable. We are only able to do this if we accept that unobservable objects have certain characteristics that bestow on that object a specific set of causal powers. The obvious case in point being the trajectory of unobservable particles through cloud chambers, where we only can detect the unobservable particle in virtue of the certain causal characteristics it has; and therefore, how it causally interacts with the gases in the cloud chamber. Without taking unobservable objects to have such characteristics we would not be able to even begin the theoretical task of explaining why some subatomic particle interacts in a certain way with a subatomic particle of another kind.

1.3.2 Origins and Form: Plato and Aristotle

The question of why particular objects have the character that they do has its original formulation with Plato. Consider the argument towards the end of the *Phaedo*[24] 95e-101c where forms are introduced

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[24] All references to Plato's works are from Hamilton and Cairns **(1961)**

to answer the question of why are things as they are. For Aristotle[25] accounting for the character of objects was taken as the project of identifying the substance of familiar sensible particulars, that is to say giving a philosophical account of why ordinary objects have the sensible character that they do, why they fall under certain kinds and exhibit the properties which are assign to them in prephilosophical thinking **(Loux 2006, 207-208)**. While Aristotle's concern is more restricted to understanding the relation between a substance and essence, that is to say the relation between a thing and its necessary properties, the query can be generalized further. Character includes not only the essential characteristics of an object but also its accidental characteristics, that is to say the contingent characteristics of that object.

Where Aristotle used the term 'familiar particulars' I will use the term 'ordinary objects'. That will include both the objects that we sense and objects that we don't sense, it will therefore include unobservable entities like subatomic particles. This deviates from typical usage of the term where ordinary objects denote macroscopic observable objects[26]. My use of the locution 'ordinary' is therefore used not to serve to distinguish between observable and unobservable objects. Rather it will distinguish between what are usually called concrete and abstract objects. 'Ordinary objects' pick out those objects that can be said to have location in some sense, therefore my sense of 'ordinary

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[25] For more on Aristotle's account of the substance of familiar sensible particulars see Chapter 3 of Witt **(1989, 63-100)** . Theodore Scaltsas also provides an excellent account of Aristotle theory in chapters 3 - 6 of Scaltsas **(1994, 36- 164)**.

[26] For instance, in much of the literature on material constitution. As an example, Merrick's **(2001)** refers to ordinary objects in contrast to those less ordinary objects referred to in physics; ordinary objects being the medium sized dry goods of the manifest image of the world and their opposite being the unobservable objects of fundamental physics.

objects' can be taken to be equivalent to 'concrete objects'. Abstract objects or entities such as numbers, sets and propositions cannot in any straightforward sense be said to have location, spatiotemporal location or some more general form of location. I think that if we are realists about such objects they can be rightly called extraordinary objects. Such abstract, extraordinary objects will not feature directly as the objects of analysis in this thesis. From here objects will refer only to ordinary, concrete or material objects.

Aristotle took it that objects exhibit whatever character they have derivatively or dependently **(2006, 208)**. They have whatever character they do in virtue of something else (*kat' allou*), that is to say objects derive their character from something other than themselves. Those other things, the character-giving entities, have their own character non-derivatively. To use Aristotle's language they have character in their own right (*kath hauto*).

Aristotle states in the Metaphysics[27] 1031ᵃ 15-18,

"We must inquire whether each thing and its essence are the same or different. This is of some use for the inquiry concerning substance ; for each thing is thought to be not different from its substance , and the essence is said to be the substance of each thing".

Speaking then of things having their character *kath hauto* Aristotle states at 1031ᵇ6-15,

*"For there is knowledge of each thing only when we know its essence. And the case is the same for other things as for the good; so that if the essence of good is not good , neither will the essence of being be, nor the essence of unity be one. And all essences alike exist or none of them does; so that if the essence of being is not , neither will any of the others be. Again , that which has not the property of being good is not good. The good, then, must be one with the essence of good , and the beautiful with the essence of beauty, **and so with***

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[27] All references to Aristotles' works are from **Barnes (1984)**

all things which do not depend on something else but are self-subsistent and primary. *For it is enough if they are this, even if there are no Forms; and perhaps all the more if there are Forms."*

Aristotle invokes the notion of *kath hauto* to explain how something is or has the character which it does in virtue of itself. That is why at 1022ª14-33 he states in reference to two senses of *kath hauto*,

"(1) the form or substance of each thing , e.g. that in virtue of which a man is good is the good itself, (2) the proximate subject in which an attribute is naturally found, e.g. colour in a surface. 'That in virtue of which', then , in the primary sense is the form, and in a secondary sense the matter of each of each thing and the proximate substratum of each".

Aristotle asserts that *kath hauto* (in virtue of itself) applies to,

"(1)the essence of each thing , e.g. Callias is in virtue of himself Callias and the essence of Callias; (2)whatever is present in the 'what', e.g. Callias is in virtue of himself an animal. For 'animal' is present in the formula that defines him; Callias is a particular animal.(3)Whatever attribute a thing receives in itself directly or in one of its parts, e.g. a surface is white in virtue of itself, and a man is alive in virtue of himself; for the soul, in which life directly resides, is a part of the man ."

Both Plato and Aristotle agree that the essential characteristics of objects are the non-derivative sources of character objects. An objects essential characteristics explain why any particular object is the determinate and well-defined object it is. However, Plato and Aristotle depart at the point of understanding how the character of objects is to be understood. For Plato any ordinary object of the material world has character not in virtue of itself, but in virtue of its relation to changeless forms. Plato calls this relation 'participation' and 'communion'. He argues that to the extent that an object x has some character F , x has F only in virtue of a relation of participation in or communion with the changeless, eternal form F **(Politis 2004, 303-305)**. Given that we can only know of the changeless eternal forms through

reasoning and not observation of ordinary objects he takes it that the character of objects cannot be in any sense a part of or identified with objects. This is because ordinary objects are mutable and finite, and we can only observe them as being such. Given this the *kath hauto* source of the character of objects is separate from those objects, related to them by an extrinsic relation of participation or communion. Aristotle takes the opposite line. The ordinary objects of the material world have character in virtue of having the character giving entities immanent within them; character is immanent within objects. To the extent an ordinary object x has some character F, x has F in virtue of F being immanent within x. So unlike in the Platonic conception, the *kath hauto* character-giving entities exist in the world of ordinary material objects. Aristotle takes these *kath hauto* character giving entities to exist immanently within objects; explaining why objects have the character which they do. There is a sense in which the character giving entities are a part or constitutive of objects. The relation between objects and these entities is therefore an intrinsic relation. In the next chapter we shall see that this difference in conception has persisted to the present to give us the Aristotelian Constituent and Platonic Relational accounts of the character of ordinary objects.

1.3.3 Another Pseudo-Problem?

Whether one takes the Aristotelian or Platonic approach to character it should be clear that it will be a theory of properties that will be required to answer the question of why objects have the character or characteristics that they do. In fact, the word 'characteristic' is typically taken to be synonomous with 'property', 'quality' or 'feature'

all being referred to in natural and formal languages by predicates. It will be the having, instantiating, exemplifying or whatever account you give of those relations that obtain between objects and properties that will explain or ground why objects have the particular character that they do. Given this it could be retorted that the fact objects have character will be explained in any attempt to use properties as the semantic values of predicates. With this option we are faced yet again[28] with Devitt's challenge against the need for properties in an account of predication. That challenge as we saw focused not on character but rather on showing that the problem of resemblance between distinct objects was in fact a pseudo problem.

Devitt **(2010a, 15-19)** asked us there to consider statements like:

i) book one ad book two have the same property *blueness*

paraphrased as,

ii) Book one and book two are both blue.

There must be something that makes it the case that both book one and book two are blue. Devitt **(2010a,15)** then offers two statements that he takes to be sufficient to account for both books being blue,

iii) Book one is blue.

iv) Book two is blue.

The problem of giving the semantic value of the first statement for Devitt dissolves away since the latter two statements can be true without any recourse to entities like properties functioning as the referents for the predicates. 'Book one is blue' is true *iff* there exists an

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[28] See section 1.2.3 for Devitt's **(2010a)** challenge in the context of accounting for resemblance.

x such that 'book one' designates x and 'blue' applies to x and 'Book two is blue' is true *iff* there exists a y such that 'book two' designates y and 'blue' applies to y. After this all we need for the truth of 'Book one and book two are both blue' is that there are two distinct objects x and y. We are no longer committed to anything over and above the particular objects. Resemblance in characteristic is therefore analysed just as the proper application of predicates to objects and this in no way require the existence of additional entities over and above objects. Notice that both of the two later statements give us statements on the character of particular objects. Consider book one. 'Book one is blue' is true just in case there is an object such that book one designates that object and the 'predicate' blue applies to that object. The question of why objects have the character they in fact do is therefore a non-question since there can, under this analyse, be no conceivable answer. The having of character is just a brute fact about the world.

However, as we saw in section 1.2.4 of this thesis Devitt's contention that we do not need to quantify over properties to give true statements of predication is false since true statements of higher order predication cannot be true solely in terms of reference to objects. This is the case because no adequate paraphrases can be given of statements of higher order predication and also cannot account for resemblance among natural kinds like the genuine resemblances that obtain between spiders and insects in statements like 'Spiders share some of the anatomical features of insects.' Properties will be required to function as semantic values in these cases. Devitt-like worries aside it should be clear that any philosopher who takes properties to be real has then to account for why objects have the character they do by exemplifying or instantiating properties. Put simply if you are a realist on properties

then you must consider how objects relate to properties to explain why particular objects have the character that they do.

1.3.4 *Kath Hauto* Character: Categoricalism or Dispositional

What does it mean for a property to be a *kath hauto* source of character? Remember that if a property *F* is a *kath hauto* source of character *F** of object *x* then that property *F* has *F** in virtue of itself. Properties themselves have character in a non-derivative way[29]. But what does this claim amount to? There are two options here[30]. Either properties are dispositional in character or they are categorical in character. If properties are dispositional then they give the objects that instantiate them their character by imbuing them with fundamental causal powers. The *kath hauto* character of properties is therefore to be analysed further in terms of their dispositional essence. However, if properties are categorical then they imbue the objects that instantiate them with character categorically. That is to say if properties have their *kath hauto* character categorically then they have that character

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[29] Properties are, as Paul **(2017, 250-251)** puts it, qualitative natures. They are what account for any object's qualitative character.

[30] There is a third view which asserts that some of the natural, fundamental properties have dispositional essences and others are categorical. See **Ellis and Lierse (1994)** for an example of this position. Given that this view allows for *kath hauto* character to be articulated both in terms of both dispositional essences and categorical primitive identity it follows that a defence of both will be sufficient to defend this mixed view. A more baroque view articulated by Martin **(1997)** and Heil **(2003)** is that a single property can have both dispositional and categorical aspect. The view amounts to the claim that properties can be described both in categorical and dispositional terms, that there is only a distinction in reason between the categorical and the dispositional **(Armstrong 2005 , 315).** Hawthorne and Sturgeon **(2006, 212)** outline, but do not adopt a metaphysically more robust version of this which they call the double aspect view. Here a properties dispositions are essential to it but are insufficient to identify the property. A *quiddity* is required to identify the property. Armstrong **(2005,315)** argues that either one of these more baroque views involves an obvious category error.

essentially. The *kath hauto* character of that property therefore gives the essence of that property such that the identity of that property is preserved across all possible world. Properties have some kind of transworld primitive identity. Black **(2000)** argues that this amount to a *haecceitism* about properties which he terms *quidditism*. However either way, if the *kath hauto* character of properties is understood categorically or dispositionally, I will argue that properties still remain the *kath hauto* source of character for objects.

Dispositional monism[31] is the view that all natural, fundamental properties have dispositional essences. Mumford **(1998, 18-20)** takes this to be the ontological thesis that fundamentally all properties are dispositional, in so far as all properties have a dispositional essence. Many of the properties we take objects to have are either covertly or overtly dispositional. Consider the following property names: *fragility, elasticity, aggressiveness, tenacity*. These covertly dispositional predicates do not refer explicitly to the stimulus conditions S and the manifestations M of the disposition but under analysis can be expressed in the form,

X possesses the disposition to *M* when *S iff x* is disposed to *M* when *S*.

Take the philosophers favourite example *fragility.* A vase is fragile *iff* that vase is disposed to break when struck. Overtly dispositional locutions will overtly cite the stimulus conditions *S* and manifestation *M* of the disposition such as,

X is disposed to *M* when *S*.

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[31] Notable advocates of dispositional monism include Bird **(2007)** , Mellor **(1974)** Shoemaker **(1982)**.

Here *M* is the description of the manifestation while *S* is the description of the stimulus condition. For instance, a negatively charged object is disposed to repel other negatively charged objects when another such object is proximal to it. There is much dispute over what the correct analysis of dispositional ascriptions[32] is but this debate while critical to understanding the nuances of the metaphysics and semantics of dispositional properties need not concern us here. All that is required is to get a sense of what is meant if we say of a property that it is essentially dispositional. If a property has a dispositional essence, then that property has the exact same dispositional character in all possible worlds. If property *P* has a dispositional essence, then any object which instantiates property *P* will have the same dispositional character as other objects that instantiate *P* in all possible worlds. For instance, being negatively charged necessarily confers on objects the power to repel other negatively charged objects. In all other possible worlds negatively charged objects repel other negatively charged particles. The identity of properties is fixed by their dispositional *kath hauto* character. Bird **(2007, 45)** calls properties with dispositional essences 'potencies' while others more generally refer to such essences as causal powers[33]. Dispositional monism is the claim that all of the natural, fundamental properties are causal powers or *potencies*. The essence of some potency

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[32] The conditional analysis, for much of the 20th century, was taken to be the best option. Ryle **(1949)**, Goodman **(1955),** and Quine **(1960).** This has been shown to be prone to notable counter examples: For 'finkish' counterexamples see Martin **(1994)**, for 'masking'/ 'antidote' counterexamples see Johnston **(1992)** and Bird **(1998)** and for 'mimicking' counterexamples see Smith **(1977)**, Prior, Pargetter & Jackson **(1982)**, and **Lewis (1997)**. For sophisticated analyses of dispositions se**e Lewis (1997)**, Manley & Wasserman **(2008)** and Vetter **(2015)**.

[33] While most dispositional essentialists refer to such essences as causal powers **(Molnar 2003; Mumford 2004, 160-181)** , while Bird **(2007, 45)** introduces 'potency' to specifically denote the dispositional essence of a property. His reasoning for introducing this technical term is to avoid confusion with other applications of the terms 'power' and 'disposition'.

P is the disposition to give the manifestation *M* in response to stimulus *S*. Therefore, in all possible worlds if any object *x* has *P* then *x* will be disposed to yield *M* if *S* is present. Using the negative charge example, in all possible worlds if a particular sub-atomic particle has negative charge then that subatomic particle will be disposed to repel other negatively charge particle if such a particle is within a certain proximity to it.

If dispositional monism is true, that all natural, fundamental properties have a dispositional essence, then this has very powerful implications for natural laws. The most important implication is that laws of nature will be metaphysically necessary, that is to say that whatever the fundamental laws of nature are in the actual world they are also the same in all possible worlds[34]. This allows us to distinguish genuine laws of nature from accidental regularities, the laws of nature are only those regularities in the natural world whose truth is guaranteed by the dispositional essence of the properties involved. Under dispositional monism the nomic roles of properties are fixed across all possible worlds and properties are identified in a non-trivial manner in terms of what specific nomic role they occupy.

How specifically does this explain the *kath hauto* character of properties? Under dispositional monism the *kath hauto* character of properties is to be understood in modal terms. Consider again the property of having negative charge. Notice that the having of negative charge has the same nomic role across all possible worlds, i.e. that at all possible worlds any object with negative charge will be disposed to repel other negatively charged objects that come within a certain

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[34] This is the most important distinction between properties taken as essentially dispositional and properties taken as essentially categorical. This will become clear in what follows when I deal with categorical properties and quiddities.

proximity of it. It is not the case under dispositional monism that a natural, fundamental property can have a different nomic role at some other world. It could be objected that if it is the case that natural, fundamental properties have the character that they do in virtue of the nomic roles they have across all possible worlds then properly speaking we cannot say properties have *kath hauto* character. This is because *kath hauto* denotes the having of character of a property only in virtue of itself and if properties are to be identified in terms of the nomic roles they occupy then properly speaking this cannot be *kath hauto* character since they are only the properties they are in virtue of something else, namely their nomic roles. But this is no solid objection. The reason for this is because the objection gets the order of explanation from dispositional essence to natural laws or nomic roles the wrong way around. The having of dispositional essences in terms of causal powers or potencies is what explains what the laws of nature are, it is what grounds the nomic roles of properties. That is to say how properties function in natural laws is fixed not by external relations between properties but by the essence of the properties themselves. The essences of properties fixes what the laws are, it is not the laws that fix the identity of properties *per se*. Properties can remain the *kath hauto* source of character for the objects that instantiate them with *kath hauto* character understood as dispositional essence.[35]

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[35] My own sympathies lie with this conception largely because it fits better with our intuitions that the identity of properties is tied up necessarily with what nomic roles they occupy. It seems a bizarre claim that the same property can in one world occupy one nomic role and in another world occupy the exact opposite role, such as in a world where negatively charged particles attract rather than repel. If Categoricalism is true then properties have *quiddities,* it then follows that this switching of nomic roles is possible. But either way we can account for properties being *kath hauto* sources of character for objects which instantiate those properties.

Categoricalism is the view that all natural, fundamental properties are categorical. 'Categorical' is best understood in negative terms. It asserts that properties have no essential or other non-trivial (*kath hauto*) modal character; it has a distinctly Humean flavour to it in that it denies the existence of metaphysical necessary connections[36]. For instance, properties do not necessarily have or confer to the objects that instantiate them any dispositional character or power **(Bird 2007, 67).** Being negatively charged confers on objects the power to repel other negatively charged objects, but it does not do so necessarily. In some other possible worlds, there are negatively charged objects that attract rather than repel other negatively charged objects. The higher order essential properties of natural properties are limited to its essentially being itself and not some other distinct property **(2007,67)**. Categoricalism about properties grounds two prominent views on the laws of nature; the regularity view and the nomic necessitation view where the laws come out as metaphysically contingent relations among categorical properties.

The regularity view finds its paradigmatic articulation with Lewis' **(1999, 224-247)** Best System Analysis of natural laws where any contingent generalization can be taken as a law of nature *iff* it appears as a theorem (or axiom) in each true deductive system that achieves a best combination of simplicity and strength **(Lewis 1973,73)**. System's here are to be understood as the systemization of all the particular, local facts concerning the way the world is. It is the arrangement of qualities that provide the candidate true systems. **(Lewis 1999, 233)**. The laws of nature therefore supervene, at any world, on the particular

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[36] In the case of Armstrong's nomic necessitation view he tries to find a middle ground that gives allows laws to be contingent by introducing a contingent relation of nomic necessitation between properties conceived of as universals.

system of local matters of fact, the arrangement and distribution of qualities that happen to obtain across that world. Hence Lewis states,

"Humean supervenience is named in honor of the greater denier of necessary connections. It is the doctrine that all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another. (But it is no part of this thesis that these local matters are mental.) We have geometry: a system of external relations of spatiotemporal distance between points. Maybe points of spacetime itself, maybe point-sized bits of matter or aether, maybe both. And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that". **(Lewis 1986b, ix-x)**

Consider that we take the following two universal generalisations of to be laws of nature: $\forall x(Fx \rightarrow Gx)$ and $\forall x ((Px \land Sx) \rightarrow Mx)$. On the regularity account we can explain the truth of the following subjunctive conditionals. If $\forall x(Fx \rightarrow Gx)$ is a law of nature, then it makes it true that if a is F then a would be G. If $\forall x ((Px \land Sx) \rightarrow Mx)$ is a law of nature this makes it true that if b is P, were b given S, then b would be M. This latter law gives a sense of how the regularity theorist can analyse dispositions without taking properties to have dispositional essences. On this view a disposition is a property that occurs in the antecedent of a law in conjunction with some other property that is given in the stimulus condition. The manifestation of the disposition is given as the property in the consequent of the law. So, in $\forall x ((Px \land Sx) \rightarrow Mx)$, P denotes the disposition , S denotes the stimulus property and the consequent M denotes the manifesting property. Remember now that what laws obtain at a world supervene on the particular system of local matters of fact that are given by the arrangement and distribution of properties or qualities that happen to obtain across that world. Given that the laws that obtain at a world

depend on what the particular distribution of properties are at that world it may be the case that at different worlds the distribution of properties is different. Hence in some possible worlds $\forall x ((Px \wedge Sx) \rightarrow Mx)$ need not be true and rather $\forall x ((Px \wedge Fx) \rightarrow Mx)$ is true. Let's say $\forall x ((Px \wedge Sx) \rightarrow Mx)$ obtains at this world , then the disposition *P* bears a special relation to the conditional $(Sx \leftrightarrow Mx)$ while in the world where $\forall x ((Px \wedge Fx) \rightarrow Mx)$ obtains *P* bears a special relation to the conditional $(Fx \leftrightarrow Mx)$. Given this *P* may at this world have a different dispositional character to what *P* has at some other world such as at the one where $\forall x ((Px \wedge Fx) \rightarrow Mx)$ obtains. Thus, on the regularity view dispositional character is contingent and given this property do not have dispositional essences.

The second categoricalist account of laws of nature takes laws to be second order relations of nomic necessitation between properties, where properties are taken to be universals. The most notable example of this view is Armstrong **(1983, 75-77)** but it also see's similar formulation in Dretske **(1977)** and Tooley **(1977)**. For the sake of brevity, we will focus on Armstrong's version here. For Armstrong the laws are not $\forall x (Fx \rightarrow Gx)$ or in the dispositional case $\forall x ((Px \wedge Sx) \rightarrow Mx)$ rather they are taken as N (F, G) and N((P$\wedge$S),M). On this reading of laws the universal generalization of a regularity in nature $\forall x (Fx \rightarrow Gx)$ is explained by N (F, G) while the holding of the dispositional regularity $\forall x ((Px \wedge Sx) \rightarrow Mx)$ is explained by N((P$\wedge$S),M). Nomic necessitation between the property universals denoted by *N* leads to the regularity holding between instance of the universals involved in the law. The crucial bit here is understanding what is precisely meant by the second order relation of nomic necessitation holding between universals involved in laws. For Armstrong nomic

necessitation is not metaphysical necessitation, the laws of nature remain metaphysically contingent **(Armstrong 1983, 158-171)** as in the case of the regularity view. He states,

"…in trying to discover the laws of nature, scientists feel free to consider possibilities in a very wide-ranging manner, quite unlike the constraints which naturally suggest themselves in logical and mathematical argument. It would be admitted , at the least, that the laws of nature give a definite impression of contingency. The onus of proof would therefore appear to be on those who maintain that the impression is mere illusion". **(1983, 158)**

Properties on this view cannot have dispositional essences because the relation of nomic necessitation between universals does not obtain at all worlds. Consider N((P∧S),M) . Here *P* is understood as a dispositional property at the actual world only in virtue of the relation of nomic necessitation obtaining at the actual world between *P, S* and *M* which explains ∀x ((Px ∧ Sx) →Mx). Given this *P* is linked to the conditional (Sx ↔Mx) at the actual world, however because the nomic necessitation relation between the properties *P, S* and *M* is metaphysically contingent the dispositional character of *P* will not be linked to the conditional (Sx ↔Mx) in all worlds. Nomic necessitation must therefore be a world bound relation since it cannot be explained in terms of it obtaining across all possible worlds. Personally, I find this to be a deeply obscure account[37] , but perhaps it can find a defence in an actualist account of modality such as Armstrong **(1989b)** later provided. Concerns on nomic necessitation aside, what is critical for current purposes is to see that properties on both the regularity view and the nomic necessitation view are categorical. On our negative

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[37] I find it obscure in so far as I do not think this can be called necessity at all, the only necessity being full on logical or metaphysical necessity. Nomic necessity seems to be some strange attempt to give halfway house between contingency and proper metaphysical or logical necessity. To see why try to make sense of the following statement without contradiction, 'Instances of F contingently necessitate instances of F'.

definition of categorical properties, such properties have no essential or other non-trivial (*kath hauto*) modal character; there are no metaphysical necessary connections between distinct properties. Properties therefore do not necessarily have or confer to the objects that instantiate them any dispositional character or power.

So how are properties to be identified and distinguished one from the other? The only option is that properties have *quiddities*, that is to say properties have some kind of property version of primitive identity. The view that properties have quiddities can be viewed as a version of *haecceitism*[38] applied not to particular objects but to properties. *Haecceitism* is broadly speaking the view that that the transworld identity of particular objects does not supervene on the qualitative properties of particular objects. Black **(2000, 87-104)** argues that while Lewis is well known for taking a stand against *haecceitism*, by rejecting the transworld identity of objects opting rather for counterpart approach **(2000,92)**, he assumes that there is no problem with the identification of properties across possible worlds. Lewis' account of counterparts can only be furnished in terms of properties since it is the sharing of properties by counterparts which grounds how we can say that any given particular object has counterparts at other possible worlds. Critically, the Humean supervenience account of natural laws requires that there have to be for any possible world facts about how the natural, fundamental properties are distributed and arranged across that world.

But since Lewis accepts the principle of recombination, there is no modal constraint at each possible world that constrains how

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[38] For a discussion of *haecceitism* see sections 4.3.2 and 4.3.3 of this thesis where I deal with *haecceitism* in the context of some versions of the constituent ontology.

properties are distributed. All there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another **(Lewis 1986b, ix)**, there are no necessary connections between properties. Every pattern of instantiation of properties is exemplified at some possible world. Given this what pattern of properties are instantiated at some possible world is not a matter of what causal, nomic or dispositional roles those properties play at that world. For instance, there are worlds that have exactly the same distribution of property instantiations as ours except one of the *quark colours* has traded places with one of its *flavours*. To describe such a world, as Black **(2000, 92)** argues, requires the assumption that properties have primitive identity across all possible worlds. There is nothing that further grounds the fact that a given property playing one causal, nomological or dispositional role in one world is identical with a property playing a different causal, nomological or distortional role in another world. They just are the same property primitively[39]. The nomic necessitation view is equally committed to the view that properties have *quiddities* since as we saw it denies that properties can have a dispositional essence. Whatever dispositional character a property may have it has that dispositional character contingently depending what relations of nomic necessitation obtain at a particular world between natural, fundamental properties of that world.

How are we to understand that properties are the *kath hauto* source of character given Categoricalism about properties? Under

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[39] Quidditism has been the subject much controversy with Black (**2000**), Mumford **(2004, 103-104)** and Bird **(2007, 70-81)** offering scathing attacks. Notably *quidditism* is seemingly highly counterintuitive since it implies that the exact same property can have totally distinct causal and nomological profiles at different possible world.

Categoricalism properties simply have *kath hauto* character by having some primitive character in virtue of their own primitive transworld identity. What should be clear from this is that on either reading, that properties have dispositional essences or that they are categorical, we can see how properties are the ultimate, fundamental source of the character of the particular objects which instantiate them. It is then properties that account for the character of the objects, whether that be a character derived from properties that have dispositional essences or are fundamentally categorical in nature.

1.3.5 Character and Resemblance

Loux **(2017, 12-16)** has persuasively argued that the traditional debate over the problem of resemblance, better known as the problem of universals, stifles and confuses the debate surrounding the question of how any particular object has any character whatsoever. That is to say a more nuanced debate on how objects relate to properties is left in a confused and unsystematic state. Even much of the recent work leaves questions of how objects have the character they in fact do untouched. The excellent recent introduction to the field by Douglas Edwards **(2014)** is a notable example of this. In the first chapter of this introduction to the contemporary debate on properties Edward delineates the primary metaphysical and semantics jobs that any theory of properties should achieve. He later uses these to go through the various successes and failures of the most notable theories of properties, using these as the criteria of the philosophical weighing of theories to determine the best overall systematic theory of properties. Among these jobs he includes accounting for different objects having

things in common, the marking of genuine similarities, serving as the semantic values of predicates, serving as semantic values of abstract singular terms, grounding duplication and grounding the causal powers of objects. The need to account for why any given particular object has some particular characteristic or overall character is not included. This is troubling because introductions such as this often serve to set the debate amongst new scholars and by omitting the need to account for character this may force the debate in a less systematic direction.

Loux **(2017** argues that a new framework for characterizing the space of debate in this area is needed. The suggestion he gives is to invoke Aristotle distinction between opposing attempts to identify the substance of familiar particulars. However, to do this there is a need to delineate questions of resemblance between numerically distinct objects from questions of how any given object can have character at all. Loux **(2017, 12)** states,

"Philosophers who claim to be responding to the problem of universals sometimes tell us that they are interested in what , following Russell, we might call the character of familiar particulars, that is, their having the properties they do, their belonging to the kinds they do, and their being related to each other in the ways they are. This talk of character is meant to be understood prephilosophically; it is supposed to be theory-neutral".

There appears to be a prephilosophical Moorean fact that given particular objects have this or that form of character, which theories of properties should provide a metaphysical account of. However, theories of properties are often focused on dealing with problems of the resemblance of numerically distinct particulars, as we saw in the earlier sections of this chapter. Given this Loux **(2017, 12-13)** goes on to state,

"But we often meet a somewhat different account of what the problem here is supposed to be. We are told that the problem is one of providing the theoretical underpinnings of the commonsense fact that numerically different concrete particulars are similar or agree in attribute. Here, the phenomenon that is supposed to require a theoretical explanation is the prephilosophical fact that distinct familiar particulars, as we say, have the same property, belong to the same kind or enter into the same relation. This problem has been dubbed "the problem of the one over the many" , and while it may appear otherwise, it is a problem distinct from our first problem: the phenomenon central to the second problem always involves numerically different particulars; whereas the explanandum associated with the first problem need not involve more than one particular; and if there are forms of character necessarily unique to just one particular, then while our second question about similarity cannot arise in their case , we can still ask for the metaphysical underpinnings of a particular's having such a form of character".

While it certainly is true that a metaphysical explanation in answering the first question will influence how one can answer the second question, and vice versa, the two questions certainly come apart given that the first deals explicitly with the character of a single object while the later deals with why it is the case that objects can share character. Both questions need to be answered to give an overall theory of objects, properties and the relations that obtain between these seemingly different ontological categories. The best theories of properties and objects will therefore be those that can systematically answer both of these problems.

This is why I suggest an articulation of the two problems which I have called the problem of character and the problem of resemblance[40].

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By*

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[40] Clearly as we saw earlier those that take these problems to be pseudo-problems like Devitt **(2010a)** will assert that adequate paraphrases can be given such that further metaphysical explanation is not required. If we grant that I am correct that these problems do required substantive answers, that is we take properties seriously, then answers to the CR and PR must be given.

example we can ask of some red object what it is about this object in virtue of which it is red.

The Problem of Resemblance (PR): *Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.*

Keith Campbell **(1990, 29-30)** was the first to identify the need to answer these two questions in parallel. As a trope theorist, his concern there was that conflation of what he termed the A and B Question was responsible for making realism concerning universals the natural position to take in a theory of properties. The A -Question being the Problem of Character (PC) and the B-Question being the Problem of Resemblance (PR). But the positing of universals is required only to account for PR given that its focus is to account for qualitative resemblance between numerically distinct objects. In terms of metaphysical explanation involved in PC and PR, the *explanans* for PC need not involve more than one particular object whereas the *explanans* for PR must involve at least two particular objects. Now if it is the case that there are forms of character necessarily unique to just one particular object then PR cannot arise in this case, but we still have the *explanandum* of PC to account for. Therefore, the two questions can be distinguished but are intricately related. To give a systematic theory of character, properties and objects answers to both questions are required. Positing universals answers PR since it gives one explanation of the resemblance among distinct particular objects. But it does not explain how those universals are related to those particular objects that instantiate them, this requires a separate answer that spells

out the relations that obtain between object and properties taken to be universals.

Answers to PC generate theories of character. That is to say all answers to PC will give accounts of how objects have particular characters[41]. Consider any object that we encounter in the ordinary world of perception, considering any such object at a single moment of time. All such objects of ordinary perception have multiple characteristics that are taken to constitute the character of the object as a whole. This is equally true for objects outside of the remit of perception. Unobservable objects such as the various sub-atomic particles of quantum theory require the postulation of individual character to account for their causal powers and by this their interaction with other objects. The fact that objects have characters is no doubt a Moorean truth. Therefore, unless the individual having of a character is primitive and brute any metaphysical account of the world must give an account of how objects have the character that they do. Any such theory will require the postulation of properties to give a necessary theoretical bedrock , since it is clear that the having of characteristics is best translated into speaking about the properties any individual object has. It seems clear that as a bare minimum any account of the character of an object will speak of the character of that object as given

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[41] Rodriguez-Pereyra **(2002, 46-48)** reverses the traditional one over many problem to give a distinct problem that mirrors the concerns of the PC. He dubs it the Problem of the Many over One, how it is the case that a single , numerically one particular can have a multiplicity of properties. It is concerned with the question of how something that has numerical identity, say object *a*, be multiple , given that it has multiple numerically distinct properties , say properties *F,G,H*. Notice however that although both the Problem of the Many over One and The Problem of Character shift focus away from questions regarding resemblance the Problem of Character is more general since it asks how it is the case at all that an object has any characteristics at all.

by the total set of properties had by that object at any one time[42]. A rejoinder to this may be that disjunctive or gruesomely gerrymandered properties will then have to feature in the total set of properties and that if this is the case then the total set of property said to constitute the character of any given particular may range to infinity. This will make it impossible to use reference to properties to account for the overall character of an object since miscellaneously disjunctive properties like being *40kg's or ten kilometres from Durban* will feature equally amongst the total set of properties of an object. If this is the case, then we would have no way to define which are the properties that actually pick out the character of any particular object. The response to this is to limit properties that can meaningful account for character to only the natural, sparse properties[43]. Accepting that disjunctive and gruesomely gerrymandered properties fall within the sphere of abundant properties and not natural properties allows us to omit this difficulty since it is only the natural properties that will allow us to account for the objective resemblances of things that is required to answer PR.

It could be objected that the need to account for character as given by PC will automatically be accounted for when an account of how properties serve as the semantic values of predicates is supplied, that is to say that PC will be answered by a theory of predication. The rebuke to this is simply that PC is a metaphysical problem that will

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[42] Clearly for now this will omit a theory of property change and therefore will ignore questions of persistence such as the problem of temporary intrinsic properties. However, it is a good theoretical start to think of the having of properties only at one given moment so as to isolate the issue at hand in need of analysis, namely the more general query of the problem of character that asks how objects are related to their properties.
[43] To see some ways to do this see sections 2.6.3 and 2.6.4 of this thesis on constituent ontologies and natural properties.

remain unanswered even when one supplies properties as the referents for the semantic values of predicates. The distinctly metaphysical question of how those properties function to make the objects have the character they do, which we predicate of them in terms of properties, is left unanswered. Namely, the question of how properties are related to objects is left unanswered. It is like answering the question of how the horse pulls the cart by simply pointing at the horse. The question should rather be formulated in terms of how the horse functions to pull the cart. In the case of properties and objects, how properties function to give us the character of objects in terms of how properties relate to objects needs to be given. The next chapter will focus on one such answer, the constituency answer to the Problem of Character.

Chapter 2. Character First, Resemblance Second: The Constituent Approach

2.1 Introduction to the Constituent Approach

At the heart of ontology is the project to investigate what fundamentally makes up the most basic structure of the world. In order to carry out this project we have to define what the fundamental categories are, those categories that mark out real ontological divisions. The clearest division of ontological categories is between objects and properties. This then leads to a question. Since objects are taken to have properties and that it is properties that give objects their character, what is the relation between an object its properties?

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

There has been very little structured and systematic overview of the issues generated by PC in the last fifty years. The majority of the content on the debate in the metaphysics of properties has focused on questions of resemblance. Recently a number of philosophers have attempted to articulate the division in approaches to answering how

it is properties relate to the objects which instantiate them more explicit. Van Inwagen **(2011,2015),** Loux **(2006, 2015, 2017)** , Olsen **(2017)** , Paul **(2013, 2017)** and Yang **(2018)** all attempt to distinguish ontologies as either relational or constituent ontologies[44].

Olsen **(2017, 63)** has pointed out that this fundamental dispute on the metaphysics of objects and properties, albeit one that has not been explicitly outlined or delineated by the relevant sides, has resulted in a fissure in the topics of metaphysical debate and in turn has spawned vast literature on these topics. The Relationists concern themselves with questions of how material objects relate to their ordinary parts – a things concrete, particular and spatially extended parts. We see an orientation of debate focused on questions of how objects persist over time given change, problems of coincident objects and problems regarding vagueness. Constituent ontologists, on the other hand, concern themselves with a wholly different set of problems explicitly concerned with how properties and objects can be conceived as being related. A taste of typical questions include: do particular objects conform to Leibniz's Law, what makes it the case that multiple properties can belong to any given particular object, how to avoid Bradley's regress regarding the relation of object to property and whether there are such things as 'bare particulars' totally devoid of properties. By and large metaphysicians in either camp do not concern themselves with the question sets typical of the other camp.

This chapter will set out to outline the constituent response to the Problem of Character. This will at least begin the process of clarifying one of the two major responses and understanding the assumptions

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[44] There is a notable outlier, namely Lowe's four category ontology **(2006)**. To see why Lowe's account evades description as either a constituent or relational ontology see Lowe **(2012)**.

that may underlie it. As Olsen **(2017, 64)** argues regarding the state of the debate on the metaphysics of objects and their properties,

"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, on the basis of the moves they make, which rules they're playing by".

The little explicit outline, review and debate that there has been has resulted in either side taking the alternative to be either *a priori* incoherent or explanatorily deficient. Unfortunately, perhaps for sociological reasons within the analytic philosophical community, this has all too often led to a stifling of debate which has prevented constituent ontologists from fully articulating their view[45]. This chapter will look to offer some clarity on the constituent ontology. The following chapter will look to defend the constituent ontology from some problems it is taken to face.

2.2 Constituency, Parts and Ontological Structure

In everyday, pre-philosophical thought the world is taken to be populated with a myriad of ordinary material objects all of which are taken to be composed of various parts. Chairs composed of arms, legs and various other parts. Hands composed of palms and fingers. Such spatial, material parts are themselves subject to further decomposition, with each level of decomposition resulting in parts

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[45] For an excellent example of some of the dismissiveness , at times without clear argument, of the constituent ontology see van Inwagen **(2015,50-64)** and Olsen **(2017, 64)**. In section 3.4 and 3.5 of this thesis I confront van Inwagen's charges head on.

that are spatially smaller than the whole of which they are parts. Such parts and wholes I will refer to as the ordinary, spatiotemporal parts and wholes. Those that advocate a constituent ontology by and large[46] agree that the world is composed of spatiotemporal parts which together fuse to give spatiotemporal wholes; however, they argue that there is also another sense in which objects are constituted. Objects are also constituted of properties. That is, in addition to having ordinary spatiotemporal mereological structure, objects have ontological structure. The point of departure is that those advocating for ontological structure in addition to ordinary spatiotemporal structure will be adding composing elements that are not seemingly concrete in the way that palms and fingers are. There is no intuitive problem in removing fingers from a hand, all that is needed is a sharp blade. Decomposition of ordinary wholes into their ordinary parts seems straightforward. Even the most avid fans of an unrestricted mereology have to admit that there is a difference between a fully whole and structured hand and one which has had a blade taken to it.

But consider the case of ontological structure regarding an object's qualitative or ontological parts. Take Arnold's arms. We sit in the gym, we observe all the other lifters in the gym and then we say, Arnold has really strong arms. We take Arnold's arms to have the property of strength. A constituent ontology will take *the property of strength* to be an ontological part or constituent of Arnold. This leads to an immediate intuitive problem. Unlike a hand and its fingers, after decomposition has occurred the decomposed ontological part in this case, the *property of strength*, can no longer be located. Once Arnold has

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[46] Not all do. As a constituent ontologist I argue rather that we should adopt fictionalism about spatiotemporal parts. See section 5.3 of this thesis for my reasons under a mereological bundle theory.

lost his strength, *the strength of Arnold* can no longer be located. When an object ceases to instantiate a property, that no longer instantiated property, relative to that object, seems to cease to exist. It therefore seems that ontological parts are annihilated the moment they cease to be a part of the whole; and this is quite unlike the ordinary spatiotemporal parts. Those that advocate that properties are in fact universals will have a response. If properties are capable of being multiply instantiated then the ceasing of the instantiation of a property by some particular object does not entail that that property ceases to exist, since it may be the case that some other object or set of objects is instantiating that very property at the same time. However, sameness of properties is not the issue here. Rather we are focused on,

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

The problem of character involves the having or instantiating of properties by only a single object. The *explanadum* of PC therefore does not involve more than one object given that we are asking of any object with some property what it is in virtue of which that object has that property. The constituency solution to PC will explain that the object has a certain property in virtue of having that property as an ontological part or constituent. Concerns around understanding properties to be ontological parts or constituents of objects will require an unpacking of the general framework of the constituent ontology, that is to say an outline of the central claims of constituent ontologies need to be given. In what follows, I will give four features of that I take to be central to any constituent ontological approach to the

Problem of Character: Realism about properties, Concreteness, Immanence and Naturalness.

2.3 Realism and Properties

All constituent ontologies are realist about properties, but not all versions of realism on properties are constituent ontologies. This is a feature of constituent ontologies that has not been noted in the literature. Perhaps this is because it seems to be an all too obvious fact of constituent ontologies. However, given that as of yet nobody has given a systematic review of the constituent ontologies this needs to be explicitly stated, we need a full articulation to understand the rules by which any constituent ontology can play. Realism in its usual guise in the metaphysics of properties has usually taken to be the assertion of the existence of universals. However, the application of the term realism that I expound refers to something more general. Namely that properties are a genuine, non- reducible category of entities in the world. Realism in this more general guise includes the view that properties are universals and the view that properties are tropes.

I suggest that this is no accident, rather it is a necessary fact of constituent ontologies that they are realist in this sense. While some relational ontologies take properties to be a fundamental irreducible category of entity **(van Inwagen 2004, 2011, 2015; Hale 2013,165-179)**, the same does not apply to all relational ontologies. Consider Resemblance Nominalism which takes properties to be classes of primitively resembling objects. This view does not take properties to be entities that belong to some fundamental ontological category of

properties over and above particular objects. Rather a relational view like Resemblance Nominalism should be taken as a form of reductionism about properties in the sense that it denies that properties are a fundamental category of entity. A succinct statement of this can be seen in Rodriguez- Pereyra **(2002)**. There he states,

".... Resemblance Nominalism is a relational theory of properties in the sense that , since resemblance relates particulars, it makes the having of a property a relational matter, since for a particular to have any property is for it to resemble other particulars. There are other such theories, like versions of Universalism which account for instantiation in terms of some relation linking particulars and universals. Resemblance nominalism is of course significantly different from any theory like that, for here the entities a particular resemble are other particulars". **(2002, 53-54)**

That his form of Resemblance Nominalism constitutes a kind of reductionism about properties is clear where he **(2002, 53-54)** states,

"...all my use of the word 'property' commits one to is the idea of an identity of nature between some different particulars. But this need not mean that there are one or more entities , over and above the particulars that are identical in nature , which are present in those particulars. This may be the case, if universals or tropes exist; but it will not be the case if that identity of nature consists , for instance, simply in that the particulars in question resemble eachother. My point here is that the idea of identity of nature between different particulars, or of different particulars sharing properties, does not commit one to the existence of any entities over and above those particulars".

Under this relational ontology all that one has to be committed to is that what makes objects have a certain property is simply that all of those objects, which are said to have that certain property, all resemble one another. The having of a property is reduced to sets of resemblance relations between objects. Properties under such a view do not exist in a substantive sense, they are dependent on the existence of objects and do not exist as some irreducible category of entity. But no constituent ontology can deny that the ontological category of

property is in some sense a fundamental and irreducible category of entity. To be a member of a real fundamental and irreducible category of entity that entity in question must belong to an irreducible ontological category that is not a subcategory of any other ontological category **(van Inwagen 2011, 389)**. For the constituent ontology the category of property must be a real and fundamental category. The reason for thinking this can be given with the following swift argument,

(1) For any entity to be an ontological part or a constituent of an object that entity has to exist fundamentally.

(2) Reductionism concerning properties denies that properties exist fundamentally.

(3) Constituent ontologies take properties to be ontological parts or constituents[47].

Therefore;

(C) Properties have to exist fundamentally to be ontological parts or constituents.

Throughout the argument for any entity to be considered to be an ontological part or a constituent of an object that entity has to exist fundamentally. Consider the sense of parthood and existence generally. Take the theory of parts and wholes in classical extensional mereology. Extensional mereology is unrestricted in the sense that if there is something x and something y then there exists a further object xy which is the fusion of x and y. Now consider if either x or y did not exist. Clearly it is the case then that there can be no composite object

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[47] (3) is simply a definition of what the constituent ontology amounts to in terms of how it conceives of objects and properties to be related.

xy which is the fusion of *x* and *y*. Composites necessarily require the existence of their parts. Unless we accept some version of Meinong's view that there are certain objects that it can be truthfully asserted of that they do not exist, that is to claim that there really are objects that have the property of non- existence, we must take parts to exist. To accept some version of Meinong's to simply object to (1) seems to be a response of last resort given that it would play havoc with our use of the existential quantifier[48]. Equally what applies for parts, applies for constituents. It is not possible to say of any constituted item that one of its constituents does not exist and yet the constituted item still exists. But existence in both (1) and (2) says more. (1) also asserts that for an entity to be an ontological part or constituent that entity has to exist fundamentally, that is to say for any entity to be an ontological part or constituent that entity in question must belong to an irreducible ontological category that is not a subcategory of any other ontological category **(van Inwagen 2011, 389)**. (2) asserts that reductionism on properties denies that properties exist fundamentally and since properties have to exist fundamentally to be ontological parts or constituents that no version of reductionism can take properties to be ontological parts or constituents. For a property to be ontological parts or constituents those entities in question, the properties, have to exist as some fundamental category, where properties are not reducible to, for example, sets of objects or sets of resembling objects. We will see in the following section[49] on the concreteness of constituent ontologies the reasons why reductionist

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[48] See Peter Van Inwagen's **(2001)** *Creatures of Fiction*.
[49] In particular see section 2.4.2 on The Concreteness Principle of Constituent Ontologies

theories of properties cannot take properties to be ontological parts or constituents.

2.4 Concreteness

2.4.1 Concreteness and Location

The second, and probably the most critical, feature of the constituent approach is the tendency to view properties as being concrete entities where concreteness is typically taken to be understood as meaning that any entity said to be concrete must in some sense an entity with a location in the spacetime nexus or in some more general space. In effect if properties are parts of the world then in some sense properties are in the world and are not transcendent. To see this, consider again the realism feature of constituent ontologies. The argument for why all constituent ontologies are realist is as follows:

(1) For any entity to be an ontological part or a constituent of an object that entity has to exist fundamentally.

(2) Reductionism concerning properties denies that properties exist fundamentally.

(3) Constituent ontologies take properties to be ontological parts or constituents.

Therefore;

(C) Properties have to exist fundamentally to be ontological parts or constituents.

A class nominalist ontology of properties, best exemplified in Lewis, takes properties to be sets of individuals. Consider Lewis in *On the Plurality of Worlds* **(1986a, 50-51)**,

"We have frequent need, in one connection or other, to quantify over properties. If we believe in possible worlds and individuals, and if we believe in set-theoretic constructions out of things we believe in, then we have entities suited to play the role of properties. The simplest plan is to take a property just as the set of all its instances- all of them, this- and other-worldly alike. Thus the property of being a donkey comes out as the set of all donkeys, the donkeys of other worlds along with the donkeys of ours".

Given this Quinian approach, Lewis seems to have something over which quantifiers can range that appear to adequately do the work of properties, namely sets of particular objects. If so then properties exist and should perhaps consider that class nominalism can feature amongst the range of constituent ontologies. However, if properties are identified with sets of particular objects then they are not entities in their own right, properties are not irreducible entities if this is the case, they are sets of particular objects. The class nominalist can assert that properties exist, they are just not the kind of entities that exist fundamentally and non-dependently, whereas particular objects do. To have or instantiate a property is just to be a member of the relevant set of possible objects. For instance, if we say that the table instantiates the property of being brown then that table is a member of the set of all possible brown objects. Given this we seem to have set theoretic constructions over which we quantify that seem to adequately play the property role. We therefore can say, under the auspices of Quinian ontology, that properties exist.

However, if class nominalism is accepted as a constituent answer to the problem of character then (3) will be falsified. This is because it is not possible for a set of particular objects to be taken as a part or

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constituent of an object at all. The class nominalist therefore can only be a relational ontology as it considers the having of a property to be analysed in terms of the relation of an individual object to a set of distinct objects, that relation being set membership. Consider a proton *x* and the property of positive charge which it has. *X's* being positively charged is not to be analysed under class nominalism as something that is the case about x *per se* but rather something that is the case in virtue of *x's* relation to other entities, namely being a member of the set of all positively charged objects. The crucial observation to make here is that sets are abstract entities and no abstract entity can be considered to be a part of an object, let alone a concrete material object. In what follows we shall see why constituent ontologies tend towards the view that properties are concrete entities.

What is meant by concrete or abstract in reference to properties? There are two useful metaphysical senses **(Lowe 1998, 211-212)** by which we can understand any given entity to be concrete: the Lockean Sense and the Spatiotemporal Sense. The Lockean Sense takes abstract entities to be dependent entities, those entities incapable of independent existence. Consider for instance the mass of some individual stone, where this particular instance of a property relative to some object is determined by the act of abstracting away all of the other properties of the stone to give a property instance of mass. Campbell **(1981, 1990)**, for instance, considers such an entity to be what he terms an *abstract* particular, in the literature what is commonly referred to as a trope. The Lockean Sense takes a concrete object to be a complete material body, where all the properties that an object has are taken together. Abstract particulars or tropes are taken to be incapable of existing separate from the object that the tropes are a part or a constituent of,

they are separated only by an act of abstraction, not as being genuinely separable from the object under consideration. Now given that trope theories are a form of constituent ontology that takes properties to be an irreducible feature of the world, it follows that constituent ontologies need to avoid the Lockean Sense of concrete and abstract. Taking properties to be dependent on objects places objects in the position of metaphysical priority but this cannot be the case if properties are an irreducible, fundamental feature of the world. The constituent ontology therefore needs a distinct sense of concreteness to do the work, a sense in which properties[50] and not only objects come out as concrete.

The Spatiotemporal Sense of Concreteness does not need to invoke notions of dependence and independence. Rather it considers whether it is conceivable that the entities under considerations can be taken as existing spatiotemporally, where spatiotemporal entities are taken to be entities that have a location in the spatiotemporal nexus[51]. But what would it amount to in saying that **a** property can have location? The answer to this will largely depend on precisely which specific version of the constituent ontology is articulated. However, given that this chapter focuses on laying out the general structure and the rules of the game for the constituent ontologist a general principle of concreteness for constituent ontologies will be sufficient to the task. There are two general articulations of constituent approach: properties as immanent universals and properties as tropes. If properties are taken as

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[50] That is the first order properties of objects. This will be refined further to mean only the sparse natural properties.

[51] In section 5.4 we shall see that perhaps, given considerations that deny spacetime to be itself a fundamental feature of the world we can generalise the notion of location.
However, since must constituent ontologies take location to be spacetime location we can in this section focus on spatiotemporal location.

immanent universals, then properties can only have location in a derivative sense. This is the case because immanent universals are usually taken as entities capable of being wholly present at each of their instances[52]. Any given property taken as an immanent universal is capable of having more than one location at any given time and at each location of its instantiation it is fully present. It has these multiple locations only in virtue of being an ontological part or constituent of multiple, numerically distinct objects. These distinct objects will be in many more cases than not separately located each from the other. For instance, consider the property of the unit negative charge of some sub-atomic particles. If this property is taken as an immanent universal, then this property is clearly instantiated at a very high number of instances in the world, present wholly at each instance. It has no one location but an indefinite number of locations spread out across all of spacetime. A property such as *unit negative charge* has location only derivatively from each of its instances.

In contrast, if properties are taken as tropes then properties have location in a non-derivative sense. Any particular trope, unlike an immanent universals, has a necessarily singular location. It is through this singular location that tropes get their particularity **(Campbell 1991,485)**. This is the feature in a realist ontology of properties that distinguishes tropes from immanent universals. However, both trope

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[52] Making sense of the notion of whole presence at multiple instances at the same time will be dealt with in subsequent chapters. Lowe **(1998, 154-158; 2006, 98-100)** an advocate of universals takes this characterisation to be flawed. This is particularly problematic if we take properties to be both universals and parts since it is unclear how one can reconcile the notion that numerically distinct things spatiotemporally disparate from eachother can have exactly the same parts. My own view is that this can be solved but by utilising the resources of the mereological bundle theory. See section 5.2.3.2 of this thesis where I argue that the mereological bundle theory does not require the notion of the whole presence of a universal.

theory and the theory of immanent universals have a united approach to the Problem of Character **(PC)**, both answer PC by taking properties to be contained 'within' particular objects. Both take properties to be ontological parts or constituents of objects. Where they differ is in their answer to the Problem of Resemblance **(PR)**. A theory of immanent universals understands resemblance in terms of the identity and whole presence of a property at numerically distinct but resembling particular objects while trope theory explains the resemblance of numerically distinct objects in terms of all of those objects being composed of distinct but primitively resembling property instances (tropes). For instance, under trope theory any two cases of instantiation of unit negative charge are distinct entities, there is that particular *unit negative charge over at location$_1$* and there is another *unit negative charge at location$_2$* ,united as a property not under identity but under a relation of primitive exact resemblance. The important point here is that in both a theory of immanent universals and trope theory properties are taken to be entities capable of having location in space and time or perhaps in some more general sense of having location. Both theories do not conceive of properties as entities existing outside of the spatiotemporal nexus that we typically take material to exist in.

Loux **(2017, 12-13)** argues that while it is true that constituent ontologists have typically taken properties to be spatiotemporal he takes this as a contingent fact of such ontologies, not a necessary fact. This explains why those that advocate properties to be universals take properties to be spatiotemporal in only a derivative sense - only as having location in virtue of being parts or constituents of material objects **(2017, 12).** He argues that universals can have this derivative spatiotemporal location only within the context of postulating the

reference framework of absolute space. But since most constituent ontologists have denied the existence of absolute space and time they have hedged their claims arguing that the categories of material objects and spacetime exist in a mutually dependent manner. Bertrand Russell's later view **(1948)** is an obvious example of giving an account of spacetime in terms of a bundle theoretic construal of objects. Under such a view spacetime is not viewed as being a substance separable from the objects that occupy it; spacetime absolutism is false on this account. Given that there are constituent ontologists, like the later Russell whose bundle theoretic account of objects is a version of the constituent approach, Loux **(2017, 12-13)** appears to be able to proceed in taking concrete spatiotemporality to be a common but not necessary feature of constituent ontologies. Another prominent advocate of such a view is Armstrong **(1978a, 1989, 1997)** For Armstrong, universals and spacetime exist in a kind of mutual relation of dependence.

"Space-time is not a box into which universals are put. Universals are constituents of states of affairs. Space-time is a conjunction of states of affairs. In that sense universals are "in" space-time. But they are in it as helping to constitute it". **(Armstrong 1989, 99)**

It is difficult to find a clear line of argument by Armstrong for the claim that space-time is a conjunction of states of affair[53] and Loux **(2017, 13)** is right to point out that this is essentially to deny that universals have a genuinely spatial or temporal location. But Loux then goes on to suggest that if this is compatible with a constituent ontology, that a proponent of the constituent ontology can deny that

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[53] It seems that giving a coherent account of spacetime in terms of a theory of universals and states of affairs is a genuine weakness in Armstrong's ontology. Quite how he substantiates the claim that spacetime is a conjunction of states of affairs without ceding ground to relationism and the bundle theory of material objects, views that he rejects, is not clear. His most articulated attempt to account for how space-time is a conjunction of states of affairs can be found in his *Nominalism and Realism: Volume I of Universals and Scientific Realism* **(1978a 122-125).**

universals have genuine spatial or temporal location, then it is mistaken to claim that the issue of spatiotemporality is pivotal at all to constituent ontologies.

"But this is essentially to deny that universals have a genuinely spatial or temporal location; and if it is compatible with the constituent strategy for a proponent of universals to deny this, then it is a mistake to claim that the issue of spatial or spatiotemporal location is what is pivotal…." **(Loux 2017, 13)**

This a strange claim. It is not clear what Loux means precisely by a 'genuine spatial or temporal location'. What can only be meant here is that universals do not have genuine location because they have multiple location, universals have location only in a derivative sense from the location of their instances. But this is only to deny that universals have exact spatial or temporal location at some, one unique point. This does not deny that they are in some sense entities that have location. In addition, the problems that arise here seem unique to issues around universals and multiple location. Tropes suffer from no such worry given that they necessarily have one exact location. Most importantly, it does not follow that if some proponent of a view articulates a theory that lies in contradiction with the more general framework that then this contradiction suggest that a notable feature of the view, in this case properties having location, is not pivotal in a description of the more general framework. It may be the case that the proponent, like Armstrong, has misunderstood the terms and limits of the general framework that they are working with[54]. Clearly this is not the fault of Armstrong given that the general framework of constituent ontologies has never been given a systematic general statement,

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[54] See the last , footnote 52.

certainly not one where the related but distinct issues of character and resemblance are distinguished.

2.4.2 The Concreteness Principle of Constituent Ontologies

What constituent ontologies have in common is not a commitment to the irreducibility of spacetime or some single articulation on what the nature of spacetime is. Rather all constituent ontologies place a premium on properties being in some sense locatable. This needs to be given in terms of the spatiotemporal location of properties either in a derivative or non-derivative sense. This is necessary because properties can only be ontological parts or constituents of objects if it is the case that those parts or constituents in have location in some sense. Hence, I suggest the following principle underlies the constituent ontology.

The Concreteness Principle of Constituent Ontologies (CPCO) : A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

So far as I can see no solid version of CPCO has been articulated in the literature that allows ontological theories of properties to be distinguished as constituent as opposed to relational. Is there any reason why all constituent ontologies would endorse something like CPCO? If one focuses on the first order properties of material objects

there certainly seems to be good reason for it. Presuppositional thinking on the character of material objects will rely on the first order properties of objects that are perceivable to us. The regimented form of this presuppositional thinking is what I have called the Perceptual Causal Argument (PCA) for CPCO. I do not suppose that this is watertight argument, rather it is a regimentation of some of the presuppositional thinking that motivates thinking of properties as being ontological parts or constituents of objects. It is, in effect , a regimentation of the thinking that leads to the constituent ontology. Its focus on perceivable first order properties brings the instant charge that it deals with only the superficial properties of perception, thus excluding the properties of unobservable entities. There is a swift rebuke to this. While the properties of unobservable entities are not observable it does not follow that they are not causally efficacious in perception. Consider the properties of photons. Such properties are clearly causally relevant to visual perception since it the interaction of photons with component parts of the human eye such as the retina that allow us as visual perceivers to have any particular, visual perception of external objects. What needs to be taken from the argument is that if properties were to be abstract, that is to say entities with no location, it is not clear how they could feature as ontological parts or constituents of objects or be causally relevant entities. In what follows I will set out the Perceptual Causal Argument for CPCO and then proceed to defend the cogency of each premise in sequence.

The Perceptual Causal Argument

(P1) Some characteristics of objects can be perceived.

(P2) All characteristics of objects are first order properties.

(P3) First order properties are either abstract or concrete entities

(P4) Only entities with spatiotemporal location can have causal powers.

(P5) Only entities with causal powers can be perceived.

(P6) No abstract entities have spatiotemporal location.

Therefore,

(SC1) No abstract objects can have causal powers.

(From P4, P5 and P6)

Therefore,

(SC2) No abstract objects can be perceived.

From (P5) and (SC1)

Therefore,

(SC3) Characteristics of objects are not abstract entities.

From (P1), (P5), (P6) and (SC2)

Therefore,

(SC4) First-order properties of objects are not abstract entities.

Given (P2), (P3) and (SC4)

Therefore,

(C) First-order properties of objects are concrete entities.

Before examining cogency, it should be noted that no constituent ontologies should conceive of higher order properties as being parts or constituents. The reason for this is clear. Consider the higher order property of *blue being a colour*. Consider now some blue object *x*.

Constituent ontologists will assert that in some sense the *blueness* of *x* is a part or constituent of *x*. But how would it be articulated that colour is a part or constituent of that object. It would be quite bizarre to claim that being coloured, in addition to *blueness*, is a constituent of *x*. There is no need to postulate this since the character of *x* is given by the having of the ontological part, *blueness*. There is no need to postulate that within the ontological structure of *x* there is some additional part *colour* that explains the truth of the conclusion *x* is blue, blue is a colour, therefore *x* is coloured. The work is done by the ontological part or constituent the *blueness* property. This can be more generally expressed if we take the relation between blue and colour to be that between determinate and determinable properties. In this more general sense, we can say that determinate properties can be candidates for ontological parthood while determinables are not. For this reason, I only consider first order properties of objects to be those quantified over when speaking of ontological parts.

(P1) Some characteristics of objects can be perceived.

The assertion here is that some of the characteristics of objects are given to us in perception, that there are some characteristics of objects that are perceived by us or other organisms capable of higher levels of perception. Issues of scepticism aside, so long as some form of perceptual realism is true this premise clearly is also true. Consider for instance that as I sit in my study and look out into the garden I perceive some object, the large spruce tree. I can distinguish this object from the rest of the surroundings in the garden only in virtue of the specific characteristics that the spruce tree has. I can contrast the characteristics of the spruce tree from say the small pine trees that

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make up the hedge in the background or from the fence that sits just below that pine hedge. It is the large height, large mass, the character of some of its individual ordinary spatiotemporal parts such as the colour of its leaves and the particular shape of the cones that allow me to differentiate this object visually from its surroundings. As a perceiver I am only capable of distinguishing objects like the spruce tree from its environment composed of nearby objects if I am able to perceive the characteristics of that object and compare its characteristics to those surrounding objects.

Given the use of the existential quantifier in this premise this premise does not assert that objects do not have unperceived characteristics, for it is perfectly possible that there are unperceived characteristics of objects like the atomic mass of various microscopic ordinary parts of the spruce tree which are unobservable to visual perceivers such as humans. It is also not the case that since some characteristic cannot be perceived that any such characteristic does not have causal power, given that clearly unobservable characteristics like unit negative charge have causal power. The truth of (P1) requires only that some of the characteristics of objects are capable of being perceived. It does not require either that all the characteristics of some one particular object are capable of being perceived nor does it require that all the possible characteristics of all existent objects be capable of being perceived.

(P2) All characteristics of objects are first order properties.

The second premise goes on to identify the characteristics of objects as first order properties, that is to say the properties that are denoted by predicates ascribed to the objects that populate the world. This is a more disputable premise than the first. This is because there are two

clear objections. Firstly, is it not possible that some of the characteristics of objects are higher order properties? That is to say that some characteristics of objects are properties of the properties of those objects. For instance, is it not plausible to say that mass is a characteristic of the spruce in the back garden, just as the exact mass of the spruce is a characteristic? Secondly, could it not be the case that the having of some characteristic is not about the having of properties at all, but rather about the having of various ordinary spatiotemporal parts? For instance, the characteristic of a person having a right arm is concerned not with properties but rather with some ordinary object having an ordinary spatiotemporal part. I have the characteristic of having a right arm not in virtue of some property of me but rather in virtue of having a certain spatiotemporal part, namely a right arm.

To the first point concerning characteristics as first order properties it should be conceded that one can ascribe predicates to objects that seem to refer to higher order properties. For instance, it is true that the spruce has mass. However, this in no way suggests that the spruce has the property of mass itself, rather it is only in virtue of the spruce having some determinate mass that the predicate 'has mass' can be ascribed to the tree. Therefore, strictly ontologically speaking, the tree only has determinate mass and the fact it has determinable mass is only in virtue of it having some determinate mass. Notice that this does not require the denial that higher order properties exist. All it requires is that the characteristics of objects, both observable and unobservable, are first order properties. The truth of (P2) therefore does not require the truth of Elementarism. This is the view that the only properties that exist are first order properties, although there are higher order predicates in our languages there are no higher order

properties to which such predicates refer **(Bergmann 1959, 115-123)**. It still can be the case that there are higher order properties, but such properties are not to be identified with the characteristics of material objects.

To the second point it can be responded that while it is clear that many predicates in natural language pick out the ordinary spatiotemporal parts of objects , such as predicating of some individual human that they have a right arm, this cannot exclude reference to first order properties of the objects involved. Consider how it is the case we are able to say of any object that it is an object of a given kind. How are we able to say that the appendage dangling off the right half of my body is an arm? We are able to do this because whether something is a human arm is determined by the first order properties of that object. This allows us to place that object as being a member of a certain kind. That is to say, kind determination can only be given by stipulating what properties pick out objects as being members of that kind, as opposed to some other kind.

Predicates like 'having a right arm' can only pick out some individual object as a member of that kind *iff* it instantiates a certain set of properties. Tobin **(2013, 164-182)** takes a strong position on the relation between natural kinds and natural properties. She argues that natural kinds are in fact natural properties; natural kinds are to be identified with natural properties where those natural properties form stable property clusters. The classification of objects into natural kinds genuinely picks out real differences in distinct classes of objects in virtue of which natural properties those objects instantiate. Our ability to do this does not require some supplementary ontological distinction between properties and kinds. But even on a reading looser

than one of identity between natural kinds and natural properties it still is the case that reference to first order properties of objects cannot be avoided. Consider Lowe's **(2006)** position. There the relation between natural kinds and natural properties is understood as being one of characterisation, where natural kinds are determined, although not identified with, a certain set of properties being instantiated by a particular object of that kind **(2006, 91-93)**. Objects, what Lowe calls substantial particulars, are themselves characterised by property instances. Characterisation of natural kinds by natural properties at the general level is therefore necessarily paralleled at the particular level where objects are characterised by property instances. The critical point to notice is that on either view at some stage referring to first order properties *simpliciter* cannot be avoided when dealing with the characteristics of material objects, including in cases where we putatively pick out a characteristic as an ordinary spatiotemporal part.

(P3) First order properties are either abstract or concrete entities.

The third premise asserts that first order properties are either non-located abstract entities or located concrete entities. This needs little argument. Under the spatiotemporal sense of what it is to be concrete or abstract, either first order properties are entities that have location, or they are entities that do not have location. (P3) is just a trivially true disjunction that functions formally in the Perceptual Causal Argument for CPCO to generate the conclusion that first-order properties of objects are concrete entities.

(P4) Only entities with spatiotemporal location can have causal powers.

The fourth premise asserts that entities can only have causal power, an ability to engage in the causal nexus of the world, if it is the case that those entities are located. As seen previously in section 2.4.1 to be spatiotemporal under a constituent ontology is to have either non derivative spatiotemporal location or derivative spatiotemporal location. (P4) asserts that only these entities with spatiotemporal location are capable of entering into the world's causal nexus. It should be noted that this is not equivalent to whether, in any given instance of a causal relation, both *relata* are spatiotemporal or not. Why is this non-equivalence of issues important? Because (P4) does not focus on the causal relation as a whole , where the terms and the relation are all taken into account. Rather (P4) focuses on the cause, that is to say the entity which is referred to in the first term of any stated causal relation. This means (P4) may leave it an open question whether the second term of any stated causal relation is spatiotemporal or not. This is important because it leaves open the possibility of spatiotemporal entities having the causal power to bring about effects whose existence cannot be spelled out in terms of spatiotemporal locations. A classic example of this is the epiphenomenal qualia often postulated to account for mental experience. Making this non-equivalence of issues clear ensures that instances of epiphenomena cannot be used as counter examples to (P4).

There is however a possible counter example to (P4) that could hit the mark. Causation by absences. Consider Tony the window cleaner, let's

say it is true that yesterday Tony was cleaning the windows of Trump Tower at the 44nd Floor. Now consider the following:

'Tony is alive because yesterday he did not fall off Trump Tower'.

We seem here to have a perfectly true causal report that has the causative *relata* as the non-occurrence of a particular event, that is to say the absence or non-occurrence of Tony's falling off Trump tower. We can generate statements like this easily.

'The flowers wilted because Rory did not water them'.

'The canary died because of no oxygen in the cave'

Mellor **(1995, 132)** claims that statements like these give genuine reports of facts of causation by absence. Such statements are negative existential statements which are made true by the non-existence of particular objects or events. For Mellor a statement such as ' Tony is alive because yesterday he did not fall off Trump Tower' is no less causal than ' Tony is dead because yesterday he fell off Trump Tower'. Statements such as the former are negative existential statements which are made true by the non-existence of particular objects in just the same way that the latter is made true by the occurrence of Tony falling off Trump Tower. With the current task at hand of examining the truth of (P4) we now ask in what sense we can say that the referents of negative existential statements have spatiotemporal location or for that matter any location at all. Consider Tony's not falling. In what sense can we give this a location? It is easy to see that Tony's falling off Trump Tower has a location; simply state the trajectory of Tony's fall to earth and the time it took from the moment he lost his footing to the moment he made contact with the ground. But in the case of Tony's not falling there is no counterpart for this. In the case of the

negative existential statement no location can be given. Tony's not falling happened at nowhere and nowhen. It seems therefore right to say that the referents of negative existential statements would have to be entities with no location. If we can attribute causal power to such referents it seems clear no that (P4) comes out false.

Beebee **(2004, 291-294)** points out that if causation by genuine absences is true, and by extension that (P4) is false, it follows that one of the best candidate theories of causation must also be false. Any version of the Network Model of Causation **(Steward 1997, 205-231)** will be false if causation by absence is possible. The Network Model is best exemplified by Lewis, and in particular in his *Causal Explanation* (**1986b, 214-240)**. Any given event, that we would explain as coming about, has causes that together act jointly to bring about that event. The event can be taken in some sense to depend on the existence of the causes. Without any one of these causative events the effect event would either have not occurred at all or it's occurrence would be less probable. And each of these causative events in turn also have a vast array of other events which act to bring them about, perhaps *ad infinitum*. So, for any given event it is usually the case that the occurrence of the event is the culmination of near countless distinct, converging causal chains **(Lewis 1986b, 214-215)**. Given this the causal history of any one event, and in fact of all events in the world taken together, form a relational structure. For network theorists, the *relata* are events, that is to say local matters of particular fact of the sorts that may themselves cause or be caused **(1986b, 216)**. Events stand in various sorts of relations to one another. Consider the events of shells exploding on the Somme battlefield. There are events standing in spatiotemporal relations to eachother such as artillery

shell *a's* exploding being 15m and 3 second apart from artillery shell *b's* exploding. But the relation that matters the most in this context is the relation of causal dependence between events. So, is the exploding of artillery shell *a* dependent on the explosion of artillery shell *b* or vice versa? No. Artillery shell *a* would still have been fired and detonated whether or not artillery shell *b* had been fired and detonated. So, while these events are related spatiotemporally, they need not be causally related even though both events may share one or more of the same causes. Lewis own account of the relation of causal dependence is of course the counterfactual analysis, although there are a number of different articulations of causal dependence under the network model[55].

But why does causation by absence falsifies the Network Model analysis of the relation of causal dependence? Because the only way to make sense of causation by absence on the Network Model would be to postulate that there are such things as negative events. Negative events would be things whose essence would be the absence of both properties and objects[56]. This is seems a clearly bizarre notion. If negative events are allowed into an ontology, then the Network Model of Causation is left in a position from which it cannot build. No

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[55] The Interventionist Approach to causal dependence and causal explanation is another example of the Network Theory of Causation. Meek and Glymour **(1994),** Hausman **(1998)**, Pearl **(2000)**, Woodward **(1997, 2000, 2003)** , Woodward and Hitchcock **(2003)** and Cartwright **(2003)** The general approach is that change in event a is of such a character that if any change occurs in event *b*, it occurs only as a result of its causal connection to event *a* and cannot occur in any other way. The change in event *b* is produced by the manipulation of event *a* can only occur through a causal route that goes through *a*. These manipulations or changes have come to be called interventions.

[56]McDaniel **(2010)** considers what it means to be ontologically committed to 'almost nothings' what in the literature are often referred to as 'holes'. All that is required here is that the notion of such entities is at least *prima facie* bizarre; generating entities that can be rightly described as 'dubious'.

Network Theory of Causation can allow negative events. As Beebee **(2004, 291-292)** rightly points out ,

" If Jones' failure to close the door is not an event, and if this failure was a cause of the fire, then the full causal history of the fire is not exhausted by the network of events and causal relations between them, for there will be no event of Jones' failure, and hence no causal relation between his failure and the fire. The Network model cannot accommodate the fact – if it is a fact- that Jones' failure caused the fire, and hence cannot be the whole causal truth about reality".

The choice is stark. Allow absences, like negative events, into ones ontology because they seem to perform some function in causal explanation or drop the Network Model, the most successful general framework for a theory of causation. Since absences are an already a dubious type of entity the choice is obvious. Losing all the various versions of the Network Model of Causation simply to allow the already seemingly spurious notion of causation by absence would quite clearly be a massive systematic theoretical loss for little gain. Given this, and the fact that absences are spurious posits in any ontology, asserting the truth of (P4) is well warranted. Only entities with location can have causal powers and enter into the causal nexus of the world.

(P5) Only entities with causal powers can be perceived.

The fifth premise asserts that it is only entities that have causal powers that can be perceived. The perceptual faculties of human perceivers are inherently causal structures; to perceive any given object whether by sight, hearing, smell, touch or taste is a causal process. Even when malfunctioning to give hallucinations, those hallucinations are the

results of faulty causal processes occurring in the neurological system. When reliable the senses give rise to perceptions by a complex chain of causal interactions with the world around us. Entities incapable of entering into this chain of causal interactions will be entities that cannot be perceived. Numbers, sets and propositions for instance, although perhaps available to us by some process of intellection, cannot feature as items of the perceived world because these entities are in no sense causally efficacious. There are no imaginable scenarios where it is possible to taste the number 2 or see the set of all mammalian bipeds since these entities have no causal powers by which they can be a part of the causal nexus of the world. This is not to deny their existence, (P5) does not require some version of the Eleatic Principle[57] to be true. The only possible case where an entity without causal power could possibly be taken to be perceived is in the case of propositions. There may be some sense to the notion that one can hear propositions. For instance, if I had been in the presence of Martin Luther King during his famous Lincoln Memorial speech then I would have heard the proposition 'that all men should be judge by the content of their character, not by the colour of their skin'. However, this would simply have been the auditory perception of the utterance of that proposition, with the utterance of the proposition and the proposition itself not being identical. The formal properties of truth or falsity of propositions makes this even more evident that propositions cannot in fact be perceived. For what sense could be made of stating that you heard the formal properties of truth or falsity of the proposition in question. Given this, one does not literally hear propositions, one hears auditory representations of propositions in the

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[57] The Eleatic Principle takes it that what exists is what is causally efficacious.

form of spoken languages. Unless counterexamples can be given it is clear that only those entities imbued with causal powers can be perceived.

(P6) No abstract entities[58] have spatiotemporal location.

The final premise asserts that abstract entities do not have spatiotemporal location. Some of the ground for this premise was covered in section 2.4.1 on Concreteness and Location. There it was seen that the best understanding of concreteness is the Spatiotemporal Sense of Concreteness, where concrete entities are taken to be entities that have a location in the spatiotemporal nexus. To be concrete is to have location. On the Spatiotemporal Sense of Concreteness[59] entities like numbers, functions, sets and propositions appear to come out as paradigmatic examples of abstract entities since it is difficult to understand how such entities could be understood to have location.

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[58] There is a longstanding debate on whether there are abstract entities at all. I do not wish to enter into that debate here, although I am happy to accept that there are entities that seem *prima facie* best described as abstract. I am concerned within this context only with first order properties and whether they are abstract or concrete.

[59] The Concreteness Principle of Constituent Ontologies **(CPCO)** asserts that a property can only be construed as a part or a constituent of an object *iff* it has either non-derivative spatiotemporal location or has derivative spatiotemporal location(s). This was the result of considering whether parts or constituents of objects could be abstract entities, that is to say entities without spatiotemporal location. We saw in section 2.3 on Realism and Properties some reasons why abstract entities such as sets or classes , cannot be consider entities capable of being parts or constituents of objects. There we saw that the reason why class nominalism cannot be a form of constituent ontology was because it fails to explain what it is about an object such that it has any properties at all without invoking entities entirely separate from it. It fails to give an answer to the Problem of Character that is appropriate as a constituent ontology. The closest class nominalism may come to achieving this would be to identify an object as a singleton set, therefore not considering what it is about this object but rather what is the relation between this object and some other entity, in this case the abstract entity of the set of all possible Fs where the set of all *Fs* contains only one member.

Against the Spatiotemporal Sense of Concreteness Lewis **(1986a, 81-86)** argues that is wrong to think of sets as not capable of having location,

"As for the first part, the denial that abstract entities are located, I object that by this test that some sets and universals come out concrete. Sets are supposed to be abstract. But a set of located things does seem to have a location, though perhaps a divided location: it is where its members are. Thus my unit set is right here, exactly where I am; the set of you and me is partly here where I am , partly yonder where you are; and so on. And universals are supposed to be abstract. But if a universal is wholly present in each of many located particulars, as by definition it is, that means that it is where its instances are. It is multiply located , not unlocated." **(1986a, 83)**

If Lewis is right then some sets, the sets containing located objects, can have derivative location from their members. Some sets have what Lewis calls a divided location. He goes on to say,

"You could just declare that an abstract entity is located only in the special way that a set or a universal is located- but then you might as well just say that to be abstract is to be a set or universal. Your talk of unlocatedness adds nothing. Maybe a pure set, or an uninstantiated universal, has no location. However, these are the most indispensable and suspect of sets and universals. If it is said that sets or universal generally are unlocated, perhaps we have a hasty generalisation. Or perhaps we have an inference: they're unlocated because they are abstract. If so, we had better not also say they they're abstract because they're unlocated." **(1986a, 83)**

If Lewis is correct, then (P6) can be rejected given that there are some derivatively located sets and therefore abstract entities with location. Lewis, however, is off the mark. Sets cannot be compared to universals in this sense given that sets at best have "divided location". By universals here Lewis means immanent universals, not transcendent universals. Transcendent universals are obvious cases of abstract entities since they exist 'outside' of space and time. The case is less clear with immanent universals, but it shall be argued in the following

section 2.5 that immanence is best understood in terms of the Concreteness Principle of Constituent Ontologies. By stating of universal , *"wholly present in each of many located particulars, as by definition it is, that means that it is where its instances are"* Lewis is utilising an immanentist conception of universals, that is to say universals are in some undefined sense 'in' and present in their instances. First order properties taken as immanent universals are 'in' objects by virtue of being able to have whole presence at multiple locations. One way to explain this would be to say that properties conceived of as immanent universals are ontological parts or constituents that give ordinary objects their ontological structure, where the same component ontological part of that structure can be at other spatial locations elsewhere at the same time. There are of course grave problems with the notion of whole presence that any advocate of such a position needs to address[60] but for now all that needs to be accepted is that the notion of whole presence is built into the definition of the term 'universal' that Lewis is using.

Sets or classes are quite distinct from immanent universals. Set membership is more like the relation that obtains between transcendent universals and its instances. As a class nominalist Lewis takes properties to be sets of possible individuals. Properties are a special type of set, that is the sets that explain and give an account of predication and instantiation of properties in terms of set membership. Consider a green leaf. To have the property of being green is to be a member of the set of all green things. The property is identified with the set as a whole. Clearly it would be bizarre to claim

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[60] In section 5.2.3 I offer an account of universals that does not require the notion of whole presence.

that a set is 'in' an object which is one of its members. By example, how would the set of all green things be contained in any one of those green things? The answer is there is no conceivable way that this is possible. If the set of all green things was contained in each one of its members, this would then mean the set of all green things is wholly present in each of those members! That would be to turn class nominalism into some version of a theory of immanent universals! Since one of the main reasons to adopt class nominalism is to avoid apparently dubious entities like immanent universals this is clearly not a route the class nominalist like Lewis can take. Lewis' model realism makes the problem here all the more intractable. Since Lewis' class nominalism quantifies not only over sets of this-worldly objects but also over other-worldly objects. **(1986a, 50-69)** The property of greenness is therefore identified with the set of all possible green objects. Clearly it makes no sense at all given Lewis' rejection of the transworld identity of objects, to say in any coherent way that the set of all possible green objects is contained 'in' any one green object **(1986a, 210-220).**

Being 'in' objects is how immanent universals derive their location. So, if sets are not in objects how then do they have derivative location or ,as Lewis puts, it "divided location? Well, properties taken as sets are partly present wherever their members are. Perhaps he means properties have scattered location much like the United States Marine Corps or the current Springbok rugby team have a scattered location at the spatiotemporal points where their members are. But this cannot be true because in the case of either of those two scattered objects each

of the parts is itself wholly present[61] exactly where it is located. Each soldier of the United States Marine Corps and each player of the Springboks is wholly present at each of their locations. In contrast, sets are not wholly present at each of their members. Rather they are partly present at each of their members. This can only be read as being a 'partially located' entity. But entities are either located or not located, not partially located. The notion of a set being partially located is better dispensed with, and advocates of class nominalism should accept that sets are properly abstract non-located entities. This is not to say Lewis' form of class nominalism is bizarre, rather it is only bizarre if class nominalism is taken in conjunction with the claim that properties taken as sets have location and can be considered to be ontological parts or constituents of objects.

Lewis perhaps could respond that the example of the singleton set gives an adequate example of how sets can have location. By unit set Lewis means singleton set, that is to say a set with only one member. The singleton set {Tony Blair} is located exactly where Tony Blair is. The predicate 'located exactly' can be translated to 'wholly present'. If this is true then some sets can have location in much the same manner as objects and immanent universals do, since singleton sets with a located member are located exactly where their members are. However, this is either a trivial formal possibility or shows that such an example entails the existence of the null set, an entity with no semblance of location. Either option is unpalatable. If it is just a formal possibility the statement 'x has the same location as y' where x is {Tony

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[61] This is the case whether we are advocate 3-dimensionalism or 4-dimensionalism in a theory of persistence. In 3-dimensionalism an individual object persists through time by being wholly present at its various spatial locations through time while in 4-dimensionalism any one of an individual objects temporal parts is still wholly present at its spatiotemporal location.

Blair} and *y* is Tony Blair would be trivial since it could be read that *x* and y are co-extensive and therefore identical. However, if we think that *x* and *y* are not co-extensive in this case, then if Tony Blair ceased to exist there would still exist the null set {}. Neither option is palatable. The having of location is not a trivial formal matter. Nor is the existence of the null set the type of entity any advocate of a locational understanding of naturalism going to allow into their ontology, since it is an entity wholly devoid of location. Given this it is reasonable to assert that it is true that no abstract objects have spatiotemporal location, including properties taken as sets. One cannot maintain that an ontology that takes first order properties as abstract is in some sense a version of the constituent ontology.

The Perceptual Causal Argument (PCA) can be taken as good reason to think that The Concreteness Principle of Constituent Ontologies is true where a property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals). PCA is thus a good regimentation of the presuppositional thinking that may initially motivate the concreteness conception of properties in constituent ontologies, at least where concreteness is taken to be best explained by reference to either non-derivative or a derivative sense of location. It should come as no surprise that location, spatiotemporal or otherwise, usually holds a central place in nearly all versions of constituent ontology.

2.5 Immanence and Instantiation

2.5.1 Objects as the *terminus* of instantiation

With the centrality of concreteness understood in terms of location how constituent ontologies deal with both the immanence of properties and the instantiation of properties can be dealt with. We shall see in what follows that the constituent approach to the problem of character comes in the form of an immanent conception of properties. The reason for this is that the constituency approach is a clear way to explain the immanence of properties, where properties are understood to be parts or constituents of the ontological structure of objects. Before proceeding we need to be clear on the concept of instantiation. For any object to instantiate a property is for that object to be an instance of that property. The term 'instance' suggests a numerical distinction between properties and objects, properties are entities which are instantiated, and objects are entities which are instantiators. Objects instantiate properties, while properties are instantiated by objects. This means that properties are those entities capable, it seems, of being present at multiple locations. It is this seeming capability that leads down the road to a theory of properties as universals, while trope theorists look to explain this away by appeal to the primitive exact resemblance of tropes. The term 'object' is used here to pick out those entities which are characterised by the properties which they instantiate. Objects, the exemplar case being material objects, are not themselves entities capable of being instantiated. Notice that while first order properties can be instances

of higher order properties, it is not the case that first order properties can be objects. Objects cannot be instantiated. Since first order properties can be instantiated it follows that first order properties cannot be objects. Douglas Ehring **(2011, 23-24)** outlines a similar notion of instantiation where he criticises what he terms Exemplification Accounts of the distinction between universals and particulars. There he uses the term 'universal' whereas I use the term 'property' and the term 'particular' where I use the term 'object'.

The items usually termed ordinary material objects seem to be paradigmatic case of objects as I use the term. Consider some desk lamp. The desk lamp, it seems, is characterized by a set of first order properties: It's degree of luminosity, it's volume, the colour of its stand and lampshade, the shape and heat of its bulb. These first order properties give the character of this particular lamp. But the lamp, being an object, cannot be instantiated by some other entity. It would be a category error to claim that some particular lamp could be a characteristic of some other entity in the same manner in which its luminosity is considered a characteristic of the lamp. It is also the case that semantically it would be a category error to attempt to predicate the term 'this lamp' of some other entity. There is no sense in how this would serve in any way to give true or false informative sentences about the character of that entity. The only option would be self-referential truisms such as 'this lamp is this lamp', but that would not amount to anything approaching an informative sentence about the character of any object. Objects[62] , with ordinary material objects as the

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[62] Perhaps given this it would be better to terms such entities 'particular object' to denote their incapability of being instantiated by other entities.

best case, serve metaphysically and semantically as the *terminus* in the sequence of instantiation relations. Instantiation ends with objects.

2.5.2 Properties as immanent, not transcendent

But how are we to understand the instantiation relation, that is to say the relation which obtains between an object and its first order properties which serve to characterise it? There are two broad approaches to understanding the instantiation relation. The transcendent approach takes properties to be entities that exist in a totally separate way from the objects that can instantiate those properties. Properties that serve to give objects character are taken to exist in a manner totally distinct from those objects. Unlike objects, properties do not exist in the ordinary material world. There must be a Platonic realm of being where properties exist if the transcendent approach is true. Plato, the early Russell **(2003a, 126; 1912, 57)** and Moore **(1953, 288- 305)** are the exemplars of the transcendent view of properties and their relation to objects[63]. Russell offers a rhetorically rich summation of this position where he takes properties to be transcendent universals,

"We shall find it convenient only to speak of things existing when they are in time, that is to say, when we can point to some time at which they exist (not excluding the possibility of their existing at all times). Thus thoughts and feelings, minds and physical objects exist. But universals do not exist in this sense; we shall say that they subsist or have being, where 'being' is opposed to 'existence' as being timeless. The world of universals, therefore, may also be described as the world of being". **(Russell 1912, 57)**

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[63] Other famous exponents of this view in contemporary philosophy include van Inwagen **(2004)**, Hale **(1987, 2013)** and Platinga **(1974, 1978, 1979)**.Other exponents of transcendent universals, for reasons related to the role of universals in laws of nature and dispositions, include Tooley **(1977, 1987)** and Tugby **(2013, 2015)**.

In contrast, the immanent approach takes properties and objects to exist in the same manner, there are no distinct manners of existence and subsisting for these two ontological categories of entity. Properties exist just like objects do; properties exist, it seems, by having location in space and time. To take this further the immanent approach takes the first order properties of objects to be in some sense 'within' those objects which instantiate them. Immanent views of properties are replete with metaphors for conceiving of this relation. Properties are often said to 'inhere' within objects, be 'contained' within objects or are 'present' within objects. For an object x to have a certain character it must be the case that x is instantiating the property P where P gives x the character it has. For the constituent ontologist a property can only be instantiated by a particular object *iff* that property is an ontological part or constituent of that object, it is an entity that contributes to the ontological structure of that object. Therefore, for P to give x the character under analysis, it must be the case that P is either an ontological part or constituent of x.

The constituent approach therefore has a readymade and clear account of how we can understand what it means for a property to be immanent 'within' an object. No constituent ontology can take a transcendent view of properties unless one takes the view that parts or constituents exist in a manner totally distinct from the whole which they compose or constitute. Quite how one would expound the thesis that parts or constituents have a transcendent existence apart from the wholes which they make would be a highly counter-intuitive, probably incoherent, thesis of the relation of parts/constituents to wholes. It would lead to a bizarre, perhaps unworkable, thesis of the relation of part to whole where a located whole is composed of parts

or constituents which do not have location whatsoever. Using the spatiotemporal notion of concreteness, where concreteness is understood as the having of location, this would mean that a located concrete whole would be composed of unlocated ontological parts or constituents. Since all of an objects ontological structure is made up of properties on the constituent view it would follow, if a constituent ontology had a transcendent view of properties, that material objects would be composed completely of ontological parts or constituents, none of which have location. Properties on the constituent approach will be immanent properties, with the notion of ontological part or constituent serving to clarify what is meant by terms where properties are said to 'inhere' within, be 'contained' within or be 'present' within objects.

2.5.3 Immanence, constituency and instantiation

There are two sense of 'instantiation' at play that need to be unpicked. Firstly, there is 'instantiation' as used to refer to what we have come to call the Problem of Character where we ask of some object x with some property F, what makes it the case about x such that it is F? That is to say instantiation refers to how a property is related to it instances. The second sense of 'instantiation', although related to the first, refers rather to the query as to whether properties must have instances to exist; must the existence conditions of properties include that those properties have located instances at all. The two sense are distinct in so far as the first sense is more general, dealing with how properties are related to the objects which may or may not instantiate them. The

second sense covers whether it is necessary that properties be related to objects at all by instantiation. If one thinks there are uninstantiated properties, then properties may be related to objects by instantiation, but such a relation is not necessary for the existence of any such property. Those that espouse a transcendent account of properties usually assert that there is no instantiation existence condition regarding the existence of properties **(Moore 1953, 288- 305; Tooley 1977, 1987; Tugby 2013, 2015)**. Immanent accounts of properties, in contrast, assert that there is an instantiation condition amongst the existence conditions of properties. The most notable example of this is David Armstrong's Principle of Instantiation that excludes the possibility that there are uninstantiated universals. Amongst nearly all immanent accounts of properties something like the Principle of Instantiation is taken as a necessary truth about the nature of universals **(Loux 2017, 13)**.

Constituent ontologies take an immanentist view of properties. Given this some instantiation condition, like Armstrong's Principle of Instantiation, should feature amongst the existence conditions of properties in a constituent ontology. This is most clearly given in Armstrong's **(1978a, 113-116 ;1989a 75-82)** body of work. The Principle of Instantiation sets an ontological limit on properties relative to whether those properties have instances or not. Armstrong asserts that for each N-adic property universal, U, there exists at least some x such that x is an instance of U. This limits Armstrong's ontology of property universals by disallowing the existence of property universals without instances. Thus, on Armstrong's view there can be no uninstantiated property universals. Armstrong's formulation posits properties as being universals to account for the Problem of Resemblance (PR) but

prominent constituent ontologies also answer PR by positing tropes, rejecting universals on the grounds that universals are bizarre entities **(Heil 2012b, 107-115)**. However, trope theorists still maintain a realist and immanentist conception of properties where properties are irreducible entities that inhere in objects. They therefore address the Problem of Character (PC) in the same fashion. Their approach to PR differs by appealing to the primitive exact resemblance relation that obtains between some tropes thereby avoiding what they take to be the bizarre notion of identity between instances of properties. Trope theorist's take properties to be particulars, tropes are best understood as property instances. The most prominent versions of trope theory constrain their theories of properties in terms of spatiotemporal immanence. Campbell **(1981, 485-486)** states that tropes, what he terms abstract particulars, get their particularity and can be individuated from other exactly resembling tropes by their spatiotemporal location. In other words, tropes of the same kind can only be distinguished by their spatiotemporal immanence[64] at different locations.

"The metaphysics of abstract particulars gives a central place to Space, or SpaceTime, as the frame of the world. It is through location that tropes get their particularity. Further, they are identified, and distinguished from one another, by location. Further yet, the continuing identity over time of the tropes that can move is connected with a continuous track in space-time. Still further, space (and time are involved in co-location, or compresence, which is essential to the theory's account of concrete particulars. So, the theory seems to be committed to the thesis that every reality is a spatio-temporal one." **(1981, 485)**

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[64] Although taking non-spatiotemporal objects such as Cartesian minds or Berkeley's mind dependent as ontologically dubious Campbell is hesitant to restrict trope theories to a very strong versions of spatiotemporal naturalism. He maintains that even in these cases some analogue of the regionalism of spacetime is required to serve to particularize and individuate tropes. **(Campbell 1981, 486)**

He goes on to assert ,

"Tropes are , of their essence, regional. And this carries with it the essential presence of shape and size in any trope occurrence." **(1981, 486)**

Tropes are of their essence immanent; they are necessarily locational in nature. If properties are tropes, then they are necessarily instantiated given that any given trope cannot exist unless it has a location. For the trope theorist the two senses of instantiation, as the relation of object and property and as an existence condition of properties, come together much more neatly. This is because on trope theories there is a more systematic account of tropes being necessarily located entities. The key point to pull out is that on both theories of properties as immanent universals and properties as tropes a premium on an instantiation condition for the existence of properties is given. Given that we are focusing on the general constituent approach which includes both theories within it, properties do not need to be taken as either universals or tropes. On either conception, properties come out as irreducible entities. Given this, the formulation of an instantiation condition amongst the existence conditions of properties, such as the Instantiation Principle Armstrong **(1978a, 113-116 ;1989 75-82)** gives need only refer to properties and not to properties as universals or tropes. The principle can therefore remain neutral on the intra-realist dispute on whether properties are universals or tropes. This also allows this formulation to focus on character since only an exclusive set of properties[65] are capable of giving an object its character.

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[65] As we shall see in section 2.6 it is only the natural properties that are capable of giving objects character.

Principle of Character Instantiation (PCI): For any character giving property, *P*, there exists some object *x* that is an instance of P[66].

The Principle of Character Instantiation **(PCI)** sets a limit on what character giving properties there are. Under PCI, properties can only be taken to exist if they have instances; there can be no un-instantiated character giving properties in an immanent ontology. But what justification is there to assert PCI as a plausible principle in the metaphysics of properties? The answer is that PCI is plausible, but only within the auspices of a constituent ontology. For a property to be 'within' an object it must be the case that either that property is an ontological part or a constituent of that object. Given this the immanence of properties falls under the application of the Concreteness Principle of Constituent Ontologies.

The Concreteness Principle of Constituent Ontologies (CPCO): A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

Under CPCO a property can only be construed as an ontological part or a constituent of an object *iff* it is the case that the property has either some non-derivative location, as tropes are taken to have, or has some

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[66] Under an eternalist view of time where there is no privileging of the present or the past this does not pose the problem that property universals that have not yet been instantiated do not exist. Under eternalism, existence is taken to range across all times.

derivative location, as immanent universals are taken to have. The entities under consideration cannot include those entities typically described as abstract, where abstract is taken to imply a non-locational form of existence. Non-located entities, such as uninstantiated universals, numbers, sets or propositions cannot be ontological parts or constituents of objects. This does not mean that a relational ontologist cannot endorse a version of PCI. It could be the case that the relationist asserts that objects instantiate property universals by standing in the appropriate *sui generis* relation to those objects, such that, as a matter of necessity every universal is in fact instantiated. As Loux **(2017, 14)** points out relational theories that endorse unrestricted self -predication or self- instantiation of universals would happily endorse some version of PCI. Given this the distinction between constituent and relational ontologies cannot alone be picked out by whether a theory of properties endorses some version of PCI or not. However, constituent ontologies do have the advantage in endorsing PCI in virtue of conceiving properties to be ontological parts or constituents of the objects that instantiate them. CPCO requires the truth of PCI in a non-arbitrary manner, since no non-locational entities can be ontological parts or constituents. Given this CPCO cannot allow uninstantiated properties to feature amongst an object's ontological parts or constituents. In contrast, when endorsed under a relational ontology PCI has the hint of being the result of mere stipulation. There is no equivalently tight way in which a property conceived of as an unlocated abstract entity should necessarily have instances which themselves may exist in the world as located objects.

Let's examine exactly why it is the case that PCI is endorsed by the constituent ontologist in a non-arbitrary, non stipulatory manner. PCI

states that for any property that gives character to objects it must be the case that that there is at least one object which is an instance of that property. As we have seen, the constituent approach to the Problem of Character (PC) should endorse something like the CPCO. This principle mandates that for a property to be an ontological part or a constituent it must be the case that the property has some form of location, either derivatively in the manner that immanent universals do **(Armstrong 1978a; 1989; 1997)** or non-derivatively in the manner that tropes do **(Campbell 1981; 1990, Williams 1953, 1986)**. In section 2.4.2 I argued that no abstract entities can have spatiotemporal location. There I specifically argued against Lewis **(1986a, 83)**. He argues that a class nominalist treatment of properties allows for properties to have spatiotemporal location, where properties are understood as classes or sets of objects. Following my line of argument in section 2.4.2 what goes for properties taken as sets, goes for properties taken as transcendent universals. If it is the case that properties are transcendent universals, then properties could exist without having instances. There could be uninstantiated universals. However, if this is the case then there is no conceivable sense in which such universals could be taken to have location. Given, this transcendent universal cannot fall within the scope of CPCO since it is possible for a transcendent universal to have no instances whatsoever and therefore exist in totally non-located manner. CPCO mandates that for a property to be taken as an ontological part or constituent that property must have instances; instances that are located. More specifically, a property must have instances by being an ontological part or constituent of those entities that can be categorized as material objects, that is to say objects occupying some location. It should be

clear that advocates of principles like CPCO should therefore endorse at least a more general version of PCI, such as:

Principle of Instantiation (PI): For any property, *P*, there exists some object *x* that is an instance of *P*.

However, given the constraints of the Problem of Character (PC) we need to restrict the more general PI to cover only those properties that are capable of giving objects their character. This then makes it the case that for any character giving property, *P*, there exists some object *x* that is an instance of *P*. Not all properties are capable of imbuing objects with character, there is an elite set of properties that are capable of this. This leads us swiftly onto the next section where I will argue that if you use a constituent ontology to answer PC then you have to restrict the properties that you think can be ontological parts or constituents to only the sparse, natural properties.

2.6 Naturalness

Under the constraints of CPCO, that a property can only be construed as an ontological part or a constituent of an object *iff* it has either non-derivative location(tropes) or has derivative location(s) (universals), only an elite set of properties will be capable of being ontological parts or constituents of objects. Only properties that can have location, those that feature in the world of material objects, can be construed as ontological parts or constituents. Eliteness or sparseness of properties is therefore built into the constituent view. Only a privileged set of properties will be permitted to feature amongst those properties that are taken to be ontological parts or

constituents. To understand this, two questions need to be addressed. Firstly, are all properties capable of being character giving? Secondly, which character giving properties are capable of being ontological parts or constituents? Perhaps a better way to put this second question is rather, do all predicates refer to properties capable of being ontological parts or constituents. To do this let's consider two examples of properties and ask both questions of these two cases: in the case of logically gerrymandered properties and in the case of structural properties like *being methane*.

2.6.1 Logically gerrymandered properties

The predicate 'grue' **(Goodman 1955, 73-75)** applies to all things examined before some time *t* just in case they are green but to other things observed at or just after *t* just in case they are blue. Given this we can say that some *x* is grue if *x* is examined before *t* and is green or *x* is not examined and is blue. Lewis **(1983, 1986a, 59-61)** takes grue to be a property since properties are sets. To have the property of *grueness* is simply to be a member of the set of objects that are green if examined before *t* but blue if not examined. We saw previously[67] that no set theoretic account of properties can be taken as a version of constituent ontology since sets of objects cannot be parts of objects. Putting that to one side let us nevertheless grant that *grue* is a property. *Grue* is certainly an example of what Lewis **(1983)** calls an abundant property. He states for any set or class of objects, however logically gerrymandered, miscellaneous and indiscernible linguistically or

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[67] See section 2.4.2 where I argue that abstract entities like sets or sets do not have location.

conceptually, that set is still a property. So long as a set is a set of objects, that set is a property. Any well-formed predicate, like 'grue', can be associated with some set of entities that satisfy that predicate. So long as a predicate has been given well set out and logically consistent rules for its assignment to objects there will be a corresponding property to which that predicate refers. Properties are therefore highly abundant since for any set of objects referred to by a well-formed predicate, there will be a property. Any two objects share infinitely many properties whether those two objects are perfect duplicates of eachother or completely different. **(1983, 346)** If properties are in fact so abundant then they are cannot capture facts of resemblance at all. The Problem of Resemblance (PR) mandates that for any theory of properties, that the facts of resemblance are accounted for[68].

The Problem of Resemblance (PR): Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.

But if all properties are abundant then it seems we have no way to answer PR since abundant properties in no way can account for the fact that both *x* and *y* can resemble eachother in virtue of being *F*[69], since *x* and *y* could be totally qualitatively distinct objects united only by their mutual membership in a set that gives some miscellaneously disjunctive property. The vast majority of abundant properties,

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[68] See section 1.2

[69] Lewis **(1983, 346; 1986a, 59-61)** also argues that properties taken as abundant will do nothing to capture the causal powers of objects. Almost all properties, when taken as abundant , are causally irrelevant, with nothing discriminating causally relevant properties from non-causally relevant properties.

notably the gruesomely gerrymandered and miscellaneously disjunctive properties will also show that the answer to the first question whether all properties are capable of being character giving will be no. Such abundant properties cannot be character giving. Consider the property *grue*. In what sense can *grue* be taken to be character giving? Remember that you can say of any object x that it is *grue iff x* is examined before *t* and is *green* or *x* is not examined and is *blue*. Remember that properties are *kath hauto* sources of character, properties give objects the character that they have only in virtue of having character in a non-derivative way. To be character giving, properties must have *kath hauto* character. But *grue* cannot have *kath hauto* character since it is derived from two other properties, *green* and *blue*, as well as a time ordered relation between those two properties. Remember that properties give character to the objects that instantiate them only by being themselves entities with an underived character, they have the character they do simply in virtue of themselves, either categorically or dispositional[70]. *Grue* therefore cannot be a character giving property since it cannot have a *kath hauto* character of its own, being itself a derived, logically gerrymandered property. And what goes for *gruesome properties* goes for the all miscellaneously disjunctive properties like *being the number 5 or being a dog.* The highly abundant, logically gerrymandered properties can play no role in answering,

 The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

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[70] See section 1.3.4 for discussion on whether one should understand *kath hauto* character in a categorical sense or in a dispositional sense.

Using such properties as character givers cannot answer PC because there is nothing about any particular object in virtue of which it is either *grue* or has a miscellaneously disjunctive property like *being the number 5 or being a dog*. Regarding the constituent ontology specifically such abundant properties can play no role in answering PC, under the framework of a constituent ontology, since under a such a framework the entities that give objects their character are discrete units of *kath hauto* character taken as ontological parts or constituents of objects. It should be clear that the use of abundant properties will not assist in an answer to PC. However, for the sake of exploration let's consider the second question, accepting that such properties may be character giving[71]. The second question asked which character giving properties are capable of being ontological parts or constituents? Can such abundant properties be taken as ontological parts or constituents? The immediate answer is no, abundant properties cannot be ontological parts or constituents of objects. Consider CPCO,

(CPCO)The Concreteness Principle of Constituent Ontologies: A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

Under this principle only those properties capable of having location can be taken as ontological parts or constituents of objects. Consider some object *x* said be an instance of *grue.* To be an instance of *grue* it

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[71] Strictly speaking logically gerrymandered properties can play a role in answering the following: Consider some object *x* with property *F* and ask of it: What is it about this object *x* in virtue of which it is *F*? The relational ontologist can answer this question by citing some non-mereological or non-constituent relation obtaining between *x* and *F*, where *F* is some logically gerrymandered property like *grue*. This option is just not open to the constituent ontologist for reasons we are about to see.

must be the case that *x* when examined before time *t* is *green* but if not examined *x* is *blue*. We can then ask, how do we locate, at some location or locations, that property that makes it the case that if *x* is examined before *t*, *x* is *green* but if not examined then *x* is *blue*. Perhaps the first part of this predicate ' x is examined before t then x is green' can be given some location. Just locate all the instance of *x* being green before *t*, and you have locations for the referent of that predicate. But what of the ' if not examined then *x* is blue'. This is a very interesting predicate because it seems to come in the form of a conditional where if the object is not examined then the object is *blue*. But how do we locate the referent of this predicate in cases where *x* is examined. What about possible worlds where it is always the case that *x* is examined before *t* and is *green*. At worlds like this there are no instances of *being not examined and blue*. So take the predicate now as a whole 'if *x* is examined before *t x* is green but if not examined then *x* is blue' and ask to what property does it refer. The property of *being green if examined before t but blue if not examined* seems to be the right one to pick out but given its conditional nature there will be some worlds where the property as a whole has no instances. In such worlds the property as a whole will have no location, at best it will be partially located and partially unlocated. Given this, *grue* cannot be taken as an ontological part or constituent of *x*. Abundant, gruesomely gerrymandered properties therefore fall outside of the remit of constituent ontologies.

The case is more difficult for miscellaneously disjunctive properties like *being the number 5 or being a dog.* This example gives a property, *being the number 5,* in the first part of the disjunct that cannot be taken to have location. Given this consider the disjunctive property of *being*

a lump of clay or being a statue. In this case both of the disjuncts clearly can have location given that at any location where there is either a lump of clay or a statue, the properties of *being a lump of clay* and *being a statue* will be instantiated. But in what conceivable sense could the disjunctive property *being a lump of clay or being a statue* be taken to be a part or constituent of either some particular lump of clay or some statue. To make sense of this consider Fine's **(1999, 2008)** attempt to address how to ground the difference between objects composed of exactly the same ordinary spatiotemporal parts. Famously he does this by taking the form objects have to constitute an additional part. This then allows for the differentiation of seemingly distinct objects that share exactly the spatiotemporal parts. Fine's hylomorphic[72] account, although answering a different question to PC, nonetheless offers some resources to understanding how objects might relate to their properties. This is obvious since clearly the form some object may take is typically predicated of that object, *x being a lump of clay* and *y being a statue.* We can therefore understand forms as being properties taken to be instantiated by different objects. For instance, although x and y are composed of exactly the same ordinary material parts, x instantiates *being a lump of clay* while y instantiates *being a statue*. What differentiates x and y is the having of different forms that Fine **(1999, 2008)** takes to be additional parts of x and y. The distinction between the materially coincident objects, the lump of clay and the statue, is accounted for by distinctions in form. The two materially coincident objects share all of their spatiotemporal parts in common but differ in form. These distinct forms are taken as parts in addition to the ordinary spatiotemporal parts. We can therefore say that while the

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[72] Kathryn Koslicki **(2008)** is another notable advocate of this position.

lump of clay and the statue share exactly the same spatiotemporal parts, they differ in terms of their form parts.

While I grant it is quite conceivable to think of properties as forms where forms are taken as some kind of ontological parts it does not seems possible to think of any particular object taking the form of *being a lump of clay or a statue*[73]. Objects can either take the form of *being a lump of clay* or *being a statue* where the disjunct is understood to properly distinguish the application of the predicates 'being a lump of clay' and 'being a statue' to distinct objects. There can be no ordinary material object that has the form of *being a lump of clay or being a statue*. While it is right that the predicate 'being a lump of clay or a statue' may be truthfully asserted of any object so long as it is either a lump of clay or a statue and also that any object may take either form, it is wrong to think that any object can take the form of *being a lump of clay or a statue.* Just because our predicates are well formed does not entail that they are all equal in their application to objects. We can truthfully assert the predicate 'being a lump of clay or a statue' of objects but unlike either one of the disjuncts we cannot take this as the truthful application of some form to those objects. The lesson to be taken from this is that while disjunctive properties may have location in a sense, via their disjuncts, this does mean that we can take disjunctive properties as being ontological parts or constituents. The case is clearly worse for miscellaneously disjunctive properties, particularly those that cite a disjunct that is unlikely to have location such as in the case of like *being the number 5 or being a dog.* The logically gerrymandered properties, that are infinitely abundant, clearly cannot fall within the

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[73] Although it could perhaps have the conjunctive form of *being a lump of clay and a statue.*

range of properties that a constituent ontology would want to utilise in their answer to the Problem of Character. This should be clear since there is no conceivable sense that such objects can be taken as ontological parts or constituents.

2.6.2 Structural Properties

The properties referred to in the chemical sciences offer an interesting intermediate between those properties we can say are not fundamental and those that can be taken as fundamental simple properties. The properties of chemistry are typically taken to be complex, structural properties. To say of some object x that it instantiates a structural property F is to assert that x is made up of various ordinary parts y and z where y instantiates property G while z instantiates property H and a certain relation R obtains between y and z. To instantiate F is therefore to have a certain structure. The most commonly cited example in the literature is the property of *being methane*. An object can be said to be an instance of methane *iff* it is divisible into five spatial parts c, h_1, h_2, h_3, h_4 such that c is an instance of carbon, each h is an instance of hydrogen and each pair c-h is an instance of the appropriate sort of chemical bond R. **(Lewis 1986c, 27)**.To be an instance of methane is for an object to have a certain structure. Lewis **(1986c)** and Armstrong **(1986c, 85-88)** disagree whether there can be structural properties[74]. Lewis asserts that there are no structural properties while Armstrong argues that there can be structural properties. Whether this answer is given in the negative or

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[74] Lewis **(1986c)** and Armstrong **(1986)** speak of structural universals not properties. However, in the context of this discussion in terms of constituency, what applies to universals applies to properties.

in the affirmative it should still be considered that if there are such structural properties are any such properties capable of being character giving? And if so, are they capable of being ontological parts or constituents? Given this I will not discuss here whether there are such properties, preferring to grant for the sake of argument that there are to explore the ground.

The answer to both is less than clear. In the former question we are asked whether such properties are capable of being character giving to the objects that instantiate them. *Prima facie* the temptation is to answer resoundingly in the affirmative. Consider an instance of methane. It is the having of this complex structural property that allows us to distinguish any instance of methane from any instances of similarly structured but distinct molecules. It is this structural character that picks out what it is to be methane. However, what muddies the water here is if properties are *kath hauto* sources of character then properties give objects the character that they have only in virtue of having character in a non-derivative way. To be character giving, properties must therefore have *kath hauto* character. Now given that structural properties like *being methane* are complexes of more simple properties it now seems problematic since *being methane* has a character derivative from its simpler components and how those components relate one to the other. It seems difficult to account for how the property *being methane* could have a *kath hauto* source of character.

Those constituent ontologists who want to endorse structural properties may have a response. The *kath hauto* character of structural properties like *being methane* is an example of an emergent property **(Humphreys 1997a, 1997b; Wilson 2013, 2015)**, a character that

depends for its existence on a certain arrangement of simpler properties but is not derivative from those simpler properties. That is to say a novel and unique *kath hauto* character emerges from the structure of the components of *being methane.* This character depends for its existence on that structure, but this novel and unique character will emerge only if that certain structure obtains. While I remain neutral on this, I think the possibility of structural properties being character giving should push us to the second question. Can structural properties be ontological parts? To this the answer is more clear, structural properties can certainly feature as ontological parts so long as the structural property in question can be said to have some form of location. So long as the properties that make up a structural property can have location then a structural property can have location and function as an ontological part or constituent. In the case of the structural property *being methane,* all of the components of the structure are located properties, hence *being methane* can be located. Given this *being methane* can be an ontological part or constituent of objects.

2.6.3 Graded Fundamental Natural properties

From the two examples above, the logically gerrymandered properties and structural properties such as *being methane* we can see that gruesome properties and miscellaneously disjunctive properties are clearly not capable of either imbuing the objects that instantiate them with a character or featuring amongst an object's ontological parts or constituents. However, for structural properties, such as *being methane* , it seems more plausible that they may be included amongst those

properties which can be included within the auspices of a constituent ontology. There is some sense in the notion that structural properties could feature as ontological parts or constituents. Any set of objects that share the property of *being methane* can also be said to objectively resemble. The having of this property allows us to say of any two objects , any two molecules of methane, that those two molecules objectively resemble eachother more than either resembles some molecule of another compound. Any set of instances of methane are not miscellaneous in the way that the set of instances of *being the number 5 or being a dog* is. The set of objects taken as instantiating *being methane* is more unified under criteria of sufficiently resembling each other and accounting for the causal dispositions those objects have. We can say with a far greater degree of certainty that the set of instances of *being methane* contains objects that have the same character, while the set of instances of *being the number 5 or being a dog* contains a far greater probability of containing objects that do not have the same character.

Lewis **(1986a, 61)** famously argues that the distinction between properties, the distinction between the abundant and the natural properties, is one of degree. Lewis understand this as a graded relation where only a very elite set of properties, those had for instance by the fundamental entities postulated in physics, can be said to be perfectly natural. Other properties can be said to be natural so long as the chains of derivation from the perfectly natural properties are not too complex. For instance, we can say that *being methane* is still a natural property but one that is less natural than *having unit negative charge*. B*eing methane* is a structural property of *being carbon and having four hydrogen atoms bonded in a certain way,* while *having unit negative charge*

is more natural since it does not, putatively, seem to have so much structure. *Having unit negative charge* seems to be a more simple property.

For Lewis the perfectly natural properties are those properties taken to be instantiated by the objects that the most fundamental parts of physics quantify over in theories. As Lewis **(1984,228)** states in *Putnam's Paradox*,

"To a physicalist like myself, the most plausible inegalitarianism seems to be the one that give a special elite status to the 'fundamental physical properties': mass, charge, quark colour and flavour,... (It is up to physics to discover these properties, and name them; physicalists will think that present-day physics at least comes close to providing a correct and complete list.) But these elite properties don't seem to be the ones we want. Only in recent times have we had words for some very eligible referents because the correct interpretations of our language were the ones that did the best on balance, not the ones that did best at best. Indeed, physics discovers which things and classes are the most elite of all; but others are elite also, though to a lesser degree. The less elite are so because they are connected to the most elite by chains of definability. Long chains, by the time we reach the moderately elite classes of cats and pencils and puddles; but the chains required to reach the utterly ineligible would be far longer still".

Lewis' **(1983, 1984, 1986a)** view can be aptly called the Graded Fundamental view of Naturalness. Under this view the perfectly natural properties constitute metaphysical bedrock – all other properties are in some sense ontologically dependent[75] on the elite and

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[75] For the purposes of this chapter, to show that the naturalness of properties is a necessary condition of understanding the framework of constituent ontologies, I do not have the space to go over problems with quite what is meant by dependence in this sense. Lewis is clear that this should be understood in terms of definability, with all other properties being defined from the elite set of perfectly natural properties. This does seem to turn the sense of dependence into an overly semantic notion. For further discussion see Hirsch **(1993)** and Mellor and Oliver **(1997, 24-29)**. What we want is something more metaphysically robust. Supervenience may do the job but runs into a number of issues related to the ontological status of the supervening properties, as Armstrong **(1997, 45)** points out the supervening properties are not properties to be counted as additional to the subvenient properties. Another problem arises from the fact that supervenience is a symmetrical relation and therefore does not capture adequately the notion of a less

sparsely numbered set of perfectly natural properties. Like Armstrong **(1978a, 1978b, 1983, 1997a),** Lewis thinks that it is physics that discovers which objects, classes and properties are in fact at this metaphysical bedrock. Physics therefore is the endeavour to give a comprehensive inventory **(Lewis 1984, 356-357)** of those properties that at least approximate to something like being perfectly natural. If physics were completely successful, then it would give us a full inventory of the perfectly natural properties. This would allow us to say of any two particular objects that if those objects are described as having exactly the same perfectly natural properties, that the predicates referring to those perfectly natural properties derived from our successful physical theory apply truthfully to those two objects, then those two objects are exact duplicates of one another. Those two objects will be qualitatively indiscernible from one another. Given that all properties are dependent on these perfectly natural properties it will follow that if these two objects have exactly the same set of perfectly natural properties then these two objects will also share all of the same less than perfectly natural properties. To highlight this in terms of the natural sciences, given that the less than perfectly natural properties depend on the perfectly natural properties, the natural properties predicated of objects in the chemical sciences will be derivable from the more natural properties of physics. There is therefore a graded hierarchy of the sciences, with fundamental physics

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fundamental property's dependence for its existence on a more fundamental property. See Kim **(1978, 1990)** for an outline of the relation of supervenience. The notion of metaphysical grounding may offer a more promising account of the dependence relation since grounding is asymmetric thereby explaining why the perfectly natural properties constitute the metaphysical bedrock from which all other properties depend. Grounding may offer a good metaphysical substitute for Lewis' more linguistic notion of dependence as definability since properties will be more or less natural depending on how long the chains of grounding are from the property under analyse to the perfectly natural fundamental properties. See Fine **(2001)** and Schaffer **(2009b)** for the original expositions of metaphysical grounding.

giving us the metaphysical bedrock and all of the other sciences working off physics. The properties of objects predicated in the biological sciences depend on those in chemistry; and so we go all the way down to the perfectly natural properties of fundamental physics, with the inventory of predicates getting ever more, sparse as we go down.

2.6.4 Non- Graded Scientific Natural Properties

Jonathan Schaffer **(2004)** takes a different stance on the size of the inventory of predicates that refer to sparse, natural properties. For Schaffer it is not only physics that can supply us with the inventory of natural properties, rather it is total science. The sparse natural properties are to be drawn not only from fundamental physics but from all levels of nature **(2004,93).** All properties referred to throughout the sciences are therefore ontologically on a par, there is no grading of more or less natural properties. In line with Schaffer I will refer to this view as the Non-Graded Scientific View of Natural[76] Properties. The main argument for Schaffer's position is that the main roles that natural properties should play are better performed by a non-graded scientific view.

Resemblance: natural properties ground objective resemblance

Causality: natural properties pick out causal powers;

Minimality: natural properties serve as the minimal ontological base

On Schaffer's Non-Graded Scientific view if we take the properties of total science to all be natural properties then most of those properties

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[76] Schaffer **(2004)** refers to sparseness as opposed to naturalness of properties; however, sparseness and naturalness can be interchanged *mutatis mutandis* for present purposes.

will perform the *resemblance* and *causality* roles **(2004,94)** ; the properties referred to in fundamental physics will only be able to serve the *minimality* role of providing a minimal ontological base for supervenience or some other dependence relation **(2004, 95)**. On *resemblance* Schaffer takes this view since he thinks that properties in less fundamental science are in fact better suited to the role of grounding the objective resemblance between pairs of objects ; for instance between two creature whom believe that *p* ,two neurons , or two atoms of oxygen , or two protons. The sharing of scientific properties grounds the objective resemblance. Psychological, neurological, chemical and subatomic properties can perform this role. However, in the case of fundamental properties Schaffer takes it that discussions on multiple realizability have shown that pairs may be utterly dissimilar at the fundamental level and but alike at some other level. For instance, in cases where two creatures believe that *p* but one is a carbon based lifeform and the other is a silicon based lifeform. Schaffer therefore denies Lewis' view that all properties are dependent on the perfectly natural properties of fundamental physics. Because of the multiple realizability of some natural properties it is false that if these two objects have exactly the same set of perfectly natural properties then these two objects will also share all of the same less than perfectly natural properties.

On *causality* Schaffer takes it that since properties from all levels of the sciences feature in scientific laws , laws which codify the particular causal powers that objects may or may not have, we should take properties from all levels of nature studied in the empirical sciences to be well suited to carve out and explain the causal powers of macroscopic objects **(2004, 95)**. Schaffer argues that the fundamental

properties are ill suited to this role. For instance, at the level of neurological objects *being a synapse* means any object that is an instance of this property has the power to transmit a pulse from one neuron to another. Neurological objects have properties that objects at a more basic level, say at the chemical or subatomic level, do not. Objects like sub-atomic particles, do not have the properties of objects at the neurological level.

The point in highlighting this difference in these two conceptions of natural properties is not to endorse either. Rather it is to show that the constituent view is capable of being consistent with both. The caveat for the non-graded Scientific view is that so long as structural properties can be allowed as ontological parts then they can feature as properties in a constituent ontology. This is because at most levels of science, at the psychological, neurological, chemical level and even the subatomic level, the predicates of those sciences will refer to complex structural properties. So long as those properties fall within CPCO they can be considered. This places a limit on just what properties from the less basic sciences may be included, the limitation being that only those scientific properties that can be ontological parts of objects under CPCO may be taken as being amongst the natural properties. There will be reasons why advocates of a constituent ontology may decide to choose between the Graded Fundamental View and the Non-Graded Scientific view of Naturalness. Those in favour of the graded view may want to assert that this offers the simplest and most elegant view of which properties count as the genuine ontological parts or constituents of objects. This can be done so long as an answer is given to the charge that the bedrock fundamental properties may be ill-suited to playing the *resemblance* and *causality* role. With such

answers given, it is clear that difficulties around including structural properties as ontological parts need not then be accounted for since only perfectly natural properties are those non- complex properties at ontological bedrock. Those in favour of a non-graded but scientific view can bite the bullet and accept less simplicity and elegance but can attempt to win the day in terms of greater theoretical utility by having more ontological resources from which to build. For them there is no ontological free lunch.

2.7 Recap and summary

Given these central features of the constituent approach to the Problem of Character we can begin to understand some of the rules of the game that the constituent ontologist will utilise in their account of how properties relate to objects. Those central features were realism, concreteness, immanence and naturalness. In section 2.3 on realism it was seen as necessary that any constituent ontology accepts that properties are an irreducible category of entity in the world that is not reducible to the category of object. Section 2.4 outlined that constituent ontologies place a premium on the notion that properties are concrete entities, that is to say that all constituent ontologies need to conceive of properties as being located for those properties to be ontological parts or constituents. Section 2.5 showed why it is the case that constituent ontologies conceive of properties as immanent and not transcendent , abstract entities and finally section 2.6 outlined why it is the case that the properties taken to be ontological parts or constituents cannot be abundant properties and should take properties to be only the natural properties referred to in the natural

sciences. These central features allow for clarity on the basics of what the constituent ontology amounts to as an approach to how properties and objects are related. With this in place we are in a position to understand what it is we want to defend in the first place. From there I will be able to move on to giving the variant of the constituent ontology that I take to be the best, namely the mereological bundle theory[77].

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[77] This is argued for in depth in chapter 5.

Chapter 3: In Defence of the Constituent Ontology

3.1 Introduction: A maligned approach

Constituent ontologies have often been received in the past century of analytic philosophy with a great deal of scepticism. When put forward as an approach to the metaphysics of properties it faces a two very general forms of attack namely 1) that it has an inbuilt tendency to hark back to medieval scholasticism and 2) that the constituent ontology , with its focus on the role of properties as constituting objects, deviates from the Quinian methodology of focusing explicitly on existence questions. Rather, the constituent approach is concerned with more esoteric questions regarding the nature of objects. The focus is less on what there is and more about what things are. The first charge is explicitly and most vitriolically stated with Ladyman and Ross **(2007)** who label such approaches to metaphysics as 'neo-scholastic metaphysics'. Their attack is levelled against analytic metaphysics as a whole. However, given that the constituent ontology is a paradigmatic example of analytic metaphysics the attack falls squarely upon it. With an explicit focus on immanent properties, resemblance and the character of objects constituent ontologies are accused of expressing the worst excesses of analytic metaphysic.

The central claim of Ladyman and Ross' charge is that if metaphysics is not supported by current physics then it has no value. They take it

that central debates in analytic metaphysics, including debates over what properties are and what the composition relation amounts to, are without value in so far as they do not prioritize current physics and put *a priori* armchair intuitions about the nature of reality over scientific discoveries.

"The result has been the rise of dominance of projects in analytic metaphysics that have almost nothing to do with (actual) science. Hence there are now, once again, esoteric debates about substance, universals, identity, time, properties, and so on, which make little or no reference to science, and worse, which seem to presuppose that science must be irrelevant to their resolution. They are based on prioritizing armchair intuitions about the nature of the universe over scientific discoveries. Attaching epistemic significance to metaphysical intuitions is anti-naturalist for two reasons. First, it requires ignoring the fact that science, especially physics, has shown us that the universe is very strange to our inherited conception of what it is like. Second, it requires ignoring central implications of evolutionary theory, and of the cognitive and behavioural sciences, concerning the nature of our minds". **(Ladyman and Ross 2007, 10)**

Ladyman and Ross then go on to list **(2007, 17-27)** contemporary analytic philosophers engaged in this sort of quasi- scientific metaphysics: Lewis, Armstrong, van Inwagen, Paul, Sider, Lowe, Merricks, Kim and Jackson are all mentioned. Any respect shown to fundamental physics is taken by Ladyman and Ross to be little more than pretence, such that Lewis and Armstrong's gestures at an empirically informed metaphysics that takes physics to give the inventory of fundamental properties are nothing but mere gestures to the pre-eminence of science. Hence topping off their list of apparently lost souls is David Armstrong,

"Finally, we exhibit David Armstrong defining metaphysical naturalism as the doctrine that everything that exists is in space and time, despite the fact that contemporary physics takes very seriously the idea that spacetime itself is emergent from some more fundamental structure. Metaphysical

naturalism of all things. Note that all of these examples are, aside from ignoring science, models of professional philosophy, being clearly written, carefully argued, and responsive to the objections of those with opposing views. They are all centrally placed in the literature. Mainstream contemporary analytic metaphysics has, like the nineteenth century metaphysics against which Russell revolted, become almost entirely a priori. Metaphysics informed by real physics is much less common". **(2007, 23-24)**

However, to show that analytic metaphysics has no value Ladyman and Ross need to show that metaphysics is completely worthless as an intellectual pursuit. While it probably should be conceded that an intuition is not itself very trustworthy it does not follow from this that armchair reasoning is completely worthless. The role of intuitions in cognition is a very controversial subject. However, if we shift the focus to *a priori* reasoning in general the strength of their case against metaphysics becomes less clear. Lowe **(1998, 1-28)** suggests that metaphysics studies the realm of metaphysical possibility, that is to say the space of the possible fundamental structure of reality. The natural sciences role is to indicate whether such fundamental structures obtain in actuality[78]. Ladyman and Ross **(2007, 16-17)** are alive to this where they state,

"We differ from Lowe on how this task is to be accomplished, because we deny that a priori inquiry can reveal what is metaphysically possible. Philosophers have often regarded as impossible states of affairs that science has come to entertain. For example, metaphysicians confidently pronounced that non-Euclidean geometry is impossible as a model of physical space, that it is impossible that there not be deterministic causation, that non-absolute time is impossible, and so on. Physicists learned to be comfortable with each of these ideas, along with others that confounded the expectations of common sense profoundly".

It seems from this that Ladyman and Ross are under the impression that for metaphysics to succeed our epistemic access to metaphysical

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[78] In section 5.4 I return to these issues.

possibility- to the total space of metaphysical possibility- must be infallible. As Tahko **(2012, 35)** points out this is a very uncharitable interpretation of what Lowe is trying to assert; in fact, it is a straw man. Why is it a prerequisite of metaphysics that it must strive for infallibility? To this Ladyman and Ross offer no justification of why it is a prerequisite; like in all difficult and complex intellectual tasks, metaphysicians are prone to making mistakes. The existence of mistakes does not imply in any way that the discipline and its methodology in totality are worthless. Tahko **(2012, 35-36)** indicates further that if we really want to investigate the history of scientific discovery it was not empirical inquiry that revealed the possibility of non-Euclidean geometry but rather *a priori* mathematical inquiry. It was Gauss, Lobachevski and Riemann that developed alternative geometries which replaced the parallel postulate of Euclidean geometry with an alternative axiom. When Kant asserted that Euclidean geometry exhausted the space of geometrical possibility, he made a mistake, not a mistake due to an inherent flaw in all *a priori* reasoning but simply a mistake in virtue of his failing to grasp the full set of geometrical possibilities. The lesson to be taken is not that the *a priori* method is of no value in metaphysics, just that like science it is revisable and prone to error.

The second charge against constituent ontologies comes from within analytic metaphysics itself. Here the general concern is that the focus on the role of properties in the constitution of objects focuses more on the esoteric question of the what the nature of things at a fundamental level amount to. Consider the following from Thomas Hofweber **(2009, 273)**

"Esoteric metaphysics appeals to those, I conjecture, who deep down hold that philosophy is the queen of the sciences after all, since it investigates what the world is REALLY like. The sciences only find out what the world is like, but what philosophy finds out is more revealing of reality and what it is REALLY like."

Hofweber **(2009, 266)** conceives of two forms metaphysics may take. Firstly, Egalitarian or Existence metaphysics proceeds with no need to have access and understanding of any special language of metaphysics. This is the usual Quinian approach. It can proceed in ordinary, everyday terms accessible to all. Egalitarian metaphysics has an easy time stating its questions and thus its domain of discourse. The following are typical questions of Egalitarian or existence metaphysics: Are there numbers? Is change possible? What are the most general features of everything? Secondly, Esoteric or Reality metaphysics holds that the questions of metaphysics must involve a distinctly metaphysical language **(2009, 267)**, what some have come to call 'Ontologese' **(Korman 2015)**. The result is that within the domain of esoteric metaphysical discourse it is easy to say why such questions are within the domain of that discourse and not some other discourse, but it does nothing to clarify what metaphysics is about external to that discourse. Such a conception of metaphysics is esoteric since to understand the discourse one has to understand the distinctly metaphysical terms employed. As Hofweber **(2009, 267)** puts it *"you have to be an insider to get in the door"*. Why does constituent ontology fall under Esoteric or Reality conception of metaphysics and not the Egalitarian or Existence conception? Well consider the typical terminology employed by advocates of versions of the constituent ontology. To pick out just a few: necessarily located tropes, immanent universals, wholly present, fundamentally constituted of,

supervenient upon, inherent within, x being grounded by y[79]. Such terms require explicit familiarity with the domain of discourse to be in any way understandable. Hofweber suggests that we should stick to the more modest Existence Metaphysics and avoid falling into Esoteric Metaphysics that cannot account for what its subject matter is, external to its own domain of discourse.

Tahko **(2012, 30)** again offers a defence. If existence questions alone are considered to be the total subject area of metaphysics then much of metaphysics will become not only concerned with trivial questions but questions that are already addressed by the special sciences, such as mathematics considering whether there are numbers and physics in considering existence questions concerning unobservable physical objects. For Tahko metaphysical questions must include questions not only of the form 'are there any such things as x?' but also 'if there are such things as x what is the nature of things such as x?'. Questions about the nature of objects are legitimate questions; they are questions about what such entities are and what categories of things such entities fall under. If this requires a special language of metaphysics to undertake this task, then so be it.

I only gloss over these two prior issues and gesture at possible answers because the focus of this chapter will be on more specific issues with the constituent approach. There is probably a sizable project in the history of 20th century philosophy that should consider the reasons for why many philosophers view constituent ontologies with a relatively negative initial lens. Unfortunately, the scope of this thesis does not allow me to consider the full historical background, but it is certainly

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[79] This same concern is seen in van Inwagen's **(2015, 54)** incomprehension at the language of the constituent ontology.

one worth considering as the burgeoning field of the recent history of philosophy grows. It is only with the work of David Armstrong **(1978, 1989a, 1997a)**, David Lewis **(1983,1986a)** and the cabal of trope theorists such as Williams **(1953, 1966, 1986),** Campbell **(1981, 1990),** Heil **(2003, 2012a)** and Ehring **(2011)** that the view that properties can be conceived of as ontological parts or non-mereological constituents began to regain traction in the later part of the 20th century and into this century. It seems to be only with the advent of the neo-Aristotelian approach[80] to analytic metaphysics that general problems for the constituent ontology are now being articulated with more precision. The likely reasons for this are that as a more non- Humean conceptions of laws of nature and dispositions are articulated so a more robustly realist metaphysics of properties is required. Once this is in place so a greater understanding of how objects relate to their properties will need to be articulated since the properties objects have must feature in any account of laws of nature or dispositions.

The charges against the constituent ontology take three general forms: i) reasons to think the view is false, ii) incomprehensibility and iii) an example of properties that the constituent approach finds difficult to handle. I deal with the problems in what I take to be an ascending order of difficulty, taking the last problem to be the most severe and difficult to deal with. The first form of charges against the constituent ontology typically take the form of a *reducio*. I will consider two versions of this, first put forward recently by Eric Olsen **(2017, 62-79),** in section 3.2 and 3.3. I will show that both of these arguments against the constituent ontology can be rejected and that the overall view of

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[80] Notable advocates of an explicitly neo-Aristotelian approach include Fine **(1992, 1994,1999)** , Koslicki **(2008)**, Tahko **(2012)**.

the constituent ontology is not false on either. The second charge of incomprehensibility, which I consider in section 3.4, is probably the most common charge and grounds the view that the constituent ontology is an ill motivated approach to a metaphysics of properties. It takes the form of an accusation that constituent ontologies employ terms and concepts that are unintelligible or confused **(van Inwagen 2011, 389- 405)**. The implication of this charge is that the constituent approach is an ontological framework that should not even get off the ground. It has typically taken the form of a charge against specific versions of the constituent ontology, but I will attempt to formulate the charge in as general terms as possible. In addition, it is quite difficult to identify quite what the charge takes to be incomprehensible about conceiving of properties as ontological parts or constituents of objects. Given this I will attempt to offer as precise an articulation of the charge as possible, going on to show that the charge of incomprehensibility does not hit the mark. Finally, in section 3.5 I consider an example of properties which I view as genuinely problematic for any constituent approach to the metaphysics of properties. This is the problem of accounting for quantities and those properties taken to be quantitative in nature. I offer some possible solutions to this.

3.2 Substance Dualism

3.2.1 Dualism

Eric Olsen **(2017, 62-79)** has recently produced two *reducio* style arguments against constituent ontologies. The first asserts that constituent ontologies entail a version of substance dualism, the second asserts that it entails that there are impossible objects. The first *reducio* that Olsen provides is far weaker than the second for two reasons: constituent ontologies need not entail dualism and even if we grant that they do the consequence of substance dualism, although unpalatable to the physicalist, is not absurd[81]. The first *reducio* can be neatly captured in the following from Olsen **(2017,72)**,

"Consider the thing composed of all of my constituents except my physical properties: shape, size, mass, temperature, atomic structure, and so on…. According to the constituent ontology….it will lack any physical properties. It will be a wholly nonphysical or immaterial thing. Yet all of my mental properties will be constituents of it, making it…. psychologically indistinguishable from me. It will be an immaterial mind. This is not quite Cartesian dualism, as it does not imply that all thinking beings are immaterial, or that physical and mental properties are incompatible. In a way it is less mysterious than Cartesian dualism, since it allows that mental phenomena might arise out of physical ones. But in another way it's more mysterious: it implies that even if all mental phenomena have a physical basis, some of their subjects- some conscious, thinking beings- are wholly immaterial. It would mean that there are both material and immaterial human thinkers, and that for every human being there is one of each. It is an absurd amalgam of dualism and materialism".

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[81] For a contemporary version of the view that the mental is an irreducible feature of the world see Chalmers **(1996; 2009)**.

As Olsen notes this is not substance dualism in the Cartesian mould since it does not imply that thinking beings are wholly immaterial entities or that mental and physical phenomena are somehow incompatible. In addition, as he states, it does not close off the possibility that mental phenomena may somehow 'arise' out of physical phenomena. Consider that an object's properties are in fact ontological parts or constituents of that object. Consider some thinking object, call it Jane. Jane is an object with mental properties. Olsen argues that it is possible, by an act of abstraction, to consider any such object with mental properties with all of its physical properties abstracted away. Consider Jane and then subtract away all of Jane's physical properties, her shape, size, mass as well as all the microphysical properties of the microscopic spatiotemporal parts that make up Jane. This new thing will be what Olsen terms a quasi-abstract object, let's call this object $Jane_{qa}$. So Olsen's charge goes, $Jane_{qa}$ will lack all of the physical properties of Jane since $Jane_{qa}$ will not have any of the physical properties as ontological parts or constituents. Yet $Jane_{qa}$ will have all of the mental properties that Jane has as ontological parts. Jane and $Jane_{qa}$ will therefore be psychologically indistinguishable but Jane will be a material object and $Jane_{qa}$ will be a wholly nonphysical or immaterial object. The result is that for every thinking object, for each human person, there are in fact two objects: a material thinking object and an immaterial thinking object[82].

However, the constituent ontology has a readymade response. Deny that you can, simply by an act of abstraction, abstract away an object's

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[82]This result clearly parallels the conclusion of Olsen's **(1997, 2001, 2003)** Too Many Thinkers argument for animalism.

physical properties and still be left with that object's mental properties. Removal of an objects physical properties would be tantamount to removal of an object's natural properties on which the mental properties depend. In the next section let's consider why this response successfully defends the constituent ontology from the charge of a bizarre form of substance dualism.

3.2.2 The dependence of the mental on the physical

Olsen **(2017 ,72)** takes it to be possible to remove from a thinking object, not just in an act of abstraction but in reality, all of the physical properties from that thinking object and still be left with the mental properties of that thinking object. The reason for this is that properties are constituents of objects, in the sense of being parts of the ontological structure of objects. To justify this Olsen puts forward two principles of the constituent ontology **(2017, 66)**,

1) A concrete particular has a property *iff* (and because) the property is a constituent of it.
2) *x* is a constituent of *y iff x* is a part of *y* and *x* is in *y*.

Principle 1 is one that every constituent ontologist should accept, however principle 2 is much more contentious. Armstrong for instance would deny principle 2 in so far as he denies that the instantiation of a property by an object can be understood mereologically. Armstrong **(1997a 119-123)** takes it that the relation between an object and the properties it instantiates is a non-

mereological relation[83]. He would therefore deny the first part of the conjunct in principle 2 that references parthood but would accept the second where properties are taken to be 'in' the objects which instantiate them. That is to say, Armstrong denies that if x is a constituent of y then x is a part of y, but he accepts that if x is a constituent of y then x is in y. But if constituency is not ontological parthood then quite what the constitution of objects in terms of properties would be is left mysterious[84].

Consider Jane and Jane$_{qa}$. Given that Jane$_{qa}$ lacks all of the physical properties that Jane has, on principle 1 and 2, Janeqa lacks some of the ontological parts of Jane but can exist as an additional thinking object to Jane, given that Jane$_{qa}$ will still be composed of the same mental property parts as Jane. But notice an underlying assumption of Olsen's charge. Olsen assumes that under principles 1 and 2 if instantiation is understood as constituency and constituency is understood as parthood that then somehow properties can be viewed as independent one from the other. Properties in no way need to exist in any sort of dependence relation to eachother. But no constituent ontologist would accept this without some resistance. The reason for this is that constituent ontologist do not generally accept properties to exist o*n par* with eachother, some properties are privileged in so far as they play certain roles in metaphysics. In section 2.6 on Naturalness we saw that constituent ontologist have good reason to suppose that only an elite set of predicates actually refer to properties that can be taken to be ontological parts or constituents of objects. On the Graded

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[83] For more on Armstrong's view see Chapter 4 of this thesis.
[84] See section 4.2 for Armstrong's attempts to demystify non-mereological constitution. In particular see section 4.2.3.

Fundamental View of Natural Properties[85] all properties are in some sense ontologically dependent on the elite set of the of the sparsely numbered perfectly natural properties. The perfectly natural properties constitute metaphysical bedrock with fundamental physics endeavouring to give a comprehensive inventory of such properties. A perfectly complete physics would allow us to assert of any two particular objects that if those two objects are described as having exactly the same perfectly natural properties then those two objects would be exact duplicates of one another, that is to say those two objects would be qualitatively indiscernible. Given that all properties are dependent[86]on these perfectly natural properties it will follow that if these two objects have the same set of perfectly natural properties then they will also share all of the same less than perfectly natural properties.

Given this if amongst the physical properties of an object are included some perfectly natural properties then if all of the physical properties of an object are removed then some of the perfectly natural properties will be removed. As we saw Olsen asserts that it is possible for an object to be ontologically structured only of mental properties with all of its physical properties removed. Hence where we have any thinking physical object, we also have a non-physical thinking object. For Olsen if the constituent approach is true then wherever we have Jane we also

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[85] On the non- graded scientific conception of natural properties, it may be the case that so long as mental properties fulfil the roles of minimality, resemblance and/or causality. See section 2.6.4 on Non- Graded Scientific Natural properties. However, this depends on three factors. 1) That the psychological disciplines fall under the natural sciences and 2) it is an open empirical question whether any mental properties function to fulfil minimality, resemblance or causality. Finally, and most critically to a constituent ontology, whether irreducible mental properties can have some form of spatiotemporal location.

[86] Where dependence could be understood as supervenience, definability or metaphysical grounding.

have Jane$_{qa.}$ But this is false if the constituent ontologist takes a graded, fundamental view of natural properties. Since perfectly natural properties feature amongst an object's physical properties and the mental properties depend on those physical properties, it is impossible to remove all of an object's physical properties without removing its mental properties. On the graded view of naturalness, it is impossible for less natural properties like mental properties to exist independently of natural properties; mental properties exist dependently on natural properties. Given this Olsen's assumption that under principles 1 and 2 if instantiation is understood as constituency and constituency is understood as parthood that somehow properties can be views independently one from the other comes out false. Olsen **(2017,72)** anticipates an objection of this form where he asserts,

"The problem would not arise in this form if all mental properties were physical properties. But it would arise in another form: consider the thing composed of all my constituents except my nonmental properties. It will have only those of my physical properties that are also mental properties. Since mass, shape, and color will not be mental properties even if some physical properties are, it would be a massless, shapeless, colorless mind".

Under this reading mental properties depend on physical properties by a very strict metaphysical relation, namely identity. Olsen then gives the converse of an object with all of its physical properties removed, namely, a thinking object ontologically composed of all of its property parts except its nonmental properties. Since only some of a thinking object's properties are identical with its physical properties this object will only have those physical properties that are identical with its mental properties. Since Olsen thinks mass, shape, and colour properties are not mental properties it follows that any thinking object will be a massless, shapeless and colourless mind. I find this to be a strange assertion. It seems to presume a one to one correspondence of

identity between some one mental property and some one physical property[87]. This seems quite implausible since if it is the case that mental properties are identical with physical properties the best scenario for this is that a given mental property is identical to a set of physical properties. For instance, the mental property of *believing that p* will not be identical with some one physical property where that physical property is understood to be a non-complex property. Take some mental property like *believing that p*. Consider *believing that p* is in fact identical to some physical property *Gness*, perhaps where *Gness* is the property of some neurological structure of the brain. *Gness* will not be a non-complex property, in fact it will more than likely be a complex structural property[88]. Given that structural properties involve more than one single property, it follows that if *believing that p* is identical to *Gness* then *believing that p* is in fact identical to a set of physical properties which together give *Gness*. Given this how are we to exclude the possibility that mental properties will not involve properties like *mass* or *shape* that may be part of the structure of *Gness*. More troublesome, Olsen will need to exclude the possibility that all of our physical properties are somehow involved in the occurrence of mental properties, perhaps by some complex nexus of causal interactions which give rise to mental properties. I submit that he cannot exclude either possibility and should reject the existence of objects like Jane$_{qa}$ composed only of mental properties. Given this advocates of the constituent ontology can reject Olsen's charge that it entails a bizarre form of substance dualism.

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[87] In effect it is a version of token-token identity.
[88] See section 2.6.2 on Structural Properties.

3.3 A necessarily false thesis

3.3.1 *Reducio* by dilemma

The second *reducio* that Olsen **(2017, 72-74)** provides is far more troubling than the first given that it purports to show that constituent ontologies entail the existence of impossible objects. If this hits the mark it not only implies that any constituent ontology is false but that they are necessarily false. The *reducio* that Olsen **(2017, 72-74)** gives comes in the form of a dilemma: either properties of whole objects are parts of ordinary parts or properties are composed of parts that are distributed across ordinary spatiotemporal parts of some whole object. Both are necessarily false as they entail the existence of impossible objects.

Let's consider the first horn. Consider some composed object *O* that is the thing composed of all of the atoms[89] that make up *Eric Olsen*[90]. *Eric Olsen* and the atoms that compose him are entities the constituent ontologist would describe as ordinary spatiotemporal parts, the standard fare of classical extensional mereology. *O* is the object such that each of Eric Olsen's current atoms is now a part of *O,* and every other non-atomic part of *O* overlaps one or more of those atoms **(2017, 73)**. For instance, *O's* right-hand overlaps with one or more of the atoms that make up *O* since that right hand is a part of O. Olsen takes

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[89] I follow Eric Olsen's **(2017,72-74)** terminology here 'atoms' to refer to refer to the all of the fundamental particles that make up Eric Olsen. This is to preserve Olsen's argument in the form he gives it. Yang **(2017, 5-9)** reformulates the argument in more technical terms. I prefer Olsen's original formulation as it preserves much of the intuitive force.

[90] Given that Olsen uses the indexical 'my' in his original formulation and that I intend to continue to refer to the very same set of objects that Olsen **(2017, 72-74)** does I will use 'Eric Olsen' and the relevant set of masculine pronouns to refer to that very same set of objects.

this to be the case given that the parthood relation is transitive **(2017,73)**. So far, we have only spoken of *Eric Olsen's* ordinary spatiotemporal parts, his atoms and his right hand. But constituent ontologists think that in addition to there being ordinary spatiotemporal parts of objects there are also ontological parts; the properties that an object instantiates. These properties are to be taken as in some sense parts of those objects. For instance, the atomic mass of one *O's* atoms must be considered a part of that atom. For the constituent ontologist, *O's* full range of parts includes atoms, other ordinary spatiotemporal parts like hands and then also ontological parts like properties. Any part of *O* other than *O's* atoms and its other ordinary parts would have to be either a part of one of *O's* atoms or composed of parts overlapping several of *O's* atoms. Therefore, if it is the case that *O's* properties are parts of O then each must overlap a part with one or more of *O's* atom.

Yang **(2018, 15)** points out that Olsen's objection proceeds assuming the following definition.

D1. Composition: *xs* compose *y*=df each of the *xs* is a part of *y*, and every part of *y* overlaps at least one of the *xs*.

With the last clause in *D1* when some plurality of objects compose some whole, there is no other part that partially composes the whole yet is disjoint from the plurality (the *xs*). That is to say completeness of composition is given by *D1* such that no additional composing part is required for the composition of *y*. However, this is problematic given how instantiation is understood under a constituent ontology. Olsen **(2017, 74)** takes constituent ontologists to explain instantiation in the following way. Instantiation is understood in terms of constituency. Any property that is a part of an object is a constituent

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of that object. An object instantiates a property if and only if that property is a part of it; an ontological part. In the case of *O's* atom, under the constituency reading of instantiation any property that is a part of that atom is instantiated by that atom. Given *D1* any property of *O* that is a part of any one or more of *O's* atoms will be a property that overlaps with *O* and those atoms of *O*. Under the constituency reading of instantiation this will mean that any property of *O's* atoms will be a property that *O* shares with those atoms.

But this cannot be right. *O* has properties that its atoms do not and cannot have. For instance, any one of those atoms cannot have a *human shape* and *human volume* while *O* does. Then consider those properties typically taken to be instantiated by fundamental particles. Even if those particles are ordinary spatiotemporal parts of *O* it is not right to claim that *O* would itself instantiate the properties of those fundamental particles. It would be obviously false to claim that atoms have a *human shape* or humans like *Eric Olsen* have *unit negative charge*. However, given that under a constituent ontology properties are to be taken as parts then since each atom of *O* overlaps at least one of *O's* atoms and that any property *P* of *O* is also a part of *O* it follows that *P* must overlap the fundamental particles, the atoms, that compose *O*. If *P* overlaps one of the atoms it follows that *P* is a property instantiated by that atom[91]. This gives us an obviously false assertion, that is to say the assertion that there is an object such as an atom that instantiates the properties of *having a human shape* or *having average human mass*. The first horn of the dilemma thus gives impossible objects; objects that instantiate properties that it is clear are impossible for them to instantiate such as atoms *having a human shape*.

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[91] Under the constituent ontology according to Olsen **(2017,72-74)**

The second horn is also problematic. The other option is that a property *P* instantiated by O, like it's *human shape* or *human mass*, is itself composed of parts distributed across many of *O's* atoms without *P* being a part of any one of those atoms. As Olsen **(2017,73)** puts it ,

"….a property might, like my liver, be composed of parts distributed across several of O's atoms without itself being a part of any of them".

If we conceive of a property being composed itself of parts, just as *Eric Olsen* is composed of parts like a liver , a hand , a leg and a foot then we can seemingly avoid the charge that the constituent ontology will have to posit obviously false cases of instantiation, such as an atom of *O* instantiating the property of having human shape. A property might be composed of parts distributed across a number of *O's* atoms without that property being a part of any one of them, hence avoiding the objection in the first horn. But this cannot be the case. Consider the example of *human shape* where a human figurine has the same shape as *O*. As Olsen **(2017,73)** nicely illustrates regarding a *shape property* having parts distributed across *O*,

"But O's shape could not be like this either. A small plaster figurine could have the same shape. So could a thing composed of the figurine's atoms. Its shape, like O's, 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)."

If this is the case, then it appears we avoid the charge of the first horn. *O's human shape* is not a part of any one of *O's* atoms. But this comes at the expense of *O's* shape not being a property with parts distributed across *O's* atoms. This is because if *O* is composed of atoms then every part of *O* must be either be an atom, a part of an atom or composed of things that are parts of atoms. The last disjunct indicating the sense in which the properties of *O's* atoms may be taken to be parts of those

atoms. It follows that *O's human shape* property cannot be a part of *O* since none of these parts of *O* can themselves have human shape as a property part. Therefore, on the constituent ontology this means that *O* does not have its shape as a property! The result is that *O*, all of the atoms that together compose *Eric Olsen*, has no shape!

The dilemma of impossible objects seems to leave the constituent ontologist without options. On the first horn the constituent ontology appears to imply the existence of objects like atoms with *human shape* or *human volume*, or humans having the properties of subatomic particles. On the second horn the constituent ontology seems to imply the existence of shapeless humans and other shapeless macroscopic objects. Either way it appears the constituent ontology is necessarily false since it seems to imply the existence of impossible objects.

3.3.2 Parthood Pluralism

Eric Yang **(2018, 1211-1216)** has pointed out that the main problem with Olsen's argument that the constituent ontology implies the existence of impossible objects is the assumption that the notion of parthood is univocal. If we consider that the parthood relation may come in another form it may be the case that the charge of impossible objects can be avoided. Yang **(2018, 1212)** points out that it seems Olsen makes this assumption that properties are parts at a level of description of the parthood relation, as opposed to a totally different form of the parthood relation. That Olsen thinks of levels of composition as opposed to radically different notions of parthood is clear where he states,

"the atoms and the other things occupy different levels of composition. On one level, a dog is made up of atoms, but on another level- a metaphysically deeper one- it is made up of the other things. The concrete particulars making up a dog and the way they relate to one another are sometimes called its mereological structure. The things other than concrete particulars making up a dog are called its constituents, and they and the way they relate to one another are its logical or ontological structure". **(Olsen 2017, 62)**

It is quite right to speak of different levels of composition such as stating that at one level of magnitude Eric Olsen's body is composed of cells, but on another more fundamental level it is composed of subatomic particles. But on this notion of levels of magnitude there is no competition of composition because the cells and the subatomic particles of Eric Olsen overlap. **(Yang 2018, 1213)** But the composition of objects by their ordinary spatiotemporal parts, such as cells and atoms, and composition of an object by its properties should be regarded as being of a different kind given the radically different natures of the types of entities involved. Yang's reasons for thinking this is that at least *prima facie* ordinary material objects are concrete entities while properties are abstract entities. For Yang it seems, properties feature amongst those entities termed abstract. Given this, properties, along with other abstract entities like numbers, can be said to have the maximal possible difference any two entities could display when compared to concrete, material objects. Yang **(2018, 1213)** takes this to give good reason to posit one parthood and composition relation that governs the composition of material objects by other material objects; and then another parthood and composition relation with its own, and perhaps distinct , set of principles governing the relation that gives the composition of an object by the properties it is said to instantiate. Given distinct parthood and composition relations for objects composing objects and then for properties composing

objects the horns of the dilemma that gives impossible objects fades away. This is because under Olsen's analysis we had one overarching, universal principle of composition governing both the composition of objects by objects and the composition of objects by properties.

D1. Composition: *xs* compose *y*=$_{df}$ each of the *xs* is a part of *y*, and every part of *y* overlaps at least one of the *xs*.

Given the last clause of *D1* when a plurality of objects composes some whole, there is no other part that partially composes the whole and is disjoint from the plurality of objects. But as Yang points out, if parthood pluralism is true we can have two composition principles for each different form of composition. Given this the constituent ontologist can distinguish two types of parthood and composition relations: *Ontological Composition*[92] which deals with properties as parts and *Integral Composition* which deals with ordinary object being parts.

Ontological Composition: *xs* compose$_o$ *y*=$_{df}$ *xs* are a proper ontological part of *y* and there is no *z* such that *z* is a proper ontological part of *y* and *z* is disjoint from the *xs*.

Integral Composition: *xs* compose$_i$ *y*=$_{df}$ *xs* are a proper integral part of *y* and there is no *z* such that *z* is a proper integral part of *y* and *z* is disjoint from the *xs*.

Given this *Integral Composition* deals with instances where an object is composed by its atoms and other ordinary proper parts. So *Integral Composition* deals with the parthood relations that obtain between *Eric Olsen* and the atoms that compose *Eric Olsen* , as well as all of the parthood relations that obtains between *Eric Olsen* and his other

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[92] Chapter 5 will deal with the notion of ontological composition in much more detail.

macroscopic ordinary parts such as his right hand, his left leg and his heart. *Ontological Composition* on the other hand deals with instances where an object is composed by its ontological parts; its properties. It will deal with cases where an object is composed of mass, shape or volume properties. For instance, *Eric Olsen's* human shape, mass and volume operate under *Ontological Composition*. Therefore, *Eric Olsen's* atoms compose$_i$ *Eric Olsen* and his properties compose$_o$ him but his atoms and his properties do not overlap in the same sense. So contrary to Olsen's charge it can be maintained that atoms compose$_i$ *Eric Olsen* and that *Eric Olsen* has the properties of having a certain mass, volume and shape in virtue of those properties being ontological parts of him. On the first horn of the dilemma we saw that objects such as the atomic parts of a person instantiate the property of having a human shape, giving impossible objects like atoms having human shape. On the second horn *O's* shape cannot be a part of *O*, and on the constituent ontology this means that *O* does not have its shape as a property, giving another impossible object, namely, shapeless macroscopic objects like shapeless people. However, if parthood pluralism is correct then these horns of a dilemma do not arise since there is no one sense of overlap between the composition of objects by objects and the composition of objects by properties. It is therefore a mistake to think that property parts of *Eric Olsen* should overlap with the atoms that compose *Eric Olsen*. These different kinds of parts do not allow for decomposition at different levels of magnitude in the way that you can decompose *Eric Olsen* at different order of magnitude such that at one level he decomposes into cells and at another level he decomposes into atoms. Rather decomposition at the level of properties is a fundamentally different kind of decomposition from ordinary integral

decomposition. Ontological Parts and Ordinary Integral parts are not 'parts' in the same sense.

There is however a major problem with adopting Yang's **(2018, 1213-1216)** strategy on my approach since I do not subscribe to the view that objects and properties are entities that are maximally distinct as any two entities can be. More precisely I do not think that if properties compose objects then properties can be conceived of as abstract[93] since all constituent ontologists should subscribe to something like the following principle:

The Concreteness Principle of Constituent Ontologies (CPCO) : A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

For Yang **(2018)** the primary reason for thinking that one can accept some form of parthood pluralism was the radically different natures of objects and properties; objects like atoms are concrete while properties are abstract,

"… the composition by particles and the composition by properties would naturally be regarded as being different, especially given the radically different natures of both types of entities, where particles are concrete and properties (whether universals or tropes) are abstract……Given such a difference , it is reasonable to posit one parthood and composition relation (and its associated principles) governing particles and other concrete objects and another parthood and composition relation (and its associated principles) governing properties." **(Yang 2018,1213)**

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[93] For my reasons for this see section 2.4.2 of this thesis.

If by 'abstract' Yang means an entity totally without location then it would be remiss of me to utilise parthood pluralism as a way to avoid Olsen's dilemma of impossible objects, given that I do not think that the properties that objects have which explain their character can be unlocated entities. But this is not what Yang means by 'abstract'. Yang point out in a footnote **(2018, 1213)** that the labels 'concrete' and 'abstract' are not always used in the same sense by philosophers such that some philosophers would be cautious to call properties, especially tropes, 'abstract'. He notes that for the purposes of his argument against the dilemma of impossible objects all that is important is that 'abstract' designates one type of ontological category and 'concrete' designates another type. It need not therefore be the case that in his view 'abstract' designates those entities which are not located. All that is important is that 'object' designates one type of ontological category and 'property' designates another without denying that properties are concrete in the sense of being spatiotemporal entities. Given this parthood pluralism will allow the constituent ontologist to deny that if properties are parts of objects then there are impossible objects. Olsen's dilemma dissolves away.

3.4 The Charge of Incomprehensibility

3.4.1 van Inwagen's confused stare

The next charge against the constituent ontology proceeds in a wholly different manner from the previous two seen in section 3.2 and 3.3. The essence of the charge is this: constituent ontologies are incomprehensible since they contain an

incomprehensible and meaningless central notion, namely, that properties can be (ontological) parts or constituents of material objects. From general interaction with the philosophical community this seems to be a central, if not the central concern, with any view that asserts that the properties an object has or instantiates can be taken to be in some sense parts or constituents of that object. There is little substantial articulation of this concern in the literature, but it finds its best statement with two papers that Peter van Inwagen **(2011, 2015)** has recently given.

Constituent ontologies employ the parthood or part-like relation to explain how it is the case that an object has a property. That is to say, either it employs the mereological relation of part to whole or some quasi-mereological relation that is in some sense analogous or comparable to the part to whole relation **(van Inwagen 2011, 390-391; 2015, 50)**. Properties can therefore be said to be constituents of material objects *iff* properties are parts of material objects or stand to material objects in some relation analogous or comparable[94] to the part to whole relation. Constituent ontologists therefore take material objects to have ontological structure in so far as there are entities, properties, that make up any material object's ontological structure. Given this the constituent ontology will analyse the 'having' , 'exemplifying' or 'instantiating' relation , which objects bear to properties, in terms of parthood or constituency. The properties that a material object has , exemplifies or instantiates are exactly those properties that are its ontological parts or constituents such that the statement 'material object x has the property F' is equivalent to ' the property F is an

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[94] A good example of a constituent ontologist who asserts that the relation of object to its properties is quasi-mereological is Armstrong **(1997, 118-119)**. In section 4.2 I will deal with the notion of non-mereological constituency in more detail.

ontological part or constituent of the material object x' . As van Inwagen **(2015, 51)** wryly notes the relation that *"Soloman bears to wisdom, Central Park to rectangularity, and Arizona to aridity"* will be identified with parthood or a relation very much like it. Placing together what I take to be the synonyms, 'having' 'exemplifying' or 'instantiating' as each referring to the instantiation relation, it is clear that the constituent ontology analyses the instantiation relation between an object and its properties in terms of the ontological structure of objects , where an object's properties feature as a part or constituent of that structure.

To van Inwagen the notion of an object having an ontological structure over and above its ordinary spatiotemporal structure is, as he admits, bewildering to such a degree that he finds hard to convey **(2015,55)**. He can attribute no coherent sense to what those properties which are claimed to ontological parts or constituents of objects could be. To van Inwagen such entities seem to be an impossible amalgam of the features that are typically attributed to material objects and those features attributed to properties. Whether one conceives of these entities, that the constituent ontologist say are featured in the ontological structure of material objects, as either immanent universals or tropes does not make a difference. The sense of mystery remains **(2015,54)**. As an example of this bewilderment he asks us to consider the relation that obtains between his Dachshund Jack and Jack's *xenophobia*- the property of behaviourally exhibiting excessive aggression towards any living thing that has not been properly introduced. Van Inwagen asserts that *xenophobia* is clearly one of Jack's properties, and indeed he admits it is a universal since Jack shares this property with van Inwagen's other Dachshund Sonia, but he contends

that he cannot conceive any sense in how *xenophobia* can be understood as a part or constituent of Jack. This is because as van Inwagen points out the relation that obtains between Jack and Sonia and their xenophobia is *"as abstract and 'external' as the variably polyadic relation 'being numbered by' that they enter into with the number 2"*. **(2015,52)**

A quick response to this could be to say that *xenophobia* does not feature as a property capable of being conceived of as a constituent in so far as the predicate 'xenophobia' actually picks out behaviours that obtain under certain conditions ; behaviours that somehow supervene or depend on the more natural biological properties of either one of the two Dachshunds. For instance, the *aggression* that either Jack or Sonia are said to have supervenes or depends on certain facts about either dog's neurological system, endocrinology and genotype. Statements that assert that either dog is *xenophobic* are not true in virtue of the dog's *being xenophobic per se* but rather as the result of a conjunction of other natural facts about both dogs. The answer the constituent ontologist could give is that what makes either dog *xenophobic* is a matter of certain more natural properties that each dog has. That is to say, the properties referred to in the sciences that go further to explain behavioural traits like *xenophobia* are in fact what are referred to in sentences that assert that both or either dogs are *xenophobic*. The problem with this response, and it is a response that a constituent ontologist will usually make since constituent ontologists should and typically do articulate some sparse, naturalistic account of properties[95], is that most , if not all, of the natural properties referred to in physical science are non-qualitative. The properties of physics are

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[95] See section 2.6 of this thesis.

usually expressed rather as quantities with numerical measures. For van Inwagen it is when constituent ontologies assert that such properties are to be understood as parts or constituents of material objects **(2015, 54)** that he feels the greatest sense of bewilderment. For instance, Lewis **(1986a, 64)** in *On the Plurality of World* articulates the notion of a natural property and how immanent universals may assist to explain what grounds the difference between a natural property or class and an abundant property or class. He gives the example of two particles each having unit positive charge. Each particle contains, so he asserts, a non-spatiotemporal part corresponding to charge. Each part is a universal and is in fact the very same universal for each particle. That is to say one and the same universal recurs as a non-spatiotemporal part of each particle; one that is multiply located in so far as it is wholly present in each particle **(1986, 64).** Using the language of parthood, it is a shared common part whereby the two particles can be said to overlap; such that being alike by sharing a universal as a part is to have something in common in *"the absolute literal sense"* **(1986, 64)**. Now properties like *unit positive charge*, *mass* and *acceleration* are understood in physics to be properties expressed as quantities with numerical measures. And it is here that van Inwagen's greatest sense of bewilderment and confusion enter. This is best seen in a referee report which he gave. That report contains the following statement,

"The author contends that the "features" of an electron (the electron's mass,charge, and spin are the examples of its features the author cites) are "constituents "of the electron. I don't care who says this—not even if it's David Lewis —, it just doesn't make any sense. Consider the case of mass. Let Amber be a particular electron. Amber's (rest) mass is 9.11 × 10 exp −31 kg. (I've rounded the figure off to two decimal places; pretend I've written out the exact figure.) If '9.11 × 10 exp −31 kg' is a name of something (if the 'is' of the previous sentence is the 'is' of identity), it's a name of an abstract object.

(And if '9.11 × 10 exp −31 kg'isn't a name of anything — if it is, as Quine liked to say, a syncategorematic phrase —, or if it is a name of something but is not a name of Amber's mass, why would anyone suppose that 'Amber's mass' is a name of anything? It looks to me as if either 'Amber's mass' and '9.11 × 10 exp −31 kg' are two names for one thing, or 'Amber's mass' isn't a name for anything: there just isn't anything for 'Amber's mass' to name other than 9.11 × 10 exp −31 kg.15) You can perform arithmetical operations on this object, for goodness' sake. You can divide it by a number, for example (if you divide it by 6, the result is 1.518 × 10 exp −31 kg), and you can multiply it by another physical quantity (if you multiply it by 10m/sec/sec, which is the magnitude of an acceleration, the result is 9.11 × 10exp −30 kg-m/sec/sec). These "results" have other names. Other names for the first result are 'one-sixth the rest mass of an electron' and 'the amount Amber's mass would increase by if Amber were accelerated to half the speed of light from rest'. Another name for the second result (if Amber is near the surface of the earth) is 'the magnitude of the gravitational force (in the direction of the center of the earth) that the earth is exerting on Amber'—since 10 m/sec/sec is the magnitude of the acceleration toward the center of the earth of a body (near the surface of the earth and in free fall) that is due to the earth's gravity. Performing calculations like the ones I performed to get those results is what solving the problems in physics textbooks largely consists in: applying arithmetical operations like multiplication and division to items like masses, charges, and spins. I can attach no sense to the idea that something one can apply arithmetical operations to is a "constituent" of a physical thing." **(van Inwagen 2011, 394)**

The confusion, so van Inwagen contends, also occurs for qualitative properties like shape and colour. In the case of qualitative properties being viewed as ontological parts or constituents his bewilderment arises because he cannot see what such properties, so conceived, could possibly be. They are not what he calls properties since they are not those things that stand to one place open sentences as propositions stand to closed sentences **(van Inwagen 2004, 131-138 ; 2015, 56)**. They are not the sorts of things that in any conceivable sense van Inwagen can understand can be thought of as properties since they are not the kind of things that one can say are true or false of things. This is because these ontological parts or constituents are said to have some

kind of presence in the physical world; to be parts or constituents of material objects they must be located. But such entities as this are not what van Inwagen thinks can be coherently understood to be properties. They are, it seems, an impossible amalgam of object and property.

3.4.2 Unpacking van Inwagen's confusion

Van Inwagen's openly states that his confusion regarding the central concepts of the constituent ontology are not to be understood as an argument. Rather it is a confession of confusion,

"I must make it clear that when I say these things, I do not pretend to be presenting an argument. What I am presenting is rather a confession. Just as a confession of faith – someone's recitation of the Nicene Creed, for example – is not a presentation of an argument for the thesis that anyone other than the speaker should accept the propositions the confession comprises, a confession of bewilderment is not a presentation of an argument for the thesis that anyone else should be bewildered by whatever it is that the speaker finds bewildering" **(van Inwagen 2015, 57)**

I find the assertion in the above from van Inwagen to be rhetorical in nature (and really quite uninformative). However, from what I can discern I can find two major reasons van Inwagen can give to explain his state of confusion at the central concepts of the constituent ontology. They just need to be stated more clearly in a form that is easier to assess. These are, firstly, that properties cannot be parts or constituents of objects because they are abstract entities and, secondly, that quantities, and therefore quantitative properties, cannot be ontological parts or constituents of objects. In the two sections that follow I articulate reasons for the confusion more precisely and then offer to each a response in defence of the constituent ontology.

However, the last issue over quantities, I concede, offers a major problem for constituent ontologies and warrants deeper consideration in the following section 3.5 of this thesis.

3.4.2.1 Properties as abstract

The reason for van Inwagen's confusion is that he conceives of properties as properly abstract entities, very much like propositions. His own view is that everything that is not a member of the primary ontological category of 'particular object' must then be a member of the other primary ontological category of 'relations'. For van Inwagen the category of 'relation' includes amongst its members properties, propositions and relations: dyadic, triadic and variably polyadic relations **(2015,52)**. Properties are what van Inwagen terms unsaturated assertibles[96]. They are contrasted with propositions like 'there are xenophobes' or 'Jack is a xenophobe' in so far as the constant in the assertible is left unsaturated, without reference to some set of individual objects or some single particular object like Jack. Properties are therefore understood as the referents of nouns or noun phrases such as 'xenophobia', 'Jack's xenophobia' or ' the property of being an x such that x is xenophobic'. Now unsaturated assertibles, what van Inwagen conceives properties to be, are much like propositions in that both are necessarily existent things to which locational or causal

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[96] This seems to bare some resemblance to Frege's distinction between an object and a concept but van Inwagen denies this stating rather that his use of the terms 'saturated' and 'unsaturated' brings undue attention to a simply terminological but non-substantive similarity between his employment of the terms and Frege's. For Van Inwagen properties are things that can be quantified over and given his Quinian methodological tendencies are to be understood to be objects in the manner in which the logician or mathematician understands objects, that is to say objects in the most general possible sense. Van Inwagen's theory of properties as unsaturated assertibles is best seen in Van Inwagen **(2004, 131- 138)**.

concepts cannot applied. Parthood or constituency are essentially locational notions[97]; therefore, one cannot apply the notion of parthood or constituency to properties. Properties, like propositions for van Inwagen are properly abstract entities. The instantiations relation, the 'having' relation that either Jack or Sonia bear to their property of xenophobia is an instance of a dyadic relation; as external to Jack or Sonia as the relation that obtains between the pair of dogs and the number 2. Van Inwagen is right to point out that if properties are in fact unsaturated assertibles, then there is no conceivable sense in which we can assert that properties can be ontological parts or constituents. The same occurs if properties are conceived of as either sets of actual objects or sets of possible objects. If that is the case, then there is no sense attached to the notion that properties can be parts or constituents of the material objects said to instantiate those properties. The reason for this was made clear in chapter 2 of this thesis[98] where I showed why a class nominalist conception of properties cannot in any conceivable sense be understood as a constituent ontology. Van Inwagen broadly agrees, at least with the notion that under a class nominalist account of properties no sense can be attached to properties so conceived being ontological parts or constituents of the objects which instantiate them **(2015,53-54)**. As he notes, under class nominalism the property of *being a pig* or *porcinity* should be understood to be simply the set of all possible pigs - with Lewisian modal realism in place – a set indefinitely larger the set of all actual pigs. Consider Freddy the pig. Freddy obviously has *porcinity*. But

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[97] See Parsons **(2007, 220-228)** for general reasons to think that parthood or constituency are very tightly connected to location. See section 2.4.2 of this thesis for reasons why the constituent ontology is tightly connected to the concept of location.
[98] See towards the end of section 2.4.2.

what is the instantiation relation analysed as under class nominalism. The relation is simply one of set membership. In line with what I argued in chapter 2 the relation that obtains between a set of possible objects and any one of those objects cannot be ontological parthood or constituency. However, it clearly could be argued that in some sense Freddy is himself a constituent[99] of the set of all actual or possible pigs. As van Inwagen notes the term 'constituent' is flexible enough to be applied in the case of the relation of a member to its set. But there is no conceivable sense in which the set of all possible pigs is an ontological part or constituent of Freddy. On this van Inwagen and I agree. If properties are abstract, properly unlocated entities then properties cannot be either ontological parts or constituents. Nonetheless we depart at the point of conceiving of what properties are, properties being for van Inwagen properly abstract unlocated entities. Entities that therefore cannot feature as ontological parts or constituents.

However, the constituent ontologist can simply respond that properties, at least the first order properties of objects that account for a material objects character, are not unsaturated assertibles or sets of actual or possible objects. The fact that it is incoherent that such abstract entities cannot conceivably be ontological parts or constituents of material objects should come as no surprise. The constituent ontologist, interested in the character of objects and taking a theory of properties as explaining why objects in fact have the character that they do, will simply retort that this demonstrates that

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[99] The sense that a member of a set can be understood to be a part or constituent of that set so long as the member is itself a set is famously argued for in Lewis **(1991)**. Lewis there also agrees that no set can be a part of any object. This is expressed in what he calls the *Priority Thesis* that asserts that no class is a part of any individual. **(Lewis 1991, 6-10)**

properties are not abstract entities. To give an object the character which it has properties must inhere in objects as ontological parts or constituents of objects; they are entities which are present and located in the world. By being located in the world as parts or constituents of objects, properties are able to imbue objects with their *kath hauto* character. Since neither sets of possible objects or proposition-like unsaturated assertibles can have location or presence in the world this suggests that they are not to be identified with those properties of objects which explain why objects have the character which they do. They cannot be understood to be located in or be present in objects. The result is that van Inwagen's charge of incoherence holds only because he conceives of properties as abstract entities. There are independent reasons for holding this, but it should not serve as a reason to deny the coherence of the framework of the constituent ontology simply as a matter of faith or as a confession of a bewilderment akin to a believer's recitation of the Nicene Creed.

3.4.2.2 Quantities as ontological parts or constituents

The confusion that arises for van Inwagen around how to conceive of properties being ontological parts or constituents if those properties being referred to are quantities with numerical measures is much more troublesome for the constituent ontologist. It poses some deeper problems on how to give an account of those properties quantified over in the most abstract reaches of mathematical physics. As we have seen constituent ontologies should and usually do adopt a sparse, naturalistic conception of properties[100]. For instance, with a graded

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[100] See section 2.6.

account of naturalness[101], the properties of fundamental physics provide the inventory of the perfectly natural properties. All of those properties will need to be understood as quantities with numerical measures; since that is how physics refers to such properties. It seems that constituent ontologies, to avoid the charge of philosophers of science like Ladyman and Ross **(2007)** that analytic metaphysician only feign a respect for physics, needs to account for such properties. But van Inwagen thinks this is impossible. There is no coherent sense in which quantities with numerical measure can be ontological parts or constituents of objects. The reason he thinks this I will have to extract from his rather bellicose statement in the referees report I quoted above[102]. It is a shame that he thinks that this complaint is something akin to a religious confession because it contains one of the most troublesome problems for any constituent ontology; how to account for quantities as properties. His reasoning I suggest is as follows:

Consider an electron, referred to from here as Amber, and the characteristics of Amber, it's mass, charge and spin. We can round off Ambers resting mass to 9.11×10 exp -31kg such that we can say that Ambers resting mass is 9.11×10 exp -31kg. Now if we consider '9.11×10 exp -31kg' to be the name of something; a name that refers to some type of entity, then it must be the case that the referent of that name is an abstract entity. Why? Well because you can perform arithmetic operations on these entities. You cannot perform such operations on concrete entities, say ordinary material objects. You can divide 9.11×10 exp -31kg by 6 such that the result is 1.518×10 exp – 31kg. You can

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[101] See section 2.6.3.
[102] See section 3.4.1.

also multiply 9.11×10 exp -31kg by another physical quantity, say the magnitude of an acceleration, such that the result is 9.11×10 exp- 30 kg-m/sec/sec. Only abstract entities are capable of having arithmetic operations carried out on them. Quantities therefore have to be abstract entities. Since no abstract entity can conceivably be an ontological part or constituent of a material object it follows that quantities, the natural properties of fundamental physics, cannot conceivably be ontological parts or constituents of material objects.

The critical premise[103] that I can pull from this argument is: Only abstract entities are capable of having arithmetic operations carried out on them; that is to say only non-spatiotemporal entities are capable of having arithmetic operations carried out on them. Notice that van Inwagen's own conception of abstract is the same as mine – abstract entities are non-located entities while concrete entities are located entities. This is clear for instance where he states " *abstract objects: necessarily existent, non-physical , and non-spatial things"* **(van Inwagen 2015, 52)** And from his previous work on properties he also thinks that the difference between any abstract entity and any concrete entity is the maximal difference that any two entities could display **(van Inwagen 2004, 111).** So, is it the case that only non-located entities can have arithmetical operations performed on them? *Prima facie* the temptation is to agree with van Inwagen. It seems on the face of it to be an obvious category mistake to suppose that one can perform arithmetic operations on concrete located entities.

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[103] No constituent ontologist can attack the premise that no abstract entities can be conceived of as an ontological part or constituent since we have seen previously that neither sets nor van Inwagen's properties as proposition-like entities can possibly feature as parts or constituents of objects.

The following suggestion however may temper the force of this. When dealing with the name '9.11×10 exp -31kg', the name of *Amber's resting mass*, we are dealing with an abstract entity. That is to say the mathematical representation of *Amber's resting mass*. '9.11×10 exp -31kg' is a mathematical representation of the instantiation of the *resting mass* of an electron, *Amber's resting mass*. It is not the property *per se* that has mathematical operations performed on it but rather the mathematical representation of that property that has mathematical operations performed on it. The problem with this response is that constituent ontologists, usually being good metaphysical and scientific realists, will usually also adopt the claim that the mathematical representations of physics in some way latch on to the way the world really is. There is some tight kind of correspondence between our mathematical physical theories, the mathematical representations contained within those theories and the way the world actually is. In this case there is a very tight correspondence between '9.11×10 exp -31kg' the name and the property *Amber's resting mass* which it picks out. It may be the case that mathematical operations are performed on abstract representations; but those representations tightly map onto the natural properties of material objects. Given this, the response offered above is unlikely to fully satisfy although it may offer some way out for the constituent ontologist. Out of all the charges levelled against the constituent ontology it is van Inwagen's charge that properties, conceived of as ontological parts or constituents, cannot make sense of the quantitative properties of mathematical physics that poses the most serious challenge. This is because constituent ontologies place a premium on the natural properties quantified over in physical theory, properties that by and large are referred to in physics as quantitative properties subject to

mathematical operation. Unlike the previous charges this is the one that hits the constituent ontology squarely in the chin.

3.5 Properties, quantities and numerical measures

3.5.1 Quantitative properties

The charge that no constituent ontology can make sense of the claim that entities that can be subjected to mathematical operations can be ontological parts or constituents of material objects hits the mark. It draws our attention to a wider issue regarding how a constituent ontology can deal with quantitative properties. Given that constituent ontologies adopt a distinction between natural and abundant properties, doing this with reference to the properties cited in the natural sciences , the task of accounting for quantitative properties is therefore a compulsory one since many of the properties cited in the natural sciences are quantitative. Therefore, a grasp of what quantitative properties are is first required. It is clear that if one takes the natural sciences seriously then certain characteristics of the world are best represented using numerical scales **(Eddon 2013, 633)**. Obvious examples are mass, temperature and wavelengths. We see in the previous section the example of the mass of a subatomic particle, the property instance *Amber's resting mass* given as '9.11×10 exp -31kg'. I will use mass properties as the paradigmatic example of a quantitative property; using it throughout as the exemplar.

Quantitative properties have three formal features that distinguish them from qualities: Ordering, closeness and distance. Quantities of the same type can be ordered. Consider masses of objects. A 100 kg object is less massive than a 200kg object which is less massive than a 300kg object. With the ordering relation we can also see the second and third formal features of quantitative properties, quantities within an overall type stand in closeness and distance relations to each other. A 100kg object is closer in mass to a 200kg object than it is to a 300kg object where the 100kg object is closer to the 200kg object by an order of 100kg compared to an order of 200kg in relation to the 300kg object. The 300kg object is more distant in mass to the 100kg object than to the 200kg object. This is because the ordering, closeness and distance relations between quantities of the same kind behave in a prescribed way **(Eddon 2013,633)**. If x has less mass than y and y has less mass than z, then x has less mass than z. If there is a distance in mass of 100kg between x and y and the distance in mass between y and z is 200kg then there is a distance of 300kg between x and z. Closeness and distance also help to measure the relative similarity or difference between objects in terms of their mass. All things being equal we can say that given that x is closer in mass to y than it is to z we can say that x in respect of its mass is more similar to y than it is to z. Consider a set of objects qualitatively indistinguishable except for differences in mass ; it is clear that those objects that are closer in mass to eachother will be more similar to eachother while the objects with a greater difference of mass between them will exhibit a greater difference. For instance, consider a set of 6 projectiles that are composed of the same materials, have the same aerodynamic shape and are travelling at the same speed; the only difference between them being that they differ is mass in increments. The more mass the projectiles have the greater the

damage they will incur on the target. The two projectiles with the greatest masses will incur damage on the target more similar than either exhibits in terms of the damage done to the target by the least massive projectile. Crucially for van Inwagen's charge we can numerically represent the symmetry exhibited by ordering, closeness and distance. It seems to be the fact that we can do this that suggests to van Inwagen that such quantitative properties cannot be ontological parts or constituents because being able to do this requires that such quantitative properties are abstract entities. However, there are two possible responses to this that suggest that this premise of van Inwagen's argument need not be accepted. Both are built out of distinct versions of what quantities in fact are. While it may be the case that both options are not fully adequate accounts of quantities, the point of this exercise is to show that van Inwagen's charge that no sense can be made of conceiving of quantitative properties as ontological parts or constituents of objects is not quite as forceful as it initially appears.

3.5.2 Quantity, number and proportion

To capture the ordering, closeness and distance relations inherent to quantities Bigelow and Pargetter **(1988, 287-304)** develop a three-level theory of quantities as proportion, utilising the general distinction between determinate and determinable properties. Objects that share a property can be said to be the same in some one respect, for instance two objects having mass. But quantities pose problems for this since it seems as though two things that are the same in respect of having mass can still differ in respect of having mass since one may have more (or

less) mass than the other. Objects can be both the same and different in the very same respect **(1988, 288)**. This is clear from the ordering, closeness and distance that quantitative properties exhibit. The analysis of quantity that Bigelow and Pargetter give rests on three levels of ingredients: (1) individual objects; (2) determinate relationships between individual objects;(3) relations of proportion between these determinate relationships **(1988, 299).** The distinguishing feature of their account is the acknowledgement of the need to account for the varying degrees of closeness/similarity between different determinate instances of the same property seen in the examples of mass above. They cater for this by introducing the third level of analysis of quantity, (3) relations of proportion between these determinate relationships.

To see this, consider three objects x, y and z at level (1). At level (2) there will be a class of relations holding between x, y and z. If these relations at level (2) stand in proportion to one another then we can group them in level (3) in terns of the relations of proportions that obtain between these determinate relationships. For instance, all mass relations at level (2) will stand in proportions to one another and all volume relations at level (2) will stand in relation to one another but determinate instance of mass will not stand in proportion to determinate instances of volume. Level (3) relations of proportion thus allow the classification of level (2) determinates in equivalence classes. The ordering, closeness and distance in these equivalence classes will be imposed by the proportion relations of level (3).

Let's apply Bigelow and Pargetter's analysis to a quantitative property like mass. Consider the mass relations of *being twice as massive as* and *being four times as massive as* . Consider the set of three objects above at

level (1): *x,y* and *z*. If *z* is twice as massive as *y* and *y* is twice as massive as *x*, then *z* is four times as massive as *x*. If we have two successive applications of the *being twice as massive as* relation, then this yields the *being four times as massive as* relation. So, the *being four times as massive as* relation is at level (3) twice as large as the *being twice as massive as* relation. Therefore, these two relations: *being twice as massive* as and *being four times as massive as* stand in a second order relation to eachother that can be mathematically represented by the ratio 2:1 [104].

As Bigelow and Pargetter **(1988, 301)** note,

"the level (3) relations among determinates may be more complex and discriminating for some classes of determinates than for others. Determinate physical quantities like mass stand in such a rich pattern of proportions to one another, that it forces us to draw upon the full resources of the real number system. In our terminology, however pains and colours, too, count as quantities. It is highly likely that the level (3) relations among these quantities will manifest a variety of structures which are less linear, and less discriminating, and so which manifest structures other than that of the real number system. Thus, quantities will subdivide into categories, according to the nature of the level (3) interrelations they manifest. These subdivisions correspond to the distinctions, familiar in measure theory, which are drawn between, for instance, interval and ratio scales of measurement. Different sets of relations can manifest different patterns of proportions among their members. And different scales of measurement must have mathematical structures which reflect these different patterns."

Let's now try to understand van Inwagen's charge in light of this account of quantity. The charge that could be extracted from van Inwagen was that only abstract entities are capable of having arithmetic operations carried out on them. Quantities therefore have

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[104] There are a number of challenges to the Bigelow and Pargetter analysis of quantity as the result of the fact that relations like *being twice as massive as* are multiplicative not additive **(Eddon 2013, 635)**. One such challenge is how to deal with congruence relations such as *being just as massive as* **(Forge 1995, 598-600)** and another challenge is that this analysis is in fact not able to account for the ordering closeness and distance features of quantities **(Eddon 2013, 635-636).**

to be abstract entities. Since no abstract entity can conceivably be an ontological part or constituent of a material object it follows that quantities, the natural properties of fundamental physics, cannot conceivably be ontological parts or constituents of material objects. As I identified it the critical premise was that only abstract entities, non-located entities, are capable of having arithmetic operations carried out on them.

But on Bigelow and Pargetter's three level account it does not seem to be the case that just because something can have mathematical operations performed on it that any such entities are abstract in the sense of being non-located. Relations of proportion holding between determinate relations are best represented by mathematical structure, and it should come as no surprise that these are subject to mathematical operations working off units of measurement. Remember the example using the relationship that obtains between *being twice as massive as* and *being four times as massive as.* There we saw that such a proportional relationship between these determinate relations could be represented by the ratio 2:1. The fact that an object has determinate quantitative properties, like having a certain mass, and that arithmetic or other mathematical operations can be performed to generate a different value does not seem to mean that such determinate properties have to be abstract in the sense of being non-located. On Bigelow and Pargetter's view of quantity determinate physical quantities like mass stand in complex patterns of proportion to one another that is best understood when we draw on the full resources of the real number system **(1988, 301)** to represent them. It's the resulting scales of measure employed to represent these relations that may have abstract mathematical structure; not the quantitative

properties to which they refer. And even with this in place, the fact we perform mathematical operations on such representations of physical quantities seems to not require that such physical quantities are abstract entities; quite the opposite for it seems. It seems to suggest that our mathematical operations somehow allow us to understand the rich relations of proportion that concrete, located physical quantities exhibit in relation to eachother within their quantity types.

3.5.3 Quantity and Structural properties

Following on from recent work from Dasgupta **(2013**), views of quantitative properties can be divided into absolutism and comparativist approaches. Absolutism is the view that intrinsic masses are fundamental. That is to say the most fundamental facts about a material object include facts about which intrinsic determinate mass property they have. This does not deny that massy things stand in proportional mass relationships to each other, but it will be asserted that these proportional mass relationships hold only in virtue of the intrinsic determinate mass properties that things have. For instance, if a lion is three times as massive as a cheetah then this is in virtue of the intrinsic determinate masses that each possess.

The prior view of quantity seen in Bigelow and Pargetter **(1988)** is not an example of an absolutist conception of quantity. Rather such a view is a comparativist view because the most fundamental facts about a material object, for instance which determinate mass they have, only concern how they are related in mass with all other facts about their masses holding in virtue of this web of relations **(Dasgupta 2013, 107-111).** Given this it could be contended that no such comparativist view

of quantity is amendable to a constituent ontology since such a view puts a premium on fundamental external relations that cannot be understood if one conceives of properties as ontological parts or constituents. In addition, it may not be suitable generally as a constituent approach response to the Problem of Character (PC). This is because if that character is to be understood in terms of the having of some determinate quantitative property such as the having of a particular mass and quantitative properties are to be understood under a comparativist view of quantity, then the having of a quantitative property like some determinate mass is a relational matter. While there may be a way to avoid this, I do not have scope to deal with this here. All that needs to be noticed is that van Inwagen's charge about quantitative properties and mathematical operations does not constitute a closed and shut case against conceiving of quantitative properties as ontological parts or constituents.

Given that that it may be the case that comparativist views of quantity may not be amiable to the constituent approach perhaps a better analysis of quantity should be an absolutist one. For instance, the constituent ontologist can take Armstrong's view of quantitative properties; one that takes the structure of quantity to be grounded solely in fundamental properties, where quantitative properties are structural properties. That is, properties that are complexes of other more fundamental properties. Armstrong is right to observe that no scientifically orientated metaphysics can neglect the topic of quantitative properties **(Armstrong 1997, 63)**. He takes it that Bigelow and Pargetter **(1998)** in their focus on higher order relations of proportions at level (3) overlook the possibility that these higher order relations only obtain from the nature of the terms that that have these

relations. Namely from the natures or character of the objects that populate level (1). The nature or character of those objects will be first order properties of those objects. The critical point is that the first order properties involved will in some sense be metaphysically prior to the relations of proportion holding between these objects. For Armstrong it is these metaphysically prior properties that constitute quantities **(Armstrong 1997a, 64)**.

For Armstrong quantitative properties are to be identified with structural properties understood to be universals. Such structural properties are complexes of other simpler properties where the simpler properties are understood to be parts or constituents of the more complex properties. It is this complex property structure that underlies the ordering, closeness and distance features of quantitative properties. The structure of such complex properties allows one to organise quantitative properties into quantitative property types, such that for instances of mass properties they only have other mass properties as parts or constituents of their structure. The ordering of such determinable quantitative property types can be understood in terms of the complex structure within a quantitative property type such that determinate mass quantity 1kg is less than 2kg *iff* 2kg has 1kg as a part or constituent. Put rather crudely Armstrong thinks that larger masses in some sense contain smaller masses as parts meaning that the larger mass is structurally more complex than the smaller mass. The determinate quantitative property of *being 2kg in mass* can thus be understood as a structural property. As Armstrong **(1988,312)** puts it,

"For an individual , X, (which may be a scattered individual), to be two kilograms in weight there must exist innumerable pairs, triples, etc, of non-

overlapping individuals, where the N-tuples are such that each member is less than two kilograms in mass , and such that the sum of the members is the individual X. The constituent individuals found in the different N-tuples will include individuals having every mass that is less than two kilograms. (Or perhaps not every mass but only every whole number multiple of a certain quantum.) The property of being two kilograms in mass is (is identical with) all those non-relational structural properties formed by taking the above-indicated pairs, triples, etc., where the mass of the members of each N-tuple sums to two kilograms".

The determinate mass relations such as *being twice as massive as* and *being four times as massive as* and the relations of proportion that obtain between these relations are not prior to the determinate first order mass properties of material objects. Mass relations and proportions between mass relations depend on objects that have some determinate mass. Determinate mass is intrinsic and fundamental to any particular material object that has mass. This above absolutist account seems to naturally accord well with an ontology that takes objects to be in some sense composed by the properties which they have or instantiate. Quantity becomes a matter of property composition or constitution itself. But how does this assist with van Inwagen's charge that it is incoherent to suppose that one can perform arithmetical operations on properties if those properties are conceived of as ontological parts or constituents?

 At least for an account like Armstrong's, where quantities are taken to be structural properties, the fact that one can perform mathematical operations on quantities is simply a matter of being able to observe proportion relations[105] that exist between different determinate quantities of the same quantity type. That these relations exist between

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[105] Forrest and Armstrong **(1987, 176-178)** give a univocal account of the natural, rational and real numbers . This is relevant because proportions between quantities are typically identified with rational numbers represented in ratios.

quantities is not strange on Armstrong's account or need result in any incoherence. If you divide up a 100 kg mass of jelly into 5 equal portions it should come as no surprise that what results is five 20kg pieces of jelly. But critically the existence of determinate quantitative properties and their instantiation is not a relational matter ; that something may have the property of *being 20kg* is not dependent on their being other objects which have the property of *being 100kg* such that there exists the proportional relation of 5:1 between *being 100kg* and *being 20kg.* This avoids the response against the constituent ontologists, that can be levelled if the conception of quantity is comparativist, that if fundamentally the having of a quantity is a relational matter then it cannot cohere with a view of properties where only the first-order properties of objects are ontological parts or constituents of objects. Quantitative properties can be first order properties of objects because there are fundamental determinate quantitative properties whose instantiation is not a relational matter.

It may be objected that the proportional relations that exist between different determinate quantities of the same quantity type , say the 5:1 proportional relation that obtains between the 100kg mass of jelly and the 20kg mass of jelly , cannot be accounted for since such an entity as a 5:1 proportional relation is necessarily an abstract entity. Perhaps van Inwagen could respond that no sense can be made of the claim that between quantitative properties, when those quantitative properties are understood to be ontological parts of the objects which instantiate them , one can apply a mathematical division operation using the 5:1 ratio on those properties. But this is a wrongheaded response. The 5:1 proportion simply allows us to understand the structure of determinable quantitative properties like mass. Forrest

and Armstrong **(1987, 176-178)** give a univocal account of the natural, rational and real numbers. Mathematical existence can be understood to be abstract on the grounds that for a mathematic entity, like a proportion, to exist all that is required is that it be possible. Armstrong **(1997, 178)** expresses this generally for mathematical entities with the formulation that any mathematical entity X exists *iff* there is some (large enough) possible world where X is instantiated. For X to be instantiated all that is required is that corresponding to each cardinal number, including the infinite cardinals, there is some possible world where there is some aggregate which has that number of parts. Notice on this that all is that is required is that it be possible that a mathematical entity have instances; all that is required is that there is some world where the quantitative structure which the mathematical entity corresponds to is instantiated; namely the relevant aggregates with a number of parts. Proportions like 5:1 will be instantiated at any world where there are objects that have 10 parts and objects that have 2 parts. Given this the constituent ontologist can tie the notion of mathematical entities and thus mathematical operations to parts and wholes; the relation that the constituent ontologist wants to utilise for understanding how objects instantiate their first order properties.

Chapter 4: Ontological Constitution without Ontological Parts

4.1 Introduction: A non-mereological constituent ontology

The previous chapter aimed to show that constituent ontologies are not ill motivated. There I gave a set of responses to general charges against any constituent ontology. Those charges are often taken to endorse the claim that any constituent ontology is ill motivated from the moment of conception. As we saw there are coherent responses that the constituent ontologist has at their disposal to avoid the charge that the framework as a whole is ill motivated. It is therefore not implausible from the start to make the claim that properties, in some sense, are either ontological parts or constituents of the objects that instantiate them. The constituent approach to both the Problem of Character **(PC)** and the Problem of Resemblance **(PR)** is certainly worth fleshing out. The notion of ontological parthood will be explored in chapter five; it is in my view the best available form which the constituent ontologist could take. However, this chapter will explore the factualist constituent view that does not employ the mereological sense of ontological part. Where the theory of ontological parts will take properties to be literal parts, ontological parts, of the objects that instantiate[106] them the factualist constituent view will avoid using the notion of part as it is used in mereology. It will prefer

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[106] See all of chapter 5 where the notion of ontological parts is explored in detail.

rather to find some other explanation for how properties are related to objects by being constituents of object.

It's worth considering some versions that the constituent ontology may take other than my view that properties are ontological parts so as to allow for a clear distinction to be made. In what follows I will focus on David Armstrong's **(1997)** factualist thesis and attempts he made later in his career **(Armstrong 2004a)** to solve what I have termed the Problem of Character **(PC),** what it is that brings properties and particular objects together in instantiation. Armstrong's own view utilises a form of non-mereological constitution that binds his property universals to their instances in what he terms states of affairs. In Armstrong's **(2004a)** later career this led to radical revision of his account of how properties relate to the particular objects which instantiate them. This was largely inspired by Donald Baxter's **(2001a,2013)** view that the relation between objects and their properties is one of 'partial identity'. I will argue that even with the acknowledgement of the PC and the account of instantiation as partial identity the factualist non-mereological constituent response suffers from serious defects in the form presented by both Armstrong **(2004a)** and Baxter **(2001a,2013)**. However, in chapter five I will argue that there is a mereological counterpart to their notion of partial identity between properties and objects, and that sense can be salvaged from their view if we take properties to be proper ontological parts of objects.

Before proceeding a brief point of clarity on ontological category theory is required. Peter van Inwagen **(2011, 389-390; 2015 47-50)** identifies a general division in ontology: between what he calls

monocategorial ontologies and polycategorial ontologies[107]. Monocategorial ontologies are those ontologies that assert that there is only one primary, irreducible ontological category that is *"not a subcategory of any other ontological category"* **(2011, 389)**. Everything that there is belongs to that category. Polycategorial ontologies, on the other hand, are those ontologies that assert that there are two or more primary, irreducible primary categories. Polycategorial ontologies will assert therefore that there is no one ontological category that captures all possible entities as members. Van Inwagen **(2015,49)** seems to think that, although at no point is he clear why this is exactly the case, no constituent ontology can be described as monocategorial. However, his way of understanding what distinguishes constituent ontologies is the notion of ontological structure and ontological parthood – that we saw in section 3.4 and 3.5 are notions he attempts to repudiate. Consider monocategorial ontologies such as versions of the bundle theory. Bundle theoretic accounts of objects certainly employ notions of ontological structure and notions of parthood, that, if not strictly mereological then are something analogous to it, such as compresence or colocation. Since bundle theories are paradigmatic examples of the constituent ontology by employing notions of ontological structure, it follows that constituent ontologies can be monocategorial ontologies. Given this clarification, in what follows I

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[107] Van Inwagen **(2011, 389)** takes it that we have some intuitive grip over what is meant by the notion of an ontological category – his view is that in keeping with Quine's ontological question – what is there?- can be answered in terms of a system of ontological categories where ontological categories are understood to be the most general of the natural classes. That is to say ontological categories genuinely cut nature at its most general comprehensive joints and are not a matter of mere arbitrary convention. For a full articulation of his view on the notion of an ontological category see Van Inwagen **(2012, 11-24)**. For the most comprehensive treatment of the notion of ontological category available see Westerhoff **(2005)**. There Westerhoff defends a Wittgensteinian factualist account of ontological categories , but the first two chapters **(2005,12-64)** offer some attempted definitions, as well as cases, of 'ontological categories'. For an Aristotelian account of ontological categories see Rosenkrantz **(2012, 83-93)**.

am going to give a polycategorial example of a constituent approach to answering the Problem of Character (PC) that explain how objects are related to the properties that they have, namely David Armstrong's polycategorial factualist account. In chapter five I will give a broadly monocategorial approach, one that I take to be superior to the polycategorial factualist approach, namely the mereological bundle theory.

4.2 Armstrong's Factualist Ontology

4.2.1 States of Affairs

Armstrong **(1997a)** famously develops an ontology of states of affairs where the most fundamental entities in the world are states of affairs, or fact-like entities. For Armstrong properties conceived as immanent universals and the particular objects which instantiate them do not exist freestanding from one another. Rather, properties and objects exist in a mutually co-dependent manner at states of affairs. Properties have no existence independent of the particular objects which instantiate them and conversely particular objects are taken to have an existence dependent on the properties that they instantiate. The simplest most fundamental entity is a particular simple state of affairs; that is a simple, unstructured particular possessing a simple unstructured property. Armstrong prefers to call these entities 'states of affairs' as opposed to Wittgensteinian 'facts' since he wants to ensure that there is no confusion between the entities he refers to and true propositions. States of affairs may be related to true propositions by what Armstrong calls the truthmaking relation;

it is states of affairs that ground the truth or falsity of propositions, but states of affairs and true propositions are not identical. States of affairs are worldly mind independent entities for Armstrong, while propositions are mind dependent linguistic entities. However, for the sake of easy reference I am going to refer to the ontology given by Armstrong as factualism throughout the thesis. The combinatorial grid below in figure 1 gives us a representation of a simple world of states of affairs.

		Objects					
Properties		*a*	*b*	*c*	*d*	*e*	…
	F	*			*		
	G	*		*		*	
	H						
	I		*			*	
	J	*			*		
	K		*			*	
	…						

Figure 1: Property instantiations at simple world W₁

At W₁ we can observe that there are a total of 11 states of affairs including *Fa, Ga, Ja , Ib* and *Kb*. Given this we can say that at W₁ there exists properties *F,G,H,I, J* and *K* and particular objects *a,b,c,d* and *e*. For Armstrong these properties and objects only exist in virtue of the set of state of affairs that obtain at W₁. Neither properties or objects have ontological priority in a factualist ontology like Armstrong's. Looking at figure 1 it is the entities denoted by the *, the states of affairs, that are the entities from which all other things are built.

It could be contended that since Armstrong thinks that states of affairs are the primary form of existence that his factualism is in fact a monocategorial ontology, not a polycategorial ontology. This is certainly not something Armstrong would support since he thinks there is a genuine and fundamental distinction to be made between properties and objects. However the contention is fair is so far as it stems from the fact that Armstrong does give a somewhat confused account, that at times gives the appearance that his factualism implies that the distinction between properties and objects is a mere conceptual difference determined from a cognitive act of abstraction from states of affairs to either properties or particular objects. This aside for now, let's follow Armstrong's intent that there are two ontological categories, that there is a fundamental distinction between properties as immanent universals and objects being particulars, and that instantiation is accounted for by states of affairs. What is critical is to understand how it is that objects and properties are brought together by instantiation at states of affairs.

4.2.2 The mode of constitution of states of affairs

Given a polycategorial ontology with a division into two fundamental ontological categories, properties and objects, the problem arises as to how these two ontological categories relate. The problem is very clear for a factualist like Armstrong where properties and the objects that instantiate them are necessarily 'bound up' together as states of affairs. The instantiation of any property, for Armstrong, is to be found in some particular state of affairs where an object instantiates a property. But what makes it the case at some state of affairs that two entities in

radically different ontological categories are related in such a way that they are 'unified' as a given state of affairs? The fact that two entities from radically different ontological categories can relate to the extent that they are unified as a whole, for instance the state of affairs of *a's being F*, is something in need of explanation. To see why let's consider the problem as it occurs for Armstrong's factualism.

How are we to account for properties taken as universals, things capable of being simultaneously wholly present at multiple disjoint locations, being either related to or 'bound up' together with material objects; entities that have only one location. As the problem occurs for Armstrong's factualism, how precisely are we to unpack the metaphor of properties and objects being 'bound together' at some state of affairs. Property *F* and object *a* could exist at a world and yet not be bound up together to give the state of affairs where *a is F*. Armstrong's initial response to the problem of instantiation was to take the 'bound up' unity of properties and objects at states of affairs to be a primitive of his ontology,

"What of the need for a fundamental tie- the tie or nexus of instantiation? Many people have thought it an overwhelming difficulty for a theory of universals. I do not think that the problem of characterizing the nature of the tie should detain us". **(1989a,108)**

In Armstrong's earlier works **(1989a)** he takes the instantiation of properties by objects to hit the bedrock of metaphysical explanation; the fact that properties are instantiated by objects at states of affairs is seen to need no further explanation. In Armstrong **(1997a)** he begins to put slightly more thought into the problem; there the instantiation of a property by an object is taken to be identical to some state of affairs. The relation of instantiation of properties by objects is to simply be identified with states of affairs in general,

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"….there is no call to bind together the constituents of a state of affairs to anything beyond the state of affairs itself. The instantiation of universals by particulars is just the state of affairs itself". **(1997a, 119)**

Given this Armstrong still sees little problem in how to account for the relation of objects to their properties. However, **l**et's spell out the problem around instantiation as it applies to Armstrong's factualism more precisely. Given that the state of affairs *a is F* is contingent, that is to say, that both *a* and *F* could exist and that their existence does not make it the case that some particular *a* has the property *F*, we can say that there is some world W_1 where it is true that *a* and *F* exist yet the proposition 'a is F' at W_1 is false. Given this there is no state of affairs *a is F* at W_1. How are we to distinguish between worlds where *a* and *F* exist from worlds where the state of affairs *a is F* obtains. To do this, we need explain the difference between worlds where object *a* and property *F* exist but at no point does *a* instantiate *F* from worlds where we can say truthfully that 'a is F'. In effect, this is orthogonal to the Problem of Character (PC),

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

Both the problem of instantiation here and the problem of character will require us to account for the relation that obtains between an object and any one of its properties. Once we have that we will be able to answer what differentiates worlds where property *F* and object *a* exist but are not related by *a* instantiating *F* or having *F* as one of its properties from worlds where *a* instantiates *F* or has the property *F*.

4.2.2.1 Armstrong's non-mereological constitution solution

In Armstrong's earliest theories of properties **(1978, 1989a)** the problem of instantiation was of only superficial concern. The instantiation of universals by particulars just are states of affairs, there is no need to bind the constituents of the states of affairs together. States of affair are just brute constitutions of universals and particulars. The form of constitution that Armstrong has in mind is certainly not mereological in his view. This is articulated in more detail as his view on states of affairs evolve. In his *A World of State of Affairs* he asserts that,

"States of affairs hold their constituents together in a non-mereological form of composition, a form of composition that even allows the possibility of having different states of affairs with identical constituents". **(Armstrong 1997a, 118)**

But why is it the case that in Armstrong's view the form or mode of constitution is non-mereological? To see his motivation, consider the following. Take the state of affairs *Abelard kissed Heloise*, where *kissing*[108] is a relation universal in Armstrong's ontology. In this case amongst the constituents of the state of affairs we have the two particulars *Abelard* and *Heloise* and the dyadic *kissing* universal. Given the factualist ontology of Armstrong the proposition 'Abelard kissed Heloise' has its truth grounded in the state of affairs *Abelard kissed Heloise* and the obtaining of this state of affairs necessarily entails the truth of this proposition. Yet now consider another proposition,

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[108] It should be noted that *kisses* is an appropriate relation here given that it is not necessarily symmetrical. It may be the case that both when Abelard is kissing Heloise it may also be true that Heloise is kissing Abelard back, but this need not be so. Abelard may kiss Heloise on the cheek and hence at that moment we would not say Heloise is kissing Abelard.

'Heloise kissed Abelard'. Note that we have the same constituents, Heloise, Abelard and the *Kissing relation* universal. Yet we do not have the same truthmaker; it may be the case that while *Abelard kissed Heloise*, Heloise did not kiss Abelard. Heloise may have been asleep when Abelard kissed her, and if intent is required for the kissing relation to obtain then it would be false to say that 'Heloise kissed Abelard'. The kissing relation therefore can be non-symmetrical since it need not be true that both relata are kissing eachother at the same time. Given this non-symmetry we have to give the additional and distinct state of affairs *Heloise kissed Abelard* which ensures the truth of the proposition 'Heloise kissed Abelard'. It's clear then that we have identical constituents Abelard, Heloise and the dyadic *kissing* relation but two distinct states of affairs; i.e. differently ordered states of affairs of the form *Abelard kissed Heloise* and *Heloise kissed Abelard*. But, so the objection goes, this form of constitution cannot be mereological. If unrestricted composition[109] is true, then since we have distinct states of affairs even with the same constituents the relation (the form of constitution) that obtains between the properties and objects in this case cannot be mereological.

Another example of this can be given with monadic properties. Lewis **(1986c; 1986d, 92-93)** provides an example of how monadic property universals also can give distinct states of affairs with exactly the same constituents. Suppose we have the constituents of states of affairs, the particulars *a* and *b* and the monadic property universals *F* and *G*. Given that Armstrong **(1978b 30-42)** accepts conjunctive, molecular states of affairs, we then can have the states of affairs (*a is F and b is G)*

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[109] See van Cleve **(2008)** for an excellent defence of unrestricted composition and Markosian **(2008)** for the cases for restricted composition.

and an additional state of affairs (*b is F and a is G*). We have exactly the same constituents *a* , *b* , *F* and G but two distinct state of affairs (*Fa & Gb*) and (*Ga & Fb*). Now given that mereological wholes supervene on their parts, again as a resulted of unrestricted mereological composition, we cannot now say that the composition here is mereological. Given unrestricted composition it is impossible to get two distinct composed entities from exactly the same set of constituents; if you have exactly the same constituents you have exactly the same whole. This is not sufficient for the composition Armstrong has in mind for states of affairs. Consider the true proposition 'a is F and b is G'. Given that Armstrong's factualism accepts some version of the truthmaking relation we assert that 'a is F and b is G' is made true *iff* (*Fa & Gb*). Whereas (*Ga & Fb*) with exactly the same constituents cannot ground the truth of 'a is F and b is G' but would entail the truth of the proposition 'a is G and b is F'. Armstrong (**1997, 119-123)** thus takes it that his factualism requires a non-mereological mode of constitution for states of affairs.

Given his factualism: that is to say his adherence to immanent universals, particulars, states of affairs and truthmaking, Armstrong is forced to bite the bullet and assert that states of affairs are an example of a non- mereological form of constitution. He rejects mereological universalism – the view that all forms of constitution follow the axioms and definitions of classical mereology.

"If we have to choose between the (intuitively quite attractive) 'Nominalist' principle' (mereological universalism) and the truthmaker argument that leads us towards states of affairs, then my judgement is that the truthmaker principle is by far the more attractive. States of affairs, then, have a non-mereological mode of composition." (**Armstrong 1997a, 122)**

In effect we can rather say that constitution in the case of states of affairs is not composition, with composition being understood mereologically. However, what this non-mereological mode of constitution amounts to is left utterly unclear **(1997,122)**. It is simply asserted that he is led to the view that there must be a non-mereological mode of constitution in the case of states of affairs by his adherence to factualism. We must accept that the 'binding tie' given by states of affairs is non- mereological and given the threat of Bradleyian regresses we cannot have an additional 'binding' constituent. In the case of Armstrong's factualism how property universals and objects stand to one another, is answered simply by the brutal constitution[110] of states of affairs. This is the view that the constitution of states of affairs by property universals and particular objects is in no further need of substantive metaphysical explanation.

However, this is clearly unsatisfactory; a point that the later Armstrong **(2004a)** came to realise. To see why this is unsatisfactory consider that those that assert that constitution just is mereological composition. They will simply press for what is meant by any instance of constitution or composition that is said to be non-mereological; that is to say does not obey the basic set of axioms and definitions of something like classical extensional mereology. It cannot just be stated that states of affairs as truthmakers demands it as this then simply leads to uninformative impasse. As Lewis states in response to Armstrong[111],

 "Suppose the leading rivals to a theory of universals – resemblance or natural class –nominalism, sparse trope theory- were somehow out of the running.

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[110] I have borrowed the notion of Brutal Composition from Ned Markosian **(1998)**
[111] Compare this quote from Lewis to the previous quote from Armstrong to see the impasse.

Set aside the issue of structural universals. Then we're left with a stark clash of principles: a truthmaker for every truth, versus uniqueness of composition. If that's the choice we face, I say it's no contest. I expect Armstrong and Forrest would say the same. But there I fear our agreement gives out". **(Lewis 1986d, 110)**

Plainly put if the unity of states of affairs, the coming together of property universals and particular objects, demands non-mereological constitution then what that amounts to needs to be outlined. The onus is on the factualist to supply a positive account of the non-mereological mode of composition required for states of affairs. To reject the uniqueness of mereological composition by stating that the composition of states of affairs cannot be mereological is not enough. While principled philosophical impasses are a danger of the game we play, attempts should always be made to avoid them by the supplying of positive theses.

4.2.3 Partial Identity

In Armstrong's **(2004a)** later work on properties we see a radical shift in his thinking concerning the problem. His view, that his factualism need not given a substantive answer to the question of what the non-mereological mode of constitution amounts to, dissolves away. He comes to view his earlier answer **(1997a, 122)**, that state of affairs just are brute compositions of property universals and particular objects as insufficient. The 'fundamental tie' or relation between any property universal and its particular instantiation by an individual object such that there is some state of affairs is seen by the later Armstrong **(2004a)** as a serious metaphysical difficulty in need of a new, positive thesis. He takes it that whatever the relation is between properties and objects

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it cannot be a relation of strict identity, since he still maintains that an object should be distinguished from its properties. He therefore maintains his rejection of the bundle theory from his earlier career **(Armstrong 1978a, 89-101; 1997a, 96-99)**. However, given concerns over Bradleyian regresses, properties and the objects which instantiate them cannot be fully distinct existences.

"a and F cannot be "distinct existences" because then they cannot be united except by a fully blown relation, call it "I" for instantiation. Then, as F.H. Bradley and others have pointed out , the problem reappears. How are a, I and F to be brought together?". **(2004a, 139)**

Armstrong therefore requires a relation to account for how objects stand to their properties; one that is not strict identity nor is mereological composition. Drawing on Donald Baxter **(2001a)** Armstrong **(2004a)** takes the appropriate relation to be 'partial' as opposed to strict identity. The basic idea is that if an object instantiates some property that object is partially identical with the property which it instantiates. Armstrong writes,

"A universal is also a oneness, a genuine one, a strict identity, that runs through its many particulars. Particulars are ones running through many different universals, universals are ones running through many different particulars. A particular instantiating a universal is an intersection of the two sorts of oneness, a point of partial identity". **(2004a, 141)**

Objects, what Armstrong more typically refers to as particulars, can be said to intersect with properties. This intersection is one between two distinct sorts of entities from different ontological categories. This is of course quite a strange notion since the fact that there is some kind of relation between objects and properties that involves identity, partial or strict, suggests that if Armstrong is correct then whether there really are two genuinely distinct ontological categories is up for debate. In effect the polycategorial credentials of this form of Armstrong's

factualism now are in question. Remember that Armstrong does not want to collapse the distinction between property universals and particular objects in either direction. For Armstrong there is an ontological categorical distinction between properties as universals and objects as particulars. But on the account of instantiation as partial identity it does appear that a categorical collapse will occur since if properties and objects are identical in any sense how are we to make a fundamental distinction between objects and properties. Let's illustrate this again with the combinatorial grid we saw earlier. The grid shows points at which properties can be said to be instantiated.

		Objects					
		a	*b*	*c*	*d*	*e*	…
Properties	*F*	*			*		
	G	*		*		*	
	H						
	I		*			*	
	J	*			*		
	K		*			*	
	…						

Figure 1: Property instantiations at simple world W_1

At this world we say that propositions such as 'a is F' are made true in virtue of *F* being instantiated by *a* such that we have the state of affairs *a is F*. However unlike in Armstrong's earlier factualism the * marks off points of intersection between objects and properties; points at which some property can be said to be partially identical to some object. Armstrong's states of affairs are those instances of partial identity between property universals and particular objects. Properties are ones running through many distinct particulars, but

particulars too are ones running through many properties. Property universals can be instantiated by multiple objects and objects can have multiple property universals. However, if this is the case how are we to make a fundamental distinction of ontological category, that is between properties as universals and objects as particulars? It does seem that a categorical collapse is immanent on this account.

However, there is a certain simplicity, at least *prima facie* within the context of Armstrong's factualism, to this approach. However his account **(2004a)** is largely given in metaphorical terms, for instance he illustrates the general idea by the analogy of the intersection of distinct but intersecting highways, flyovers and lanes in a motorway system **(2004a, 151)** . But a more substantive account of what partial identity amounts to between objects and properties is left untouched. As noted earlier it seems to pull apart the very notion that there is a fundamental distinction between objects and properties; the polycategorial credentials of Armstrong's factualism do seem to be at stake with this new articulation of the fundamental non-mereological tie between objects and properties. To avoid this Armstrong has to offer a substantive account of what instantiation as partial identity amounts to. Although I will in chapter five endorse a view that collapses into monocategorialism, it is certainly not one Armstrong would endorse as even in his later work he continues to reject bundle theoretic accounts of objects and the reducibility of objects to properties **(2004a, 140)**. That Armstrong clearly continues to reject monocategorialism and the bundle theory in his later work is clear where he states that a theory of the relation of properties to particular objects,

"must reject what we call Universalism, the view that a particular is nothing more than a bundle of universals…There is something that has the properties, a subject attribute view as opposed to a bundle view."

Unfortunately, Armstrong's later work on instantiation as partial identity were never fully articulated. To more fully articulate partial identity and explore the options that factualism may have at its disposal I shall introduce Baxter's **(2001a, 2013)** notion of aspects.

4.2.4 Aspects and a non-mereological mode of constitution

Donald Baxter (**2001a**) articulates his version of the partial identity of properties and objects in terms of what he calls 'aspects'. For Baxter the non-mereological tie or unity of state of affairs is the identity of an aspect of a property with an aspect of an object. Under this account instantiation is to be understood as the sharing of an aspect by some object and some property, where properties are understood to be immanent universals. Both objects and property universals are taken as complex entities in so far as both objects and properties are in some non-mereological sense made up of aspects. All of the various aspects of some one particular object differ but are all numerically identical to one another, with the same applying to any property universal. This, of course, at first reading is a bizarre and contradictory claim. It explains Armstrong's **(2004a, 142)** reticence in adopting Baxter's full on account of instantiation as partial identity of aspects where he states in a footnote that, *"Baxter explains instantiation in terms of what he calls "aspects", but I have found this part of his theory difficult to understand".* **(2004a, 142)** What Baxter has in mind is something very much like Duns Scotus' attempt to explain the identities and

distinctions in the Persons of the Trinity[112]. His aspectival distinction is therefore very much akin to Scotus' formal distinction **(Baxter 2001a, 451)** between different parts of the Trinity[113]. Unlike Armstrong **(2004a)** where no substantive account of instantiation as partial identity of objects and property is given at least Baxter **(2001a)** does attempt to offer an account. More specifically he gives an account of the unity of objects and properties at states of affairs that can be understood as being, at least not straightforwardly, a non-mereological account. Rather it attempts is to utilize a relativized form of identity[114] to understand instantiation where Leibniz's Law in the case of instantiation concerns the identity of shared aspects of objects and properties, not the objects and properties considered in total.

Let us try to understand this difficult thesis by way of example. It is true that I am both a good driver and a philosopher. As a good driver I spend too much time absent minded thinking about philosophy but as a philosopher I do not spend too much time doing so. As a philosopher over thinking is the correct behavioural state! However, while driving I often find myself thinking over philosophical issues. While in the act of driving I know it is true that I should not do this as it may distract me from carrying out the task at hand, i.e. safely and efficiently driving my car, constitutive of being a good driver. At least in the abundant as opposed to the sparse sense of properties it appears that there are two different properties here. *Thinking about philosophy*

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[112] For an excellent discussion of identity and difference in the Trinity see Hughes **(1989,187-240)**.

[113] See King **(2003, 18-26)** for Scotus' notion of the univocity of being, the trinity and the formal distinction.

[114] Baxter's theory of relativized identity and aspects is considered in more detail outside of the context of properties and how they relate to objects in his work on identity in general. For the best examples of his views on identity and composition see Baxter **(1988; 1989; 1997; 2001b, 2014)**

too much as a good driver and *thinking about philosophy as a philosopher* and in the two scenarios of good driving and doing philosophy I instantiate only one of them. Another way to think in terms of properties here would be to say there is one property here *thinking about philosophy* relativized to whether I instantiate either of the two further properties *being a good driver* and *being a philosopher*. Baxter's way of conceiving of this is neither, rather he asserts that we have two aspects of Rory the object: *Rory insofar as he is a good driver* and *Rory insofar as he is a philosopher*. The import for us here is that *Rory insofar as he is a good driver* and *Rory insofar as he is a philosopher* are not wholly distinct. They are both identified with Rory; indeed, the latter goes some way to explaining why Rory thinks too much about philosophy while driving. However, they are not wholly/ strictly identical either, that is to say they are not numerically identical to Rory the object. Rather each is an aspect shared between Rory as an object and each of the properties in question, *philosopherhood* and *driverhood*. Both aspects can be identified with me, but they need not share exactly the same properties with me or with eachother **(Turner 2014,226)** They are partially identical therefore with me and also with eachother.

We at least have a sense of what Baxter means for an object to have aspects which, while not strictly identical to the object, are partially identical to it. But what of the properties in question. Properties, taken as universals, under a polycategorial ontology are understood as in a distinct ontological category from objects. They are those entities capable of being wholly present at multiple, locationally disjoint objects but by being wholly present retain their numerical identity at each of their instantiations. Consider some property *F*. *F* can be instantiated by two distinct objects *a* and *b* such that we have the two

states of affairs *a is F* and *b is F*. Let it be the case that *a* and *b* are locationally disjoint, *a* could be on Mars and *b* could be on Venus. If *F* is a conceived of as a universal, a oneness running through many, it is traditional to say that *F* is wholly present wherever it is instantiated. Wherever *F* is instantiated it is there as a whole. But then all of *F* is at *a* and all of *F* is at *b,* all of F is simultaneously on Mars and on Venus. The property therefore is where it is not. On the face of it this is absurd. However, as Baxter argues, this *reducio* argument assumes that being wholly present at one location entails not being present in any capacity at some separate location. Being wholly located at Mars entails not being capable of being present at Venus. This objection to multiple location gives us the following,

i) If some property *F* is wholly at one location$_1$ then *F* as a whole is at no separate location$_2$.

Baxter could argue that without an aspectival account of objects and their properties i) could be read as very plausible given the concerns regarding multiple location of property universals. However, in Baxter's **(2013, 296)** aspectival terms we can read i) as,

ii) If some property *F*, insofar as *F* is at one location$_1$, is wholly present at location$_1$ then *F*, insofar as *F* is at location$_1$ cannot then be wholly present at location$_2$.

The property *F* insofar as it is at one location cannot then be at a distinct location. The 'insofar as' locution indicates that we are only considering *F* as *F* exists at some given location$_1$. For Baxter we are then only partially considering *F* insofar as it is located at some one

place. We are considering[115] an aspect of the property *F*. Now Baxter takes it that with aspects injected into the mix that ii) allows us to make sense of the multiple location of property universals. Baxter believes that ii) is consistent with *F* being wholly at some other location, it is only the aspect *F insofar as it is at location$_1$* that is it is unable to be multiply located. Insofar as the property *F* is at location$_1$ it is separate from itself insofar it is at location$_2$. Just like aspects of objects, aspects of universals such as *F insofar as it is at location$_1$* and *F insofar as it is at location$_2$* are to be identified with *F*. However, given that they are multiply located in this respect they differ both from eachother and from *F* overall. The aspects are partially identical with the property *F*. Baxter thus believes that with aspects we can now dispense with the objection to the multiple location of property universals. Properties can be where they are not, but only in so far as properties have aspects where they are instanced.

Given the above aspectival account of properties and objects factualism can offer an account of the non-mereological constitution of states of affairs as the intersection of two sorts of oneness, a point of partial identity between properties and objects. Particular objects and properties are two sorts of unity or oneness. To be a one is to be one whole numerically identical thing. Both properties and objects are therefore single things constituted of various aspects that are neither wholly identical nor wholly distinct from eachother, or the whole which they compose. Instantiation of properties by objects is therefore

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[115] We are not threatened with rendering universals and particulars as mind dependent in virtue of the truthmaking principle – truthmaking has pushed us to states of affairs and consideration of the Instantiation problem has led has to consider this, the non-mereological mode of composition fleshed out in terms of universals and particulars as both having aspects.

understood as the identity of a shared aspect of some object and some property. Consider again the combinatorial grid,

		a	b	c	d	e	...
Properties	Objects						
	F	*			*		
	G	*		*		*	
	H						
	I		*			*	
	J	*			*		
	K		*			*	
	...						

Figure 1: Property instantiations at simple world W$_1$

The state of affairs *a is F* obtains in the world represented above. Let us say that here *a* denotes Rory and *F* denotes *Philosopherhood*. In the world given in the combinatorial grid above the proposition 'Rory is a philosopher' would be true, with its truth grounded in the state of affairs *Rory being a philosopher*. With Baxter's aspectival account of instantiation we can assert that Rory has an aspect, *Rory insofar as he is a philosopher*, and that the property *philosopherhood* has an aspect, *philosopherhood insofar as Rory has it*. These two aspects: *Rory insofar as he is a philosopher* and *philosopherhood insofar as Rory has it* while appearing distinct in terms of the linguistic ordering of terms 'Rory' and 'Philosopherhood' are for Baxter strictly one and the same aspect. If we take these aspects in in their linguistic form 'Rory insofar as he is a philosopher' and 'philosopherhood insofar as Rory has it' Baxter would say that both refer to exactly the same entity in the world.

No doubt Baxter's account plays havoc with basic grammar but it does have at least some appeal by attempting to give a non-mereological

account of the constitution of state of affairs and therefore of the instantiation of properties by objects[116]. It also allows us to distinguish worlds where property *F* and object *a* exist from worlds where it is also the case that *a* instantiates *F*. In the grid above both *b* and *F* exist. Given unrestricted mereological composition we therefore have the object which is the fusion of *b and F*. However, the proposition 'b is F' would be false since the state of affairs *b is F* does not obtain even though both exist. Objects and properties could both exist at a world without the object being an instance of that property. For Baxter's aspectival account the reason why the state of affairs *b is F* does not obtain is because object *b* and the property *F* do not share an aspect in common; *b* and *F* are therefore not partially identical. Let *b* be my dog Mable and *F* be philosopherhood. Mable may have many aspects, aspects which she shares with other properties such as *I* and *K*, but no aspect of Mable is identical with any aspect of philosopherhood. There is no aspect of Mable insofar as she is a philosopher and no aspect of philosopherhood insofar as it is had by Mable. In virtue of this there is no state of affairs *Mable is a Philosopher*. The object and property in this case do not intersect and are not partially identical.

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[116] For an excellent attempt to formalise Baxter's notion of aspects and their role in theories of identity and constitution see Turner **(2014,225-243)**. There Turner offers a formalisation of aspects to allow for an assessment to check what Baxter's aspectival theory is minimally committed and to check whether the aspectival can in fact accord with mereology. The reason Turner does this is that he thinks Baxter's theory is rich and complex enough to potentially offer solutions to a myriad of metaphysical problem including problems of materially coincident objects, and as we have seen, the problem of character. The formalisation will, Turner thinks, assist in the vertigo over Baxter's theory that some analytic philosophers may feel, including myself, on encountering the theory of aspects in its raw form in Baxter's body of work. Mantegani **(2013,697-715)** covers a good array of reasons to reject instantiation as partial identity as it is articulated by both Baxter **(2001a)** and Armstrong **(2004a)**. Baxter **(2013)** offers defences of his theory primarily against those set out by Mantegani **(2013)**.

4.3 Some deficiencies of factualism

4.3.1 Property universals as mere abstractions

The first deficiency of Armstrong's factualist ontology is that it seems to deny the foundations from which it was initially built. Those foundations being an acceptance of the view that properties are universals. With an ontology of states of affairs, it seems to ultimately result in an ontology that is not straightforwardly committed to the existence of properties as universals. As noted in section 4.2 Armstrong's factualism takes it that the most fundamental entities are not particular objects nor the property universals which they instantiate but rather states of affairs. Right at the beginning of his *A World of States of Affairs* this thesis has its most clear statement,

"The hypothesis of this work is that the world, all that there is, is a world of states of affairs." **(Armstrong 1997a, 1)**

Properties in the factualist thesis have no existence independent of the particular objects which instantiate them, while the particular objects have no existence independent of the properties which they instantiate. As Mumford **(2007, 96)** rightly points out, a factualist like Armstrong views the most fundamental form of entity to be *the particular object bearing some property*. That Armstrong would end in this position of the fundamentality of states of affairs should come as no surprise. Its embryonic form could be noted in his earliest work on properties, *Universals and Scientific Realism*, by two principles underlying his own form of immanent realism regarding property universals and particular objects. These two principles he gives are the Principle of Instantiation **(Armstrong 1978a, 113)**, which in effect

nullifies the possibility of there being uninstantiated properties, and the Principle of No Bare Particulars (**1978a, 113)**, which nullifies the possibility of their being particular objects that exist without having any properties whatsoever. These principles assert that,

(1) *Principle of Instantiation*: For each n-adic property *P* there exists at least one particular object *x* such that *x is P*.

(2) *Principle of No Bare Particulars*: For each thin particular object *x* there exists at least one property *P* such that *x is P*.

The bare particular, the object as an entity stripped of all its properties is just a mental construction imagined by stripping away an object's properties. But this stripping away of properties is only an act of abstraction. That is to say it is only a mental act that does not have any worldly counterpart such that there actually exists bare particulars. Equally the transcendent universal, a property without any instances whatsoever is a mental abstraction. What exists in reality are objects possessing some properties. Now given the Principle of Instantiation and the Principle of No Bare Particulars it is clear for Armstrong **(1978a, 113-125)** that properties and objects exist in some kind of state of ontological mutual dependence. The result of this inevitably, is that all that must then fundamentally exist are atomic states of affairs; *a particular object bearing some (one) property*. But surely if this is the case then neither properties nor objects exist in a form other than as a mere abstractions from states of affairs. This is obviously problematic if Armstrong wants to remain being a realist about properties as

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universals. As Mumford **(2007, 104)** correctly points out, it appears to render universals as being mind-dependent entities, since in reality property universals cannot exist independently of particular states of affairs. That this is the case for Armstrong is clear as he takes states of affairs to not themselves be universals. Rather, like objects, Armstrong takes them to be particulars. This is clear given what Armstrong calls the 'Victory of Particularity' where states of affairs are understood to be unique, singularly located entities. His view on the repeatability of states of affairs is very clear,

"States of affairs contain as constituents both particulars and universals. But what of states of affairs themselves? Should they be classified as particulars, universals or neither? Confining ourselves here to first-order states of affairs, the only ones that have been so far considered, the answer would appear to be that they are particulars. For they lack the repeatability that is the special mark of universals". **(Armstrong 1997, 126)**

Now the conjunction of the assertion that the fundamental entities are states of affairs (not particular objects and property universals) and that states of affairs are not themselves universals clearly leaves Armstrong's factualist ontology vulnerable to the suggestion that it is no longer a realist thesis of universals. At this point Armstrong seems left with three choices; (i) let his factualism collapse into some version of trope theory, (ii) jettison factualism in favour of a more traditional immanent realism regarding properties as universals or (iii) take property universals to be some kind of mental abstraction from states of affairs. Each one of these options is likely to be unpalatable for Armstrong[117].

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[117] However, (i) a collapse of factualism into trope theory seems the one that Armstrong would be most likely to accept on the terms of his own philosophical preferences. This is very clear in Armstrong **(1989a, 116-119)** where he considers how to adopt a factualist ontology in a trope theoretic context. Given his acceptance of polycategorial ontologies over bundle theoretic monocategorial ontologies the version of trope theory he would

4.3.2 Bare Particulars and *haeccieitism*

An issue that faces all polycategorial ontologies, factualism included, is that they have to accept that there are bare particulars[118] and if so, they have to accept there being primitive individuating essences known as *haecceities*. There are various attempts to articulate a reasonable account of both bare particulars and *haecceities*. Should this be done then the issue may be resolved. However, the need to articulate a positive account of bare particulars and *haecceities* is certainly an additional burden on any ontology, that for considerations of parsimony are best avoided where possible. Consider so-called bare particulars. Assume that there are irreducible properties (universals or tropes) and there are particular objects that have those properties. There are particular, concrete objects like trees, dogs , bosons , stars and people. And then there are properties had by those material objects: *being green, being docile, having integer spin, having huge mass* and *being tall*. Given that in natural language there are subject and predicate terms it is natural to assume this view, that the subject and predicate terms refer each two fundamental ontological categories of distinct types of entities, objects and properties. Constituent ontologies assert that for any object there is an internal ontological structure true of that object, that is, objects have either mereological or non-mereological components or constituents that together constitute that object. There are two traditional versions

likely accept is something like Martin's **(1980)** substance -attribute account of tropes as attributes. But it would still constitute an unpalatable deviation away from Armstrong's view that properties are universals.

[118] For instance even though Armstrong **(1978a, 113)** claims to reject bare particulars , there are little options for articulating exactly what he means by the notion of a 'thin' particular other than using the concept of bare particular.

of this the bundle theory of objects and the substrata theory. The bundle theory of substance asserts that substances have only properties as their constituents. As van Inwagen **(2011, 389-390)** puts it we therefore have a monocategorial ontology; an ontology with only one ontological category that is itself not a subcategory of any other ontological category. Any object, like Mable the boxer dog, is nothing but some kind of fusion or constitution of properties that the individual dog Mable is taken to instantiate. There only is the ontological category of properties, whatever exists is either a property or is fundamentally constituted only of properties. Mable is nothing but a fusion or constitution of a definite number of properties, instances of this being *whiteness, domesticity, being one metre in length, being 40cm in height* and *being 40kg's in mass.*

The Substrata Theory, of which Armstrong's factualism is an instance, asserts that in addition to property constituents there is, for each object, a bare particular constituent which instantiates those properties and that this bare particular itself has none of properties of the object that the bare particular adds to the constitution of. It is, in effect, the simplest form of object. Take Mable. If there are bare particulars, then in addition to Mable's properties there is a proper constituent of Mable that neither is a property nor has properties as constituents of it. Let's call this thing bare (Mable). In virtue of not being a property nor having properties as constituents it must belong to some ontological category other than property. Let's call this category of bare particulars 'substrata'. The Substrata Theory is therefore a polycategorial ontology given that it implies that there is more than one ontological category, there are properties and then there are the things, substrata, which together with properties can

constitute the objects that we typically take to populate our world. Why posit the existence of these strange entities, the substrata? They seem to be entities that are in no way detectable or involved in causation. There are two primary reasons to postulate substrata and both are purely metaphysical reasons, in addition both rely on the perceived failure of the bundle theory of objects. That failure is that the bundle theory fails to fulfil two crucial roles in any metaphysical theory of objects: (1) individuation; namely, how objects are to be individuated one from the other and (2) unity; namely , how it is the case that objects are constituted such that they are unified.

Individuation

The bundle theory of objects has been taken typically to suffer from a major setback, it appears to entail the Identity of Indiscernibles and thereby take the numerical identity of an object to be equivalent to qualitative indiscernibility[119]. The problem is most severe if we take objects to be bundles of properties taken as immanent universals. If we take properties to be immanent universals, entities wholly present at each of their instantiations, it is clear that two objects constituted of exactly the same properties and nothing else will not be distinguishable. Given bundle theory we cannot individuate two objects that have exactly the same properties[120]. However, given possible scenario's such as Black's **(1952)** indiscernible but

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[119] The problem of qualitative indiscernibles is considered in much more detail in section 5.5 of this thesis.

[120] Notice that a trope version of the bundle theory does not suffer the problem of individuation given that properties when taken as tropes are not wholly present at multiple instances, rather tropes are particularized property. Therefore, substances as bundles of properties in this sense can be individuated given that the constituents are not capable of whole presence at multiple locations.

numerically distinct spheres we are driven to postulate something unlike properties to play the individuating role. Substrata can fill this theoretical role as they are taken to be necessarily unique individuals; they are the most basic form of individual. Given this, at Blacks **(1952)** world we may have the two qualitatively indiscernible spheres, the two spheres having exactly the same properties. But with primitively individuated substrata being constituents of the two spheres we can still numerically distinguish one sphere from the other.

Unity

Take Mable as constituted solely of her properties, whether we take those properties as universals or tropes. What explains how it is the case that these properties bundle together such that we have the material object Mable? Russell **(2003b)** for instance first introduced the notion of compresence between properties to fulfil the unifying role. On this account objects are sets of compresent properties where each member of the set is compresent with every other member. Without worrying about problems regarding completing the sets it is typically pointed out that if objects are taken to be sets of compresent properties then it appears that we have to accept that all the properties had by any object are had by that object necessarily given that sets have their members necessarily. Changing members means changing sets. Objects as sets of compresent properties thus could not have failed to have the properties which they in fact do. Even those properties we ordinarily take to be contingently instantiated by objects will on the bundle theory turn out to be necessary , essential properties of objects. Substrata are now introduced to explain the unity of the properties,

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bare(Mable) instantiating properties explains the unity of Mable's properties. Substrata such as bare(Mable) therefore play the role of grounding why properties come together in one unified object, all the properties of an object being unified to that one substratum. For instance, bare(Mable) will be constituted with each and every property that Mable has, and every property will be related to bare(Mable) such that the unity of Mable as an object can be explained.

4.3.3 Haecceitism

Those that posit the existence of substrata, including the versions of factualism above , answer both (1) individuation and (2) unity by taking substrata or bare particulars to be the most primitive simple form of object. That is to say an object totally devoid of any further constituents. Given that the instantiations of properties are taken to be explained by a form of constituency such substrata or bare particulars are to be understood as having no properties whatsoever. However surely, we should say that substrata such as (bare)Mable in fact have one property, that is to say the property of being self-identical. (bare)Mable is what it is and is distinguished from all other substrata or bare particulars by having a primitive thisness; an essential individuating property. It seems quite clear that any advocate of substrata or bare particulars will have to posit the existence of primitive identities, or essential thisnesses, for every substratum. This is what explained the distinction to be made between Mable and a qualitatively indiscernible duplicate of Mable. This property of primitive thisness is a non-qualitative property known traditionally as a *haecceity.* Any thesis of substrata or bare particulars therefore entails

the existence of *haecceities*. If one adopts a theory of properties as immanent universals then while all other properties of objects will be universals (Armstrong included), then *haecceities* will be those properties or entities that are not universals since *haecceities* necessarily cannot be shared or be repeatable entities.

Unlike many philosophers I do not take the mere fact of postulating bare particulars or *haecceities* to constitute a *reducio*. That is to say I do not think that if a theory is committed to these primitive individuators that then we have a reducio of any such theory. Sense can be made of both bare particulars[121] and *haecceities*[122]. Perhaps this can be done in terms of bare particulars and their primitive identity being articulated in the context of an absolutist or substantival conception of spacetime where bare particulars are understood to be point sized regions of spacetime with their self- identity and distinction from other point sized regions being given in terms of a primitive difference in location of point sized regions within a spacetime manifold. Sider **(2006, 387-397)** articulates this form of defence of bare particulars in terms of spacetime regions. Perhaps understanding bare particulars or *haecceities* like this could go some way to also alleviating concerns over their undetectability and causal inefficacy. The problem with substrata, bare particular and *haecceities* is therefore not that the postulation of such entities is incoherent or incomprehensible but rather one of sheer parsimony of theory. Any theory of the relation

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[121] See Allaire **(1963; 1965)** and Alston **(1954)** for earlier work on, and problems with, the notion of bare particular. See the largely unknown work of Gustav Bergmann **(1967)** for a constituent ontology that defends bare particulars. In that work see in particular **(1967,85-110)** for Bergmann's notion of bare particular as perfect particular as a constituent of objects.

[122] For an excellent treatment and defence of the notion of *haecceity* see Rosenkrantz **(1993)**. For a modern articulation and defence of Scotus' notion of *haecceity* see Bates **(2010, 86-125)**. For the most well-known modern treatment of *haecceity* , in the context of individuation, identity and possible worlds see Adams **(1979, 1981).**

between objects and properties that can avoid the postulation of such entities without loss of explanative power is at an advantage. Understanding bare particulars and all associated entities within the context of a substantival conception of spacetime, while metaphysically coherent, only adds to the postulation of entities and may rail against some accounts of spacetime in contemporary physics. If a theory of bare particulars or *haecceities* commits as to a certain fixed account of the nature of spacetime then we will be in trouble in terms of giving a systematic metaphysics that takes into consideration physical theory that rejects that spacetime is a fundamental ,irreducible form of entity[123].

4.3.4 Bailey's New Problem for Bare Particulars

A new problem for the existence of bare particulars has recently been proposed by Bailey **(2012, 31-41)**. What's interesting about Bailey's new objection[124] to bare particulars is that it holds that even if bare particulars have some properties problems still remain. The new objection grants bare particulars might have some properties but then asks a further question about which properties bare particulars have **(2012, 35)**. Given the perceived failure of the bundle theory to adequately account for the individuation and the unity role, substrata

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[123] In section 5.4 of this thesis I will argue that our metaphysics of properties and objects should not be wedded to any one fixed account of the nature of spacetime.

[124] Bailey's new objection has ignited a veritable little cottage industry within the journal *Philosophical Studies* with a number of papers being published in response and in defence of Bailey's new objection to bare particulars. Those offering a response and contrasting defence of bare particulars include Connolly **(2015)** and Wildman **(2015).** Connolly's position however is to respond in defence of bare particularism by arguing against the constituent ontology; it is therefore a response no constituent ontologist who wants to defend bare particulars should turn to. Giberman **(2012)** offers a continued attack on bare particulars.

theorists assert that every object is constituted of both properties and a substratum. Bailey **(2012, 32)** argues that any theory that posits substrata in addition to properties is the conjunction of two theses:

The Constituent Thesis: Every object, *x*, has at least two kinds of non-mereological (proper) constituents: its properties and its substratum/bare particular *b(x).*

The Having Thesis: Every object, *x*, has its properties by having as constituents' properties that are instantiated by another of its constituents: its substratum/ bare particular, *b(x).*

With the Constituent Thesis and the Having Thesis in place Bailey then poses the following question for any theorist that posits bare particulars in their ontology.

Q) Do substrata/bare particulars have the properties of their host objects?

Bailey's new objection to bare particulars takes the form of a dilemma. In answering Q, if one answers in the negative then this amounts to a denial of the Having Thesis, but if one answers in the affirmative then a *reducio* ensues via what Bailey terms the 'Crowding Problem'. Let's first consider the affirmative answer to Q. Sider **(2006, 388)** for instance seems content to answer Q in the affirmative,

"Now let us look more closely at the complaint against the substratum theory. Thin particulars are alleged to be "bare"; "in themselves they have no properties". Thoughts about this issue must begin with the obvious and flat-footed response: no , thin particulars are not bare. They have properties. For what it is to have properties, according to the substratum theory , is to instantiate universals. Since I am venting, let me belabour the point. If the objection is that thin particular have no properties, then the objection is just wrong. Thin particulars have properties. They really do! Thin particulars may be red, round, juicy, whatever." **(2006, 388)**

As Bailey **(2012, 37)** points out Sider seems to rely here on the following Principle:

The Doubling Principle: For every property F and ordinary object x, if x has F then $b(x)$ has F.

From this Bailey's Crowding Problem follows. For any object, there are two things (in the same vicinity) that have the properties had by the object: the object and also its associated bare particular. So, for example there is something other than x in the vicinity of x, namely a non-property constituent of x. This is $x's$ bare particular $b(x)$ which has all of the properties of x. This follows from the Having Thesis. Consider again Mable and her bare particular (bare)Mable. If Mable is 40kg, white, docile and protective and we answer Q in the affirmative then it follows that (bare)Mable is also 40kg, white, docile and protective. Now if both Mable and (bare)Mable are 40kg, white, docile and protective it seems where we thought we had one dog we in fact have two! We seem to have a very overcrowded ontology given bare particularism, an ontology that posits that for every object we have another qualitatively identical thing. One response to this might be that there are two ways to have a property. In the first way the having of a property is to be tied to that property in the appropriate non-mereological constituency relation, in the second way having a property is by having as a constituent a bare particular that is tied to the property in the appropriate non-mereological constituency relation. In the case of Mable we can say that Mable has her properties by having a bare particular, (bare)Mable, that is a constituent of her that is tied to all the relevant properties in the appropriate non-mereological constituency relation. In the case of (bare)Mable , this bare particular has the relevant properties by being tied to those

properties by the appropriate non-mereological relation. This response gets us nowhere however since even if there are two ways of having a property it still appears we have two Mables where we thought, very plausibly, we only have one. This is, firstly, a bizarre thesis and, secondly, gives ontological surplus without any real explanative gain.

What if we answer Q in the negative? This gives us the other horn of the dilemma. If substrata/bare particulars do not have the properties of their host object, then the *Having Thesis* is false. Consider Mable. Mable is 40kg, white, docile and protective but since we answer Q in the negative (bare)Mable is not 40kg, white, docile and protective. (bare)Mable does not instantiate those properties. It may be tied or related to *being 40kg*, *whiteness*, *docility* or *protectiveness* but it does not instantiate those properties. Since (bare)Mable does not have these properties or any other properties of Mable including her essential properties constitutive of her being a dog it follows that (bare)Mable is not a dog. As Bailey **(2012,36)** argues this is problematic as it denies *The Having Thesis*, central to any constituent ontology that posits substrata in addition to properties.

The Having Thesis: Every object, *x*, has its properties by having as constituents' properties that are instantiated by another of its constituents: its substratum/ bare particular, *b(x).*

The role of bare particulars is to give a theory of what it is for objects to have properties; the role of bare particulars being that they are supposed to instantiate the properties of their host object. They are those constituents of objects that have properties by entering into the appropriate non-mereological tying relation with those properties. In traditional metaphysical parlance bare particulars are the property-

subjects **(2012, 36)**. In effect a negative answer to Q is to deny the primary role of bare particulars, namely be the things that instantiate properties. A negative answer to Q would therefore be to deny the thesis of bare particularism. We'd better therefore say that bare particulars have properties, indeed all the properties of their host objects. But as we saw in the first horn that is not an appealing option. If Bailey is correct, the very notion of bare particular should be jettisoned from the constituent ontologies and we should relook at versions of monocategorial bundle theories that do without bare particulars or substrata all together.

Chapter 5: The Mereological Bundle Theory of Objects

5.1 Introduction: Properties as parts

We are now at the point where the subject of the thesis can come to its culmination. Focus can be put onto the variant of the constituent ontology that in my view is the most promising in answering not only the Problem of Character but also the Problem of Resemblance. This version of the constituent approach has come to be known generally as the Mereological Bundle Theory. It takes the bundling relation between properties, the relation that obtains between a group of properties such that they constitute an object, to be the relation of part to whole. Therefore, instead of taking the relation between an object and its properties to be some kind of non-mereological binding tie, mereological bundle theory accepts that objects are compositions of 'fused' properties. The ontological constitution of objects is simply a form of mereological composition, what I call ontological parthood. The constituents of objects, the properties that objects instantiate, are to be understood as ontological parts of that object. Therefore, to understand the ontological structure of objects a property version of mereological composition has to be employed.

This approach to understanding how properties are in some sense a part of the objects which instantiate them has its antecedents in Nelson Goodman's **(1956)** pioneering work *The Structure of Appearance* and in Donald Williams' **(1953,1986)** articulations of trope theory where he

takes tropes to be the "finer parts" of an object over and above its ordinary spatiotemporal parts. The version of the mereological bundle theory which I will draw most on is Laurie Paul's **(2002, 2006, 2012a, 2013, 2017)** version. This version is the most recent and worked through, making substantive advances on both the work of Goodman, Williams and others. Unlike Goodman the version she proposes is properly speaking a metaphysically realist position; Goodman's version is phenomenalistic in nature taking the property instances to be appearances. William's, while using the term 'part' to describe the relation tropes bear to objects, gives no explicit definition of what property parthood amounts to. As Paul **(2006, 632)** notes,

"…. Williams gives no explicit definition of qualitative parthood, no mereological axioms or definitions, no information about whether fusion is restricted or unrestricted (and if it is restricted , how to treat it), and no account of how qualitative parthood connects to spatiotemporal parthood. As Williams is not even minimally explicit about how a trope-theoretic mereological approach is to be formulated, he cannot be seen as venturing beyond more than a straightforward adoption of (nonphenomenalist version of) Goodman's system."

Paul **(2006)** is therefore claiming clear intellectual priority over the mereological bundle theory by taking the metaphysical realist ground over Goodman's (**1966**) phenomenalist version and by giving a more informative account than Williams' **(1953,1983)** by going into detail about what the claim that properties are parts would amount to. Section 5.2 of this chapter will be devoted to an exploration of this account, outlining the central features of the theory and pointing out some nuances that became apparent in the most recent articulations **(Paul 2012a, 2013, 2017; LaFrance 2015)**. Critically it will be noted that Paul's version of the mereological bundle theory is a monocategorial ontology; the only category of entity that there is, is the category of

property. She categorically states that her version is superior in virtue of not being tied to a substantivalism concerning spacetime, preferring an account where spacetime is emergent from the more fundamental entities of the category of property.

In section 5.3 I will argue that Paul should adopt a fictionalism about the ordinary spatiotemporal parts of objects , taking the view that while talk about spatiotemporal parts is useful in certain contexts it should not be taken as genuinely referring to spatiotemporal parts over and above the more fundamental ontological parts. I will also consider a polycategorial version of the mereological bundle theory that deals with issues around spacetime in a radically different manner to Paul. Unlike Paul, who remains sceptical of a fundamental spacetime structure, what I call the Substantival Mereological Bundle Theory takes spacetime to be a substance independent from properties and objects (that are fusions of those properties). Objects, properly understood as fusions of properties, are taken to rather occupy regions of spacetime **(LaFrance 2015)**. Under this view the material objects taken to inhabit the world are properly understood as properties themselves, albeit very structurally complex properties, but spacetime and regions of spacetime are entities that do not belong to the ontological category of property. We therefore have a distinction between properties and material objects on the one hand, and the substance of spacetime on the other. In light of empirical considerations on the nature of spacetime from physical theory covered in section 5.4 it will be concluded that the monocategorial version of the bundle theory is superior to the polycategorial substantival version. This will also serve to reinforce the view that we should be fictionalists about spatiotemporal parts. The reason for this

being , if we want to be able to apply our metaphysical models of the world in a systematic metaphysics that takes empirical considerations into account , it would be a disadvantage if our theory was committed to a view of the nature of spacetime that may be objectionable in the light of current physical theory. Finally, in section 5.5 I will consider what I have called the problem of indiscernible fusions, which is the mereological bundle theory's version of the problem which has been taken to beset all monocategorial versions of the bundle theory, namely the problem of qualitatively indiscernible objects. In light of the possibility that there may be numerically distinct but qualitatively indiscernible objects, in the case of the mereological bundle theory that there may be numerically distinct but qualitatively indiscernible fusions of properties (objects), it follows that the mereological bundle theory needs to offer an explanation. It will be found that the problem will turn on whether the property mereology employed is fully extensional so as to give identity.

5.2 The Mereological Bundle Theory

5.2.1 Different origins of theory

Laurie Paul's seminal paper *Logical Parts* **(2002)** approaches the theory of objects being composed of properties from an angle distinct from how I have come to the issue. Unlike my own view that comes to the theory as a means of accounting for the Problem of Character (PC) and the Problem of Resemblance (PR), Paul **(2002, 589-593)** comes to the mereological bundle theory as a novel way to solve the problem of material constitution. The problem of

material constitution is of course ancient and well known but it is worth briefly stating it here to anchor the difference in origin of Paul's mereological bundle theory to my own. Consider a statue and all of the clay that composes that statue. A natural thought is to suppose that the clay and the statue are in fact identical since the clay and the statue share exactly the same ordinary spatial proper parts. Classical extensional mereology tells us that objects with all of the same ordinary spatial proper parts are identical, since the clay and the statue occupy exactly the same regions of space. As is well known the seemingly natural view that the clay and the statue are identical as a result of classical extensional mereology faces immediate objections because the statue and the clay have different modal properties, and therefore different persistence conditions. Take for example the statues fragility which it does not share with the clay. Under certain sets of conditions, for instance if the statue were to fall onto a hard floor from a height, the statue would break and cease to exist but the clay that composes the statue would persist. With this difference in modal properties, like fragility, the view that the statue and the clay are numerically identical comes directly into conflict with the principle of the identity of indiscernible – a principle that Paul **(2002, 589)** rightly notes is as natural and intuitive as the view that constitution is identity. That constitution as identity and the principle of the identity of indiscernibles come into conflict is obvious since if the statue is identical to the clay and the statue is fragile or necessarily has a certain shape then the clay must be fragile and take a certain shape. If the identity of indiscernibles is true then the statue and the clay must have exactly the same properties, including their modal properties. This is clearly not the case since the clay is not fragile, at least not in the same way that the statue is.

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Approaches to the problem of material constitution take one of the two principles as having primacy and work from there. Typically, [125] either you take constitution as identity to have primacy[126] or you take the identity of indiscernibles to have primacy[127]. Either side it seems must adopt a counter intuitive position by denying the other principle. Paul's solution using properties as parts; she refers **(2002)** to properties as parts as 'logical parts', offers a way around this clash of intuitions. Consider both objects: the clay and all of its properties including its modal properties and the statue and all of its properties including its modal properties. If we take those properties to be ontological or logical parts of the two objects it follows that the clay and the statue are not identical since the statue is ontologically composed of some properties that are not ontological parts of the clay. For instance, fragility is not a property of the clay. But mereological bundle theory also explains why the statue and the clay are so intimately related. The clay with all of its properties and the statue with all of its properties partially overlap, that is to say they share many of their properties as ontological parts but not all of their properties. The postulation of

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[125] There are other possible avenues to approaching the problem of material constitution that are not exhausted by the disjunction of accepting the primacy of constitution as identity or accepting the primacy of the identity of indiscernibles. For instance Compositional Nihilists deny that composition occurs at all **(Dorr 2005)** , Organicists like Van Inwagen **(1990)** argue that the only composed entities that exist are organic , biological entities such that given some *xs* , there is a *y iff* the activity of the *xs* constitute a life **(1990,90)** and Eliminativism, most notable seen in Merricks **(2001)** ,who take the postulation of the ordinary objects to be superfluous in light of causal overdetermination by the entities that putatively make up those ordinary objects.

[126] The constitution as identity view is, as far as the literature goes, the far less common position. However, for examples see Baxter **(1988, 1989)**, Noonan **(1993)** and Hughes **(1986)**. A somewhat watered-down version of composition as identity can be seen in Lewis **(1991,81-87)** where he articulates composition to be analogical to identity. Sider **(2001,154-161)** while remaining non-committal to composition as identity sees its advantage being its power to explain his view that composition is necessarily unrestricted.

[127] This is known in the literature as the Constitution View as it takes objects like the statue to be constituted by but not identical to the clay. This is by far and away the more common view, to the extent that it has been taken to be the standard account. Notable versions include Baker **(1997,2004)**, Fine **(2003)**, Koslicki **(2004. 2008)** and Johnston **(1992)**.

ontological parts is therefore initially used by Paul to solve issues around material constitution.

Paul's property mereology therefore arises in an interestingly distinct way to the origins of my support of the theory as the best form of constituent ontology. As noted at the beginning of this section my own preference for mereological bundle theory arises from attempts to solve these two orthogonal problems:

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

The Problem of Resemblance (PR): Take two objects x and y both with property F and ask of this fact, what is it about these two numerically distinct things x and y in virtue of which they are both F. By example we can ask of two red objects what is it about these two objects in virtue of which they are both red.

Prior to writing this thesis, I had begun to explore the idea that particularly in trying to answer PC, the relation between an object and its properties could be understood as partial identity. That is to say that states of affairs or property instances should be understood as instances of identity between a given object and a given property. Using a toy example, the instance of a particular rose's redness can be understood as an instance of identity between *redness* the property and an object, namely a particular rose. The view had drawn heavily on Armstrong **(2004a)** , a view which we saw in section 4.2.3. However, in that account Armstrong gives little detail of what partial identity between objects and the properties which they instantiate amounts to.

Although himself inspired by Baxter **(2001a)** Armstrong is reluctant[128] to utilise Baxter's own more substantive account of partial identity which draws on his notion of aspects. As noted in section 4.2.4 the theory of aspects is itself difficult to follow and perhaps unduly opaque. In addition , as we saw in section 4.3, neither Armstrong **(1997a, 2004a)** nor Baxter **(2001a,2013)** are sufficiently able to deal with two general problems. Firstly, both seem to render their adherence to realism concerning universals incoherent and secondly, both have attached problems surrounding bare particulars and *haeccieitism*.

What is needed is an account of how it is the case that properties and objects may overlap to the extent that it is possible to say of any particular object that if it has a certain property, then that object is partially identical with that property. Given the failure of Baxter's aspect theory, an immediate alternative of a well worked through formal framework became apparent, mereological composition that deals with the relation between parts and wholes. Understanding the constituent relation between an object and its properties could thereby be understood in terms of properties being literal parts of objects and utilise a well understood formal theory to do it. Hence, from a different initial approach from Paul **(2002)** we both arrive at a similar destination, namely the mereological bundle theory of objects that utilises a property mereology to account for the ontological structure of objects.

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[128] As we saw like both Armstrong and I agree that Baxter's theory of aspects is opaque and difficult to comprehend. As Armstrong states, "*Baxter explains instantiation in terms of what he calls "aspects", but I have found this part of his theory difficult to understand*". **(Armstrong 2004a, 142)**

5.2.2 A property mereology

5.2.2.1 Some basic concepts

Traditional versions of the bundle theory have taken the bundling relation to be a primitive relation where the relation is understood in various versions to be compresence, co-location, consubstantiation or concurrence. Paul's theory deviates radically from these by utilising the parthood relation, understanding objects at a given time to be mereological fusions of properties. In Paul's theory objects are to be understood as nothing more than bundles of properties **(Paul 2006, 631)** or rather ,from here, as nothing more than fusions of properties**.** In addition, Paul endorses the thesis that properties are immanent universals or at least something very much like immanent universals, that is to say she takes objects to be fusions of multiply locatable properties **(2006,631)**. The theory as proposed by Paul therefore rejects the thesis that property instances are to be understood as primitively individuated entities, by doing so she rejects the more common versions of the bundle theory that take objects to be bundles of tropes **(2006,631)**. However, Paul **(2002,583)** caveats this endorsement of immanent universals by stating that, *"Logical parts will allow us to argue that characterizations of properties as tropes and universals are just different sides of the same coin, and combine the benefits of tropes and universals without their attendant problems"*. The promise of the mereological bundle theory is therefore strong. If successful it would seem to have great explanative power not just in terms of accounting for how objects and properties are fundamentally related[129] , which is the subject domain of the Problem of Character (PC), but also great

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[129] See section 5.2.3.1 for how it answers the Problem of Character.

explanative power in answering concerns that arise from the postulation of both immanent universals and tropes[130]; both of which serve to provide answers to the Problem of Resemblance (PR). However, before proceeding to the theories explanatory prowess let's first go through how the theory utilises the tools of mereology. Let's start by considering some of the mereological tools we are including, these will form some of the most basic central concepts from which the theory can work. This will then allow clarity before we proceed to give a property mereology.

Proper Parts

The most critical distinction within a theory of mereological composition is that between proper and improper part, since it is the notion of proper part that captures the correct sense of what is meant in ordinary language by phrases like 'that branch is a part of that tree' or ' that liver is a part of Tom'. When it comes to a property mereology it will also give the correct sense of what is meant by x has the property F as a result of F being a part of the fusion x. To capture this, we need to see why the concept of part in mereology will not suffice and thus why we need to employ the concept of proper part. We need to employ this notion because we need to capture the transitivity , asymmetry and irreflexivity of the parthood relation that correctly makes sense of what we mean by phrases like 'that branch is a part of that tree 'or 'that liver is a part of Tom'. The reason we need the notion of improper part is because the relation of part to whole, with the formal properties of transitivity, asymmetry and irreflexivity is a

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[130] See section 5.2.3.2 for how it answers the Problem of Resemblance.

partial ordering and as such we need to employ the notion of part more generally to include that if we say x and y are identical , then we can say x is an improper part of y. So, an essential characteristic of a theory of mereological composition is that an improper part means part-of-or-identical-to. As Simons **(1987, 11)** notes just as arithmetic, which gives partial orderings of numerical quantities, needs the relation of less-than-or-equal so mereology needs part-of-or-identical-to. This then allows us to assert that if x and y are identical, then x is an improper part of y. We therefore have a mereological concept in improper part to understand the notion of identity within the confines of thinking about parthood. But with proper parthood we have the relation we need, namely a relation that gives the sense that a part is always somehow less than the entity[131] which it is a part of. We can now say of proper parts that they have the formal characteristics we need. (Proper) Parthood is transitive such that if one entity is a proper part of another, and the second is a proper part of a third, then the first entity is a proper part of the third. (Proper) Parthood is asymmetrical such that if one entity is a proper part of another, then the second is not a proper part of the first. (Proper) Parthood is irreflexivity such that no entity is a proper part of itself.

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[131] I refrain from using the term 'object' or 'individual' as most commentators do, preferring rather to use the more general term 'entity'. I could of course use the term 'existent' but I found this rather cumbersome in use but I think 'entity' captures that general sense. Simons **(1987)** prefers to use the term 'individual' following Leonard and Goodman's **(1940)** *Calculus of individuals* since it is taken that the part-whole relation only operates between the lowest type of logical entity represented formally as constants. Given that I take the part whole relation to be able to operate amongst entities such as universals I have avoided the term 'individual' in so far as 'individual' is contrasted with 'universal'. Of course, it could be argued that universals are just a more general kind of individual but for the sake of simplicity I avoid the term 'individual'.

Overlap and Disjointness

With the notion of proper and improper parts distinguished we can now look at the critical concepts of overlap and disjointness. The reason that we need to get a grip on these concepts is that they will be employed in the definitions of the property mereology. In a theory of mereological composition two entities[132] can be said to overlap eachother *iff* either they share some common part including an improper part in cases of identity or where between three entities the second entity shares a part in common with first and third but the first and third do not share between them a common part. In the case of identity, we can say that if x and y are identical then x is an improper part of y and x and y completely overlap such that no proper part of x is disjoint from y. Entities are disjoint *iff* they do not overlap, that is to say that they share no common part. Overlap is reflexive and symmetric but is clearly not transitive given that x can overlap y and y can overlap z but x and z need not overlap.

The concepts of overlap and disjointness will be critical if properties are understood as universals, as Paul understands properties to be. For instance, consider the property universal *having negative charge*. Clearly if this property is a universal then it is as Paul states a multiply locatable **(2006,631)** property given that more than one object[133] may instantiate that exact property. However, objects may instantiate other properties and equally properties may be instantiated by many

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[132] See previous footnote for why I prefer to use the term 'entity' as opposed to 'object' or 'individual'.

[133] It needs to be noted that when the term 'object', or more exactly a 'material object', are meant to pick out those things that are a fusion of properties; objects in fact only being fusions of properties. The notion of fusion will follow on from the central concepts of proper parthood, improper parthood, overlap and disjointness.

distinct objects. Now if we understand the having or instantiating relation to be ontological parthood, we can say that an object has or instantiates any one of its properties if that property is a proper ontological part of that object. With overlap we can say that the property universal *having negative charge* overlaps every object that has negative charge. But the property universal *having negative charge* being a whole itself is also disjoint from each of its instances is so far as it is instantiated by other distinct objects. We can say that for any property *F* and any objects *x,y,z* if each object instantiates *F* then *F* overlaps *x,y,z* but while *x,y,z* may overlap in so far as they all have *F* as an ontological part they are disjoint from eachother in so far as they may have other ontological parts that neither of *x,y,z* share as a common ontological part with eachother. We can say therefore say that each of *x,y,z* partly overlap with eachother by having some but not all ontological parts in common.

Summation and Fusion

With the concepts of proper part, improper part, overlap and disjointness in place we can now move on to the mereological operations that will allow us to make sense of the concept of a fusion. The concept of fusion, on the mereological bundle theory, will be required to understand what objects[134] are, since objects will be taken to be the fusion of their properties taken to be ontological parts. To start to understand fusion we need to consider two entities taken to compose some further object. This would be the product of those two entities. If two entities overlap, then they share at least one part in

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[134] See previous footnote 133.

common. It is the product of those two entities which is the entity which is part of both and is such that it is identical to that shared part of the two entities. For instance, if x and y overlap then they share at least some one common part. That product of x and y then is that entity z which is a part of both, and which is a common part of both x and y. As Simons **(1987, 13)** correctly points out it is the mereological version of the intersection of two sets, the difference being that in set theory two disjoint sets have an intersection , the null set, whereas entities which are mereologically disjoint are understood as disjoint precisely because they lack a common part between them. We can call the joining of different entities 'summation' with the sum of this being called the fusion. Any fusion is the summation of two or more entities. In classical extensional mereology consider two entities x and y[135]. The sum of those two entities is the entity $x + y$. This entity $x + y$ which is defined as mereological summation of x and y and is that entity which overlaps anything *iff* it overlaps at least one of x and y.

5.2.2.2 Objects as fusions of properties

With these central and basic concepts in place I can begin to outline the property mereology which underlies the mereological bundle theory. Unlike Paul I will not refer to the parts in this context as

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[135] A central thesis of classical extensional mereology is that for any two entities whatsoever there is a fusion of those entities. This has come to be known as the thesis of Unrestricted Composition and is the most controversial aspect of classical extensional mereology since it asserts that for any set of entities no matter how unrelated, how spatiotemporally disjoint or how radically different in kind there must exist the fusion of those entities. For instance, consider the following: the number 3, the sun, my right hand and a dinosaur that lived 70 million years ago. No matter the great differences in kind, spatiotemporal difference and unrelatedness of these entities, according to Unrestricted Composition there exists the further entity which is the fusion of all of them.

'logical' parts , rather following earlier usage in this thesis regarding the ontological structure of objects I will use the term ontological parts. Bundle theories of objects are able to analyse the relation between an object and its properties by taking the object to be identical to a bundling or grouping of properties which that object is said to instantiate. Traditional bundle theories of objects attempt to analyse the bundling relation in terms of various concepts of compresence, co-location, consubstantiation or concurrence. These concepts are not anchored by any well-known or understood background theory. The genius of Pauls **(2002, 2006)** initial movement to a mereological bundle theory is to realise following Goodman **(1966)** and Williams **(1953,1986)** that there is a non-arbitrary and relatively well understood relation that can account for the bundling relation and allow for a distinction to be made between a mere set of properties and a set of properties that constitute unified entities like material objects.

As Paul **(2013b)** states,

"Mereological bundle theory improves upon traditional bundle theory by taking the primitive relation of bundling to be the more familiar relation of fusing or composing, such that objects are fusions of properties or fusions of property instances. Hence , mereological bundle theorists endorse a property mereology where properties or property instances can be parts of objects. An advantage of the approach derives from the fact that standard mereologies take composition to be primitive or define it using a different primitive mereological notion (such as primitive parthood). Thus, taking the basic primitive of bundle theory to be composition can reduce the need for additional primitives in one's overall ontology and substitutes a familiar type of relation relied upon elsewhere in ontology for an unfamiliar type of relation unique to the bundle theorist ".

The mereological composition relation therefore gives us a relatively well understood means to analysing the bundling relation used to explain the relation between an object and any one of its properties.

To get to grips with the mereological bundle theory let's first develop the property mereology in terms of some axioms and definitions.

A₁. For any ontological proper part x, x is not an ontological proper part of itself.

A₂. For any proper ontological part x and for any y if x is an ontological proper part of y, then y is not an ontological proper part of x.

A₃. For any proper ontological parts x and y , and for any z , if x is an ontological proper part of y and y is an ontological proper part of z then x is an ontological proper part of z.

D₁. For all x and y, x is an ontological part of y *iff* x is a proper ontological part of y or x is identical to y. (An objects improper ontological part is identical to that object)

D₂. For all x and y, x ontologically overlaps y *iff* x and y have an ontological part in common.

A₁ gives the irreflexivity of the proper ontological parthood relation, A₂ gives the asymmetry of the ontological parthood relation and A₃ gives the transitivity of the ontological parthood relation. Now consider the definition D₁-D₂ that deal with understanding objects in terms of their ontological parts. Interestingly according to D₁ if an object x is an ontological part of object y then either x is a proper ontological part , being a part of y without y being a part of it, or x and

y are identical. The fact that we can still conceive of *x* being a part of *y* , in so far as it could be an improper part enforces the notion that objects are nothing more than fusions of properties since if *x* and *y* are identical, that is to say they completely overlap, then there is no disjoint remainder not a part of either *x* or *y*. That is to say there are no non-property bits left over to account for any difference between *x* and *y*. The world of objects is exhausted without remainder by ontological structure, that is to say fusions of properties are themselves properties. Van Inwagen **(2011)** was the first to notice this about Paul's ontology when picking it out as a monocategorial ontology. Speaking of Pauls ontology, he states,

"…there exist only properties (but the members of any non-empty set of properties have a fusion; the fusion of any set of properties is itself a property; among the various fusions of properties are concrete particulars……thus certain objects that traditional ontologies would place in other categories than "property" do exist, but, whatever else they may be , whatever non-primary ontological categories they may belong to, they are one and all members of the only primary ontological category, the category "property".) " **(van Inwagen 2011, 390)**

According to D$_2$, if *x* and *y* each have property *F* as a part , then *x* and *y* ontologically overlap in virtue of their shared ontological part *F*. Consider a proton on one side of this galaxy and another proton on the other side. Both protons can be said to have *positive charge*. Under D$_2$ we can say that the two protons , no matter how locationally distant ontologically overlap in virtue of their shared ontological part *positive charge*. This is the case even though the two protons do not overlap with respect to any of their seemingly ordinary spatiotemporal parts, being very distant from eachother. Thus, objects that are qualitatively similar can have different locations or occupy distinct regions of

spacetime[136] while still overlapping ontologically to a significant extent **(Paul 2006, 634)**.

D₃. For all x and y, x is ontologically disjoint from y *iff* x and y have no ontological part in common.

D₄. For all x and y, x partly ontologically overlaps y *iff* x and y have some but not all ontological parts in common.

D₃ accounts for objects that are totally qualitatively distinct, that is to say objects that do not resemble in any respects. Such objects would have no properties in common and therefore would not overlap with respect to any ontological part. While most pairs of objects would not be totally dissimilar in this way the theory still has the ability to deal with objects that may be said to display the maximal difference any two objects could display. For instance, perhaps between God and the rock of Gibraltar. However, in almost all cases most pairs of objects will ontologically overlap to some degree in virtue of resembling in some respect; that is to say they would be qualitatively different but not ontologically wholly disjoint **(2006, 634)**. D₄ accounts for this more common case of most objects resembling in some respects . Something to note in relation to Armstrong **(2004a)** and Baxter's **(2001a, 2013)** thesis of instantiation as partial identity is that in partial ontological overlap we seem to have an excellent stand in for the notion of partial identity, one that does all of the work of partial identity but avoids the

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[136] In section 5.3 and 5.4 we will see that the mereological theory, in its best form, should do away with the notion of spatiotemporal parts and with the notion of regions of spacetime.

pitfalls. It seems better to think now of instantiation as partial overlap as opposed to partial identity.

D$_5$. For all *x* and *y*, *x* is the ontological fusion of *ys iff x* has all the *ys* as ontological parts and no ontological parts disjoint from the *ys*.

Critically D$_5$ defines what it is to be a fusion of properties. Where *ys* are properties , if *x* has all the *ys* as ontological parts and has no ontological parts distinct from the *ys*, then *x* is the ontological fusion of the *ys* such that ontological fusions of properties are bundles of properties **(Paul 2006, 634)**. Proper ontological parts therefore exhibit the formal characteristics of proper parts **(Paul 2002, 581)** : nothing is a proper ontological part of itself (irreflexivity) , if *x* is a proper ontological part of *y* , then y is not a proper ontological part of *x* (asymmetry) and if *x* is a proper ontological part of *y* , and *y* is a proper ontological part of *z* then *x* is a proper ontological part of *z* (transitivity). An object that is the fusion of properties *F* and *G* is not a proper ontological part of itself, and if that object is the fusion of *F* and *G* is a proper ontological part of some object *x* , *x* is not a proper ontological part of the object that is the fusion of *F* and *G*. If *F* is a proper ontological part of an object that is the fusion of *F* and *G* , and if the object that is the fusion of *F* and *G* is a proper ontological part of a fusion of *F*, *G* and *H* , then *F* is a proper ontological part of the object that is the fusion of *F*, *G* and *H*. As noted with D$_1$ the concept of ontological parthood is extended to include improper ontological parts such that every object is an improper ontological part of itself. The concept of improper ontological part is needed given that Paul's version of the mereological bundle theory is a monocategorial

ontology. It has to be ensured that trivial claims such as "x has the property of being identical to x" **(2002,581)** are true within the confines of the property mereology of ontological composition. This is carried out by the concept of improper ontological part with *being identical to x* picking out the fusion of properties identified with x such that x is an improper ontological part of x.

However, Shriver **(2014, 904-905)** notes that the property mereology given by A_1-A_3 and D_1-D_5 is not sufficient for a fully developed mereology. What seems to be required is a supplementation principle that makes fully explicit the relationship between ontological fusions and identity such that the property mereology can be extensional. However, in Paul's earlier work on her mereological bundle theory **(2006, 635)** she states,

"…my bundle theory allows for the possibility of actual-world cases of qualitatively indiscernible objects at different locations because such objects can be individuated by their location properties, by properties of their spatiotemporal parts, or primitively. Primitive individuation does not require the acceptance of primitive thisnesses or haecceities, but unless it is the property parts (instead of the whole fusion) that are primitively individuated , it does require the rejection of a mereological supplementation principle , qualitative extensionality, according to which objects (excluding objects that are qualitative simples) with the very same proper qualitative parts are identical."

However, she still takes it that qualitative extensionality holds, and that extensionality of the property mereology does not entail acceptance of the principle of the numerical identity of qualitative indiscernibles[137]. This is because she includes amongst ontological parts many different kinds of property parts that can include the

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[137] See section 5.5 for the Problem of Indiscernible Fusions and its solution.

properties of having particular locations or (if necessary) primitive individuated properties **(2006, 635)**. Shriver **(2014, 905)** argues that we cannot make full explanatory use of the mereological bundle theory without an appropriate supplementation principle that makes explicit the theories extensionality. He argues this using the example of problems of material constitution that Paul **(2002, 2006)** originally formulated her theory to solve. Remember that to distinguish the statue from the clay Paul takes the statue and the clay to be unique fusions of properties that heavily overlap but have some disjoint ontological parts. But without supplementing the property mereology given by A_1-A_3 and D_1-D_5 there is no way to distinguish fusions one from the other. There has to be a way to invoke the notion of identity or something akin to identity. It therefore seems that there is a need to give a supplementation axiom A_4 in addition to A_1-A_{-3} to makes fully explicit the notion that a fusion of properties exhausts what it is to be an object. Shriver **(2014, 905)** therefore suggests a supplementation principle similar to a Supplementation Principle **(SSP)** invoked in ordinary classical extensional mereology.

(SSP) For all objects x and y, if x is not a proper part of y , then there is a part of y that does not overlap x.

He argues that without a property mereology version of SSP there will be no guarantee that the fusion of the qualitative and location properties of the clay will be a proper ordinary part of the fusion that ontologically composes the statue ; even though there is one set of properties that picks out this unique ontological fusion of properties referred to as the clay. This means that without a qualitative version of SSP there is no way to ensure that ontological fusions with exactly

the same ontological parts are identical and without that there is no way to pick out fusions of properties as the material objects we take to inhabit the world. In the case of the clay and the statue we have no way to show that they ontologically overlap such that we can solve the problem of material constitution using Paul's **(2002, 2006)** theory. A supplementation principle that gives full extensionality, Shiver argues, is needed to give the theory its full explanatory power. Shiver **(2014, 906)** therefore supplements property mereology with the following strong supplementation that explicitly invokes the relation between the sharing of exactly the same ontological parts and identity,

A₄ss . For any x and y, if x and y share exactly the same proper ontological parts , then x is identical to y.

However, Paul **(2006, 635)** appears somewhat tentative to fully endorse a strong supplementation principle that gives an explicit statement of qualitative extensionality. She states in a footnote **(2006, 656)** that if qualitative extensionality were to be rejected then property mereology could at least be weakly supplemented with *"…the axiom that every object with a proper qualitive part has another proper qualitative part that is disjoint from the first".* In her later work on the mereological bundle theory she **(Pauls 2017,38-39)** offers just such a weak supplementation such that if an object (a fusion of properties) has a proper ontological part, then it has at least one other proper ontological part.

A₄ws. For all x and y, if x is a proper ontological part of y, there is a z such that z is a proper ontological part of y, and z is ontologically disjoint from x.

Her acceptance of a weaker version of supplementation indicates some reluctance to fully endorse qualitative extensionality to account for the relation between ontological parthood and identity. Unlike in her earlier work **(Paul 2002, 2006)** the reasons for this become clear in her later work **(Paul 2017,39-40)**; she does not want to take fusions with exactly the same proper ontological parts to be necessarily identical. This is because she wants to allow into her property mereology the possibility that there are fundamental polyadic properties like relations, and that therefore these may feature as ontological parts[138]. Given that Paul takes relations to be things with a certain intrinsic character *(*what I have called *kath hauto* character*)* it follows that if relations can be ontological parts and fuse to other properties then that character will influence the ontological structure of the fusion that includes the relation as an ontological part.

Now if there are fundamental asymmetric relations then there are relations with an intrinsic direction such that when an asymmetric relation fuses to other properties, the resulting ontological structure has a structure with a certain direction **(2017, 40)**. For instance, consider an asymmetric relation *R* that is fused to properties *F* and *G* such that there are distinct relations *FRG* and *GRF*. Given this asymmetric relation, if in fact they figure as ontological parts, they provide ontological fusions with a certain structural character via the mereological composition of properties with relations that have direction in virtue of having places for their relata. An example of this could be fundamental temporal directions or fundamental causal relations **(2017, 40)**. Consider fundamental temporal directions. If it is

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[138] In addition, I suggest in section 5.5.3 I also argue that if the mereological bundle theory accepts strong supplementation then it cannot account for examples of qualitatively indiscernible fusions, whereas weak supplementation can.

the case that the world includes asymmetric temporal ordering relation *R*, such that the fusion of *FRG* has an intrinsic direction because it includes the intrinsic (or *kath hauto*) character of *R* then the fusion of *GRF* has a different intrinsic direction, even though it has exactly the same proper ontological parts. We can therefore understand the inclusion of fundamental asymmetric relations to be the view that some relations may have ordered places for their relata. Which of these places other properties and relations are fused with determines the overall character of the fusion that includes that asymmetric relation **(2017, 39)**. However, Paul **(2017, 39)** concedes that it might not be the case that there are fundamental asymmetric relations and that if not the property mereology[139] *"could be made extensional (replacing the axiom of weak supplementation with something stronger to give extensionality)."*

Given this when I refer to a supplementation axiom A₄ I refer to the disjunction of the following:

A₄ss. For any *x* and *y*, if *x* and *y* share exactly the same proper ontological parts, then *x* is identical to *y*. (Strong Supplementation)

Or

A₄ws. For all *x* and *y*, if *x* is a proper ontological part of *y*, there is a *z* such that *z* is a proper ontological part of *y*, and *z* is ontologically disjoint from *x*. (Weak Supplementation)

In section 5.5.3 that deals with problems of indiscernible fusions I will return to the matter of whether strong or weak supplementation to the

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[139] See the last note 129 for an additional reason to not accept strong supplementation for the property mereology.

property mereology should be given. However even with the dispute over whether to supplement with A_{4SS} or A_{4WS} properties and fusions of properties exhaust what it is to be an object; objects just being fusions of properties. With all of this in place an account of what the bundling relation amounts to can be given. The account that I endorse uses the central basic concepts from the well-known theory of parts and wholes, as opposed to less well-known relations like compresence, co-location, consubstantiation or concurrence.

5.2.3 Solutions to the Problems of Character and Resemblance

5.2.3.1 Character and Instantiation

A central aim of any constituent ontology is to give an account of what instantiation amounts to. This is given by the challenge set to give some answer to the Problem of Character (PC). Given A_1-A_4 and D_1-D_5 it is clear we now have the tools in place to give an answer. For any property F to be instantiated by an object a is for that object to be nothing more than a fusion of properties and for F to be a proper ontological part of that fusion. The parthood relation, more specifically the ontological parthood relation, is now the relation used to analyse instantiation.

		Objects					
Properties		*a*	*b*	*c*	*d*	*e*	…
	F	*			*		
	G	*		*		*	
	H						
	I		*			*	
	J	*			*		
	K		*			*	
	…						

Figure 1: property instantiations at simple world W_1

Consider again the combinatorial grid that represents a world W_1 where it can be truthfully asserted that certain objects instantiate certain properties; that is to say a world where propositions like 'a has F' or 'd is F' are true in virtue of *a having property F* or *d having property F*. We saw in the last chapter that Armstrong's factualism **(1997a)** used an ontology of states of affairs to account for instantiation. It was however an answer that was unable to sufficiently explain the relation that accounts for instantiation. The later Armstrong **(2004a)** attempting to draw on Baxter's **(2001a)** theory of instantiation as partial identity between properties and objects but for various reasons[140] this attempt is not satisfactory. However, this ingenious theory, and the central notion of partial identity of objects and their properties, has merit in so far as it offers a robust attempt to account for the instantiation relation. There is something to be salvaged from

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[140] See sections 4.2.3 , 4.2.4 and 4.3 to see reasons why the theory of instantiation as partial identity, at least under the scope that Armstrong **(2004a)** and Baxter **(2001a)** give, is not satisfactory.

this account, albeit not in the terms that either Armstrong[141] or Baxter[142] would have happily countenanced.

The terms we are presented with in the mereological bundle theory, with properties being ontological parts, are given by A$_1$-A$_4$ and D$_1$-D$_5$.

A$_1$. For any ontological proper part x, x is not an ontological proper part of itself.

A$_2$. For any proper ontological part x and for any y if x is an ontological proper part of y, then y is not an ontological proper part of x.

A$_3$. For any proper ontological parts x and y, and for any z, if x is an ontological proper part of y and y is an ontological proper part of z then x is an ontological proper part of z.

A$_{4SS}$. For any x and y, if x and y share exactly the same proper ontological parts, then x is identical to y. (Strong Supplementation)

Or

A$_{4WS}$. For all x and y, if x is a proper ontological part of y, there is a z such that z is a proper ontological part of y, and z is ontologically disjoint from x. (Weak Supplementation)

D$_1$. For all x and y, x is an ontological part of y *iff* x is a proper ontological part of y or x is identical to y. (An objects improper ontological part is identical to that object)

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[141] Particularly in the case of Armstrong who we saw to thoroughly reject the notion that an object is anything more than a 'bundle' of its properties.

[142] Baxter would not likely accept a theory, at least in straightforward terms, of properties being proper ontological parts of objects. He instead has focused, using his theory of aspects, on the sense in which an object can be both distinct and identical to itself. To see his theory of instantiation as partial identity in the context of his previous work see Baxter **(1988; 1989; 1997)**.

D$_2$. For all x and y, x ontologically overlaps y *iff* x and y have an ontological part in common.

D$_3$. For all x and y, x is ontologically disjoint from y *iff* x and y have no ontological part in common.

D$_4$. For all x and y, x partly ontologically overlaps y *iff* x and y have some but not all ontological parts in common.

D$_5$. For all x and y, x is the ontological fusion of ys *iff* x has all the ys as ontological parts and no ontological parts disjoint from the ys.

Drawing on cases from our combinatorial table at figure 1 and utilising our set of axioms and definitions above we can analyse instantiation of properties in terms of ontological parthood. First attention must be drawn to A$_4$ and D$_5$ that deal with fusions of properties. A$_4$ in both its potential forms, either as a strong or a weak supplementation principle, allows us to say that an object is in fact nothing more than the properties that ontologically compose it. Objects are nothing but fusions of ontological parts, those ontological parts being properties. As we saw there are two options. To take *A$_4$* in its stronger form as **A$_{4ss}$** which gives extensionality such that ontological composition can give identity. Or *A$_4$* can be given in a weaker form A$_{4ws}$, such that while an object is not identical to a fusion of properties it is nonetheless nothing over and above that fusion of properties. This allows for cases where sameness of ontological parts may not give identical fusions, such as in Paul's case where there are in fact fundamental asymmetric relations that may feature amongst

the ontological parts[143]. The sense of object x 'is nothing more' than the properties that compose it is therefore different between A$_{4SS}$ and A$_{4WS}$, with A$_{4SS}$ making the property mereology fully extensional. In A$_{4SS}$ when we say that object x 'is nothing more' than the properties that compose it what is in fact meant is that x is identical to some fusion of properties. In A$_{4WS}$ when we say that object x 'is nothing more' than the properties that compose it what is meant is that there are no other components in the fusion referred to as x, the properties as ontological parts of x exhaust what x is. Since A$_{4WS}$ does not give extensionality, ontological composition is not identity. Either way ontological composition as given by A$_4$ bears a striking similarity to the identity relation, either if it is identity or is perhaps some analogue[144] of identity. In the case of D$_5$ a consequence of this definition is that objects are nothing but fusions of properties such that if object x is a fusion of all of its (proper) ontological parts, the ys, then there are no ontological parts of x that are disjoint from the ys.

To see an example, consider the object a in the combinatorial grid in figure 1. a is said to instantiate properties F, G and J. Let's now suppose that F, G and J are in fact the only properties that a instantiates. Given either version of A$_4$ and also D$_5$ if F, G and J are the only properties that this object instantiates then 'a' in fact picks out the ontological fusion

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[143] See the argument from the possibility of fundamental asymmetric relations towards the end of section 5.2.2.2.

[144] Lewis **(1991,81-87)** endorses composition as some kind of plural analogue of identity. As he states, *"I say that composition – the relation of part to whole, or, better, the many-one relation of many parts to their fusion – is like identity. The 'are' of composition is, so to speak, the plural form of the 'is' of identity."* **(1991, 82)**. For an excellent collection of articles on composition as identity see Cotnoir and Baxter's **(2014)** *Composition as Identity*. In that collection see Varzi's **(2014, 47- 69)** thesis regarding the relation between ontological commitment and counting the many in the many-to-one relation of parts to wholes , Cameron **(2014, 90-107)** who argues that while parts are not identical to wholes they nonetheless generate the whole and Byeong-uk Yi **(2014b, 169- 210)** for a more formal analysis of plural objects and plural logics.

of *F, G* and *J*. For the ontological fusion that 'a' refers to there is no remaining entity over and above *F, G* and *J*. Now take the following true propositions ' a has F' and 'a is G' seen at simple world W_1 in figure 1. What makes it the case that these propositions are true at W_1 ? The answer from a property mereology is quite simple. At W_1 there is an appropriate fusion of properties that has both *F* and *G* as proper ontological parts. That is to say there is some fusion of properties *FGJ* denoted by 'a' that overlaps both *F* and *G*. The Problem of Character (PC) therefore has an answer. For any object *x* with some property *F*, *x* has *F* in virtue of the *F* being a proper ontological part of the fusion of properties denoted by 'x'.

To illustrate this further consider a tangible example given by Paul **(2002, 581-582)**. Take the object which is my favourite black ceramic mug. In a property mereology as given by A_1-A_4 and D_1-D_5 the mugs property of *being black* is a proper ontological part of the object in question, namely my favourite black mug. The black mug has very many ontological parts, which include the properties of *being black*, *being ceramic* and *being fragile*. Of course, these properties may not in reality feature as ontological parts[145], perhaps they are not sufficiently natural properties, but for the sake of present purposes let take them to be possible proper ontological parts. Take the property *being black* which we take my favourite black mug to have or instantiate. Under A_1-A_4 and D_1-D_5 *being black* is one of the proper ontological parts of the fusion of properties that includes *being black, being ceramic, being*

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[145] As we saw in section 2.6 on the natural properties and constituent ontologies not all putative examples of properties can feature as either ontological parts or constituents; most notably the most egregious examples of abundant properties like gruesomely gerrymandered properties or miscellaneously disjunctive properties.

fragile and many other properties beside. *Being black* therefore overlaps the ontological fusion of properties that is denoted by 'my favourite black mug' , albeit it partly overlaps the fusion since it is a proper ontological part of that fusion. *Being black* and the ontological fusion of properties that is denoted by 'my favourite black mug' can be said to be partly disjoint since *being black* is only one among many different properties that my favourite black mug has as ontological parts. The same applies to any other property that my favourite black mug can be said to have or instantiate. This gives us a sense of what is meant when we say that properties and the ontological structures that they form in terms of fusions of properties exhausts the world, at least where the world of material objects is concerned.

This also makes sense of what van Inwagen **(2011, 390)** means when he says of Paul's mereological bundle theory that it is a monocategorial ontology. This is the case in so far as there exist only properties since ontological fusions of properties, what objects are analysed to, are composed without remainder only of properties. Given this properties and fusions of properties are one and all members of a single primary ontological category, the category of 'property' **(2011, 390)**. For Paul, given her rejection of a substantivalist conception of spacetime[146] , locations and regions can also be understood to be properties such as *being at location L_1 , being at location L_2 , occupying region R_1* or *occupying region R_2*. At least this is the case in Paul's **(2002, 2006)** earlier work on the mereological bundle theory. In

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[146] In section 5.3 and 5.4 this will serve as the departure point between Paul's version of the mereological bundle theory and what I call the 'substantival mereological bundle theory' where properties fuse to give material objects but spatiotemporal locations and regions do not feature amongst a material objects ontological part. As we shall see this will have radically different consequences for that theory's analysis of instantiation such that instantiation cannot be analysed away by ontological parthood.

her later work **(2012a, 2017)** she rejects such locational and regional properties at least in so far as they are thought to be fundamental[147].

Whether or not the property mereology accepts that there are fundamental locational or regional properties the mereological bundle theory can analyse the instantiation relation simply in virtue of the fact that objects themselves are nothing over and above the properties which they are usually taken to instantiate. For an object to have or instantiate a property is nothing more than for that property to overlap a fusion of properties. The mysterious 'binding tie' between an object and is properties therefore is replaced with the much more familiar idea of fusion and the relation between a fusion and one of its parts. Instantiation is just proper ontological parthood.

5.2.3.2 Resemblance, Universals and tropes

What about the Problem of Resemblance? How can the property mereology assist with providing an answer to how we can say of any two objects *a* and *d* that both have property *F.* As is the case at W_1 ,given in figure 1, what it is about the two numerically distinct objects *a* and *d* that makes it the case that they are both *F*? With a tangible example, what is it about my favourite mug and my keyboard in virtue of which they are both black? Paul **(2002,583)** takes her theory to offer an account of resemblance by taking properties to be very much like immanent universals. In addition, a property mereology is able to show why universals and tropes are as she puts it *"different sides of the same coin"* **(2002,583)**, able to combine the benefits of both

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[147] See section 5.4 for the reasons why.

properties as universals and properties as tropes without the problems associated with each **(2002,583)**.

Before continuing on to the property mereological solutions to the Problem of Resemblance lets briefly recap both a theory of properties as universals and a theory of properties as tropes. Those that argue that properties are universals argue that particular objects have the same property in virtue of sharing the same universal; that is to say objects have the same property by both instantiating exactly the same universal. Defenders of universals use the term 'same' here in its strictest sense, meaning that the numerically same property universal is instantiated by both objects. As we have previously seen a theory of universals comes in two general forms: one that postulates transcendent universals and one that postulates immanent universals. Transcendent universals stand apart from objects , existing as we saw as abstract non-located entities that still exist even if they are not instantiated by any particular objects. Immanent universals are not transcendent, they exist as part of the world and have location. They are understood to 'exist in' particular objects as ontological constituents or parts of objects; taken to be 'wholly present' wherever they are instantiated. As we saw when outlining the general framework of constituent ontologies, all theories of properties as immanent universals are examples of constituent ontologies. So, under a theory of properties as universals, what makes it the case that both my favourite mug and the keyboard are black is that both objects literally share a universal in common. Paul **(2002, 2006)** takes properties to be very much like immanent universals but with the caveat that her theory can dissolve away associated problems with whole presence of universals at multiple locations.

Trope theorists reject the thesis of properties being wholly present at different locations preferring to define properties as collections or sets of primitively exactly resembling property instances. In the literature such property instances have widely come to be referred to as tropes. Sets of exactly resembling tropes can be taken to define properties , so that in the case of *blackness* of both my favourite mug and the keyboard what makes it the case that these two object resemble in respect of both being black is that both objects contain as constituents a trope , the *blackness of the mug* and the *blackness of the keyboard* that exactly resemble eachother . The exact resemblance of the two tropes, and the exact resemblance of all tropes that define properties, being taken as an undefined primitive of the trope ontology. But as Paul **(2002, 583)** notes against a trope theoretic account of properties,

"But the view that properties are collections (of exactly resembling tropes) suffers from the fact that different properties may be had by all and only the same particulars (unless one accepts modal realism). Sets of exactly resembling tropes can be taken to define properties , so that what makes one cup the same color as another is the fact that the trope of the first exactly resembles the trope of the second, but the relation of exact resemblance must be taken as an undefined primitive. Universals have the advantage of allowing us to be realists about properties without accepting possible worlds distinct from the actual world, and without postulating a primitive relation of exact resemblance between tropes"

So, the associated problems of the trope theory are clear for Paul. Trope theory comes with the baggage of the undefined primitive of exact resemblance and an attachment to modal realism to account for differences between properties defined as sets of exactly resembling tropes[148]. But a theory of universals also carries unwanted package

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[148] See Ehring **(2015)** for the problem of coextensive resemblances classes as it occurs for classes of exactly resembling tropes. There Ehring tries to show ways that the trope theory can avoid modal realism to solve the problem of coextensive resemblance classes of tropes.

with the notion of whole presence of property universal at each of their instances. The notion of the whole presence of property universals at each of their instances is dubious in so far as it is not clear how anything meeting this description could be literally true. **(Lowe 2006, 99)** For instance, consider my favourite mug and the keyboard both of which are black. Both of these objects are in different locations. If properties are universals, entities wholly present at each of their instances, then the property universal *blackness* is wholly present in its entirety by being a constituent of both the mug and the keyboard. This means that all of the property universal *blackness* is in its entirety present at two numerical distinct objects. Somehow we have to accept that if property universals have whole presence at each of their instances that this literally means that there are entities that are unified at one and all of their instances yet at the same time are disjoint from themselves by being instanced at numerically distinct objects. This seems to be at worst an incoherent notion and at best something that advocates of a theory of immanent universals would have to take as a primitive of their theory.

Let's now consider how the property mereology can account for the problem of resemblance (PR) that both properties as immanent universals and trope theory are attempts to answer; and do so in a way that avoids their associated problems. To do this let's consider two objects that have the same property. Consider the example of objects a and d that both have the property F at W_1 in figure 1. a and d both have the property F at W_1 and in respect of F we can say that both a and d resemble eachother in so far as they are both F. Under a theory of properties as universals we say that both a and d instantiate exactly the same property F, while in a trope theoretic approach we say that

we have two exactly resembling tropes. At W_1 under a property mereology given by A_1-A_4 and D_1-D_5 we can say that both objects, *a* and *d*, are nothing over and above the fusion of their properties. This can include their location properties such that *a* and *d* are distinct from eachother. Let's take it now that at W_1 it is in fact only *a* and *d* that have *F*. Now if at W_1 we subtract away all of the proper ontological parts of both *a* and *d*, including their distinct location properties, we are left with the ontological part *Fness*. That is to say we are left with just the one entity, the property *Fness*. It is this lone entity that grounds the claim that there is one and the same property shared between *a* and *d*. It is this entity, *F*, that can be said to partly overlap both *a* and *d* where both those terms 'a' and 'd' denote fusions of properties. In this way, two distinct fusions have the same proper ontological part *F* that ontologically overlaps each. What makes Paul's thesis distinct from extant theories of immanent universals **(Paul 2002, 584)** is the following. The property *F* that is abstracted away from the fusion of properties denoted by 'a' and 'd' would be an entity that itself does not have a location since it would be the entity left over from *a* and *d*, where *a* and *d* are understood to include among their ontological parts their location properties. *F* does not itself have particular locations as parts, even if at W_1 it overlaps with fusions of properties *a* and *d* that do have particular locations in virtue of having location properties as ontological parts. It is therefore only in the derivative sense that properties, at least qualitative material properties, have location. Properties therefore have locations in the derivative sense by being ontological parts of fusions that have location properties as ontological parts. Given this the mereological bundle theory can therefore conform to the concreteness principle articulated in section 2.4.2 of this thesis:

The Concreteness Principle of Constituent Ontologies (CPCO) : A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

This derivative sense of the location of properties allows the mereological bundle theory to be distinguished from extant theories of immanent universals **(2002, 584)**, while still maintaining that properties are not transcendent entities. *F* can be distinguished as an entity in its own right, separate from the fusions of properties of which it is a proper ontological part. *F* can be understood to be derivatively located in so far as it is a proper ontological part of fusions that are located in virtue of having as ontological parts certain location properties. It is this sense that properties like *F* do not exist abstractly, in some abstract mysterious realm distinct from material , located entities. To clarify more sharply the mereological bundle theory does not entail the acceptance of some form of the transcendent existence of properties; entailing rather a more novel treatment of immanence in terms of fusion. Paul **(2002, 584)** goes on to state that,

" If we maintain that there is an ontological distinction between the determinable property of being in spacetime and the determinant properties of having particular spacetime locations, we can even hold that R includes the part of being in spacetime while not including the parts of having particular locations, allowing us to distinguish the view even more sharply from the theory of transcendent universals."

With an understanding of how a property can be in two locations at once (understood in terms of the ontological overlap of numerically distinct objects) and also with its immanentist credentials in place we

can now consider what Paul means when she says that a theory of universals and trope theory are *"different sides of the same coin"* **(2002,583)**. To see why the trope theory and the theory of property universals are closely related let's call the entities that have *Fness* fused with different location properties the 'Fness tropes' and the *Fness* ontological part when considered by itself the 'Fness universal'. The relation between the different *Fness* tropes here, unlike in normal trope theory where the relation is exact resemblance, is identity. There is no need for the primitive relation of exact resemblance between the *Fness* tropes when property fusions both include exactly the same *Fness universal* as a proper ontological part. The *Fness* tropes are simply the particularized properties *Fa* and *Fd* which are unique particular fusions in so far as they are fused with distinct location properties. There is no need to postulate a primitive relation of exact resemblance between *Fa* and *Fd* because these distinct fusions can be said to overlap by sharing the common ontological part, the *Fness universal*. With this is place we can see how qualitative sameness is grounded on strict identity – that is to say identity with respect to the literal sharing of proper ontological parts.

Using the more tangible examples of the black mug and the black keyboard we can say the following. There are two *blackness tropes* in so far as the *blackness universal* is fused to the location properties of the mug and the keyboard. Let's call these the *blackness-at-mug-trope* and the *blackness-at-keyboard-trope* where the 'mug' and 'keyboard' terms pick out the location properties of the mug and the keyboard. Under the more usual reading of trope theory the *blackness-at-mug-trope* and the *blackness-at-keyboard-trope* are unified under the primitive inter-trope relation of exact resemblance. With the mereological bundle

theory this primitive exact resemblance relation between the *blackness-at-mug-trope* and the *blackness-at-keyboard-trope* is replaced with strict identity in so far as the *blackness-at-mug-trope* and the *blackness-at-keyboard-trope* share a common proper ontological part namely the *blackness universal.*

It is clear from this how the mereological bundle theory avoids the need to postulate a primitive relation of exact resemblance. However, in regard to a theory of immanent universals how does it avoid the associated problem with that theory, namely, the problem of understanding the 'whole presence' of universals at each of their instances. If property universals are wholly present at each of their instances then , for instance , the *blackness* universal is present in its entirety by being a constituent of both the mug and the keyboard. If universals are wholly present in this way then *the blackness of the mug* and the *blackness of the keyboard* are two locationally disjoint instances of the *blackness* universal, that universal being present in its entirety at both. As I stated previously this means that universals are unified as a one at each of their instances yet at the same time are disjoint from themselves. But if this is the case how can you assert that a universal is wholly present in its entirety at each of its instances. At best we can just take whole presence as a primitive, at worst it is a totally incoherent notion.

What was the original reason to postulate the whole presence of a universal at each of its instances? It was to account for the Problem of Resemblance, explaining qualitative sameness in terms of having a property universal in common. That is to say by a numerically identical entity being wholly present at each instance of qualitative sameness, as in the instance of both the mug and the keyboard *being*

black. My own inclination, in line with a number of other proponents of universals **(Lowe 1998, 154-158; 2006, 98-100),** is that the notion of whole presence in the context of properties being wholly present is in fact incoherent. But presumably the reason that universals need to be wholly present is that somehow it is the whole presence of the universal that imbues any object where that universal is present with the requisite character[149]. But with a theory of property universals as proper ontological parts it becomes clear that for any property *F,* if *F* is a proper ontological part of *x* there is some part of *F* that is disjoint from *x*. On this picture property universals are not wholly present at their instance, there are parts of *F* separate from the part of *F* that overlaps *x* where *x* is a fusion of properties. For instance , consider the *blackness* universals and the *blackness* of my mug and keyboard. In this case there is a part of the property universal *blackness* that ontological overlaps my keyboard and then a distinct part of that same *blackness* universal that overlaps my mug. The *blackness* universal is present at both, but it is not wholly present at both. The result is that property universals are not wholly present at each of their instances. But does this mean that a property mereology cannot account for the resemblance between objects where objects are understood to be numerically distinct fusions of properties? No, the notion of whole presence is superfluous to the task and carries unnecessary metaphysical baggage. Parts of property universals that ontologically overlap with objects are up to the task of accounting for the problem of resemblance. Properties are pure units of character; that is to say their nature throughout is given by its *kath hauto* character[150]. They are not like fusions of properties that have multiple characteristics by

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[149] Again, this emphasises the centrality of the Problem of Character.
[150] See section 1.3.4 for an articulation of the *kath hauto* character of properties.

having many properties as proper ontological parts. Rather, the nature of a property is exhausted by some one unique *kath hauto* character. This means that any part of a property, which may ontologically overlap some object which is a fusion of properties, is qualitatively exactly the same given that the nature of that property is exhausted by a single *kath hauto* character. Therefore, when some part of a property ontologically overlaps a fusion of properties (an object) it imbues that fusion with that character. For instance, in the case of the *blackness* universal and the black keyboard and mug , the *blackness* universal imbues both with the same character by being a proper ontological part of both. A theory of universals in the guise of the mereological bundle theory can do away with the notion of the whole presence of universals at their instances. And while doing so it can still account for how properties give objects character that may be shared between multiple objects.

An obvious rejoinder to this is the following. Isn't this simply the notion of the whole presence of a universal now in the guise of a property having a single *kath hauto* character, since a property is said to have some one unique character? To see this objection, consider again the *blackness universal* and the tropes *blackness-at-mug-trope* and *blackness-at-keyboard-trope*. Under Paul's **(2002,582-585)** analysis we saw that the relation between the tropes *blackness-at-mug-trope* and *blackness-at-keyboard-trope* is no longer primitive exact resemblance but rather identity is so far as *blackness-at-mug-trope* and *blackness-at-keyboard-trope* both overlap the *blackness universal.* The resemblance between the *blackness-at-mug-trope* and *blackness-at-keyboard-trope* is therefore explained by the sharing of one proper ontological part, the *blackness universal.* But what ensures the qualitative sameness of the

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blackness universal in its entirety and across its many parts? Well, so the objection goes, either it is the primitive exact resemblance of the different parts of the *blackness universal* or those different parts are somehow numerically identical to eachother. If the first case is correct then this is no improvement on trope theory and if the second is correct then we are back to square one with the bizarre notion of whole presence!

But if a property mereology understands properties to be *kath hauto* sources of character this objection need not delay us. The exact resemblance of different parts of a property in so far as they overlap numerically distinct fusions of other properties comes as no surprise. If a property has one *kath hauto* character and that this having of *kath hauto* character is taken as a primitive of the mereological bundle theory then the fact that different parts of properties have exactly the same character wherever it fuses with other properties is just a primitive fact about the nature of properties. What in effect this means is that in addition to primitive facts about the ontological parthood relation seen in A_1-A_4 and D_1-D_5 the property mereology should also accept among its primitives the view that properties have *kath hauto* character and that it is this *kath hauto* character of properties that imbues objects, taken as fusions of properties, with the character which we take them to have. That is to say we do not take the character of objects , as fusions of multiple properties, as primitive but rather we take the *kath hauto* character of any one property as a primitive.

5.3 Ontological Parthood and Spatiotemporal Parthood

5.3.1 The Status of Ordinary Spatiotemporal Parthood

With a mereological bundle theory of objects in place that accounts for both the problem of character and the problem of resemblance a question arises regarding the status of ordinary spatiotemporal parthood; that is to say the parthood relation that obtains between objects and what we typically take to be their ordinary spatiotemporal parts. What is the mereological bundle theories account of ordinary spatiotemporal parthood, namely the type of parthood that deals with cases like my table being composed of various spatiotemporal parts likes its top and its four legs *etcetera*? If the mereological bundle theorist takes their property mereology to be the master fundamental mereology, that is to say the form of parthood that underlies all of the structure of the world, then how do we find a find a place for the ordinary spatiotemporal notions of parthood? My own suggestion is that if the property mereology is to be taken as the master fundamental mereology then ordinary spatiotemporal parthood is reduced to a useful fiction, good for the actions of ordinary life and some scientific activity but on an ultimate metaphysical analysis not representative of the way the world is in fact structured. In effect if this is the case then the mereological bundle theorist must deny parthood pluralism; reducing all parthood to ontological parthood. That Paul **(2012a,243)** thinks something along

these lines is clear in her more recent work on properties as the fundamental constituent of the world,

"What about spatiotemporal composition? Whether we need it, or some spatial analogue will depend on the ultimate empirical facts. We might need to add it to our ontology, perhaps by taking it to supervene on certain sorts of qualitative compositional facts. It exists, it just isn't fundamentally spatiotemporal composition, it's a restricted kind of property composition. Another thing we might do is become fictionalists about spatiotemporal composition. We can regard it as a handy conceptual tool, but one without ontological import. The view of spatiotemporal composition as a purely conceptual tool has interesting intersections with methodological questions. In the latter part of the twentieth century, work in contemporary metaphysics shifted from a focus on the analysis of various concepts to the investigation of the ontological entities those concepts referred to. Some of the work done on the metaphysics of mereology, especially some of the work on composition, makes more sense to me when understood as an attempt to analyse mereological concepts rather than to determine mereological ontology". **(2012a,243)**

Paul therefore gives two possibilities concerning the ontological status of ordinary spatiotemporal parthood; either it exists by supervening on the facts of the more fundamental ontological parthood given by a property mereology or spatiotemporal parthood is nothing but a useful conceptual fiction. This is the result of Paul's monocategorialism, that entities that populate the world are all of the ontological category of property. There is also a third option regarding the status of ordinary spatiotemporal parthood that Paul **(2012a, 242-244)** does not mention. That spatiotemporal parthood and the ontological category of spacetime are ontologically independent of

ontological parthood and the world of material objects composed entirely of fusions of properties. This option entails that separate to the ontological category of property there exists the substance of spacetime which can be divided into particular regions or locations of spacetime.

In what follows I will argue that of the two options Paul **(2012a)** considers regarding the status of spatiotemporal parthood , that spatiotemporal parthood supervenes on ontological parthood or that fictionalism about spatiotemporal parthood be adopted, she must adopt the latter. She must adopt fictionalism about spatiotemporal parts. Following this I will consider the radically different approach of postulating a separate category of substance, spacetime, to account for ordinary spatiotemporal parthood and how objects as fusions of properties relate to particular regions of spacetime.

5.3.2 Fictionalism and Spatiotemporal Parthood

On the monocategorial view, that the world is composed and exhausted by properties, either spatiotemporal parthood exists by supervening on the facts of the more fundamental ontological parthood given by a property mereology or spatiotemporal parthood is a mere useful fiction. Let's consider why the first option is not one that Paul can adopt under the terms of her own ontology. In other work **(Paul 2017,38)** she clearly endorses the view the ontological structure of the world is based on relationships between ontological parts, properties, and the wholes that they together fuse; what we

ordinarily take as material objects. This structure is not categorical[151] in so far as fusions of properties do not create new natures or entities belonging to some real ontological category that is not a subcategory of the entities that fall under the ontological category of property. In her view, as we have seen, ontological composition is the basic building relation of the world with properties being the basic parts used to construct everything else that there is. Properties are those sorts of individual entities, metaphysically prior simples in so far as the have *kath hauto* character, that are fused together to create everything else. That Paul **(2017)** believes in something like what I have called the *kath hauto* character of properties seems clear when she states that in her view, the fundamental constituents of the world are properties or 'qualitative natures' and that all else is mereologically composed from these **(Paul 2017,38)**.

Given this how can Paul claim that spatiotemporal composition is additional to our ontology over and above ontological composition? She cannot, precisely because in her monocategorial view spatiotemporal regions or locations, which are the bedrock of the classical extensional mereology of spatiotemporal parts and wholes, are themselves properties. That is to say , if there are such things as spatiotemporal locations or regions then those things are themselves

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[151] This is the thesis that has come to be known in the literature as the ontological innocence of mereological composition, the view that while we are committed to the existence of fusions given a prior commitment to the proper parts of the fusion. A commitment to ,for instance, fusions of properties is not a commitment to entities other than the properties we already quantified over. The fusion is nothing over and above its parts. This is the case even if the property mereology is weakly supplemented. For the most famous statement of the ontological innocence of mereology see Lewis **(1991,81-87),** for an excellent analysis of the ontological innocence of mereology see Hawley **(2014, 70-89)** where she analyses ontological innocence in terms of composition as 'leveling-up' and decomposition as 'leveling-down'. Cameron **(2014,90-107)** argues against ontological innocence where parts 'generate' wholes but are not identical to it. Composition can ,in his view, generate new entities over and above their parts.

properties. There are fusions of properties and we can refer to some of those fusions as 'objects', the objects we seemingly encounter in the material world. But ontological composition is itself innocent in so far as the fused wholes that result in no way are an addition of being. Consider the following example. Take the object which we refer to as 'Mable' the dog. Let's arbitrarily divide Mable into six ordinary spatiotemporal parts that together we can say spatiotemporally compose the whole of Mable: her four legs, her thorax and her head. Pick any one of those parts, for instance her thorax. Now there is a sense in which this part, this object, exists. It has a distinct spatiotemporal location at any one time from all of the other spatiotemporal parts given how Mable is structure as an organism of a certain sort and this spatiotemporal part, the thorax, is composed of ordinary spatiotemporal parts disjoint from the five other spatiotemporal parts of Mable.

But here's the problem for the view that Paul can treat spatiotemporal parthood as properly distinct from ontological parthood. The spatial (and indeed temporal) locations of Mable's thorax are themselves properties. Call the location property of Mable's thorax SP_{MT}, it is this property that gives the particular locational character to that spatiotemporal part of Mable. SP_{MT} given a monocategorial property mereology fuses with all of the properties that Mable's thorax is typically taken to instantiate to give the property fusion that exhausts what it is to be Mable's thorax. This means that under a monocategorial property mereology 'Mable's thorax' refers only to a fusion of properties, that is to say SP_{MT} fused with all the other properties of Mable's thorax. When Paul **(2017,243)** states that spatiotemporal composition might need to be added to our ontology,

perhaps because it supervenes on certain ontological compositional facts, she seems to be giving a view of spatiotemporal composition that is in conflict with her own monocategorial inclination. This is because supervenience can be a symmetrical relation such that it could be the case that if the spatiotemporal parts supervened on the ontological parts then those ontological parts would supervene on those spatiotemporal parts. This would not capture what Paul means to say when she takes ontological parts to be more fundamental because fundamentality needs to be an explicitly asymmetrical relation between the more fundamental and the less fundamental. Given her overall view, spatiotemporal parts do not supervene on ontological parts because ontological parts are more fundamental **(Paul 2012a)**.

It is Paul's second suggestion, that we should be fictionalist about spatiotemporal composition and parthood, that accords best with her monocategorial inclinations **(2013, 89-113)** . It is certainly very useful in ordinary life, and indeed in a number of scientific contexts, to countenance the notion that there genuinely are spatiotemporal parts such as Mables six bodily parts. For instance if I take Mable to the vet suspecting that she is suffering from a condition that originates from a disease of the bowels it is correct for the vet to first focus on the relevant spatiotemporal part of Mable, in this case Mable's thorax not Mable's head or any one of her four legs. In this context at the vet the claim that there is such a thing as the spatiotemporal part Mable's thorax is strictly speaking false , where the locution 'there is such a thing' means 'fundamentally there is such a thing'. In this context the concept of canine thoraxes and the various facts derived from theories of veterinary medicine about canine thoraxes are critical in the

potential treatment of Mable, if in fact it is the case that her symptoms are caused by some abnormality of the bowels. The term, Mable's thorax and the concepts that this may refer to in the theories of veterinary medicine are critically useful in the determination of proper treatment. Therefore, the actions the vet may take under the pretence that there are such things fundamentally as canine thoraxes will be medically appropriate.

There are many other contexts of discourse, both ordinary and scientific, where using the concepts of ordinary spatiotemporal composition and parthood will be appropriate although literally false if referring to some fundamental feature of the world. The point being that adopting a fictionalist response to ordinary spatiotemporal composition and parthood is wholly consistent with Paul's own monocategorial ontology of properties and property fusions. However, a more substantive view where spatiotemporal composition and the resultant spatiotemporal fusions are some addition of being cannot be countenanced without radical revision. Any such revision where spatiotemporal composition genuinely added to what there is in the world would require the mereological bundle theory to accept that in addition to ontological parthood there is some other totally independent form of the parthood relation. Given Paul's **(2013, 89-113)** monocategorial inclinations, this is not an option for her worldview.

5.3.3 Substantival Mereological Bundle Theory

5.3.3.1 A new option

As alluded to there is another option for understanding what ordinary spatiotemporal composition and parthood amount to. The option is to accept that there are genuinely distinct forms of composition and that there are no cross categorial instances of composition. What this amounts to is an endorsement of a polycategorial ontology in that the world is composed of entities that fall into either one of two ontological categories. In this case, in addition to there being the category of properties and fusions of properties, there is also the substance of spacetime. The view remains a mereological bundle theory of material objects in so far as material objects are still fusions of properties; but the distinction is that there are no locational properties that form a part of those fusions. Rather the location of material objects, and by extension the location of properties, is given by material objects entering into the occupation relation with certain regions of spacetime. This is certainly not a position that Paul would endorse[152] but it is nonetheless a live option and worth considering given it may have explanatory power to burn, albeit at a loss of ontological parsimony. I have called this view the Substantial

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[152] The exact reasons for Paul being unable to endorse this position that postulates substantival spacetime will be given in the next section of this thesis 5.4 on physics and the metaphysics of ontological parts.

Mereological Bundle Theory in virtue of the fact it postulates substantival space as a separate category of being to properties and property fusions (objects).

5.3.3.2 Objects as fusions of properties and spacetime substantivalism

The Substantival Mereological Bundle Theory is distinct from Laurie Paul's version in so far as it does not take ontological parthood to include any location properties. Under Paul's view the locations of properties, and objects as fusions of properties, is given in terms of properties being fused to some location property. Under Substantival Mereological Bundle Theory if *F* is a proper ontological part of some (object) fusion of properties *x,* then *F* is a part of *x* at the region *R* where *F* is exactly located and no other region. Objects, as fusions of properties, can be said to be exactly located at some region of space it is taken to completely fill, and it has the same shape and size of that region which it fills. In the only articulation of the Substantival Mereological Bundle Theory that I know of LaFrance **(2015, 202-219)** asserts that the relation of ontological parthood must be understood to occur at some one region of spacetime. In effect what this means is that the ontological composition relation that any two properties bear to eachother to give a fusion is a ternary, not a binary relation. This is the case because every instance of ontological fusion now bears some third term at which fusion occurs, namely some region of spacetime. To articulate this distinction further he gives the following principles which he takes to govern any fusion of entities, including ontological fusion. The first he calls Fusion Existence **(FE)** which gives an account of any fusion of entities; including fusions of properties **(2015,206)**.

Fusion Existence (FE): For any *xs*, there is an *f* (the fusion) such that every one of the *xs* is part of *f* and every part of *f* overlaps at least one of the *xs*.

LaFrance takes Paul's version of the mereological bundle theory to endorse a version of FE that pertains to fusions of properties. But it is a binary relation because any one of the *xs*, in this case specific properties, bear a one to one ontological parthood relation to some fusion. LaFrance's deviation **(2015, 209)** from this is that he takes the ontological parthood relation to in fact be a ternary relation given by a principle of Regional Fusion Existence **(RFE),**

Regional Fusion Existence (RFE): For any *xs*, there is an *f* (the fusion) such that every one of the *xs* 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.*

Like for Paul **(2002,2006, 2012a ,2017)** LaFrance **(2015)** also endorses the view that material objects are either identical to fusions of properties or , failing extensionality, are nothing over and above fusions of properties. So, under this view any two objects overlap at a region *r* just in case they have a common part exactly located at *r*. Thus, if one of the *xs* is part ,at *s*, of *f*, then any part of *f* overlapping that *x* must overlap that x at some subregion of *r* , $r_1, r_2, r_3 \ldots \ldots r_n$, that is a proper or improper spatiotemporal part of *r*. Let's translate this into talk of ontological parts using a tangible example. Consider two properties of a black ball; its *blackness* and its *sphericity*. For the sake of simplicity consider the ball partially in so far as we have the fusion of two of its ontological parts *blackness* and *sphericity*. Given RFE there is a fusion of *blackness* and its *sphericity* such that there is part of both *blackness* and *sphericity* that ontologically overlap at some region *r*,

namely they ontologically overlap at the region usually taken to be the region that the ball is said to occupy. In a sense we can say that there are two tropes *blackness-at-ball-trope* and *sphericity-at-ball-trope.* (we can call the parts of the two property universals tropes in the way I do in section 5.2.3.2**)** . Here the 'at -ball' locution in both refers to some one spatiotemporal region these tropes of the *blackness universal* and the *sphericity universal* ontologically overlap at. In effect the spatiotemporal region is where this instance of ontological overlap uniquely occurs.

What the substantival mereological bundle theory entails in virtue of RFE is a commitment to there being a substance separate to properties. This substance gives regions and sub-regions of spacetime the ability to account for the 'overlap-at' third term of the ternary relation of ontological overlap of properties at regions. Now given that objects have been taken by LaFrance **(2015, 209)** to occupying some regions exactly such that the region which the object occupies has exactly the same shape and size as that object, it follows that spacetime can be broken down into regions such that we can identify spacetime regions as ordinary spatiotemporal parts. For instance, when we arbitrarily divide Mable up into six spatiotemporal parts: her head, her thorax and her four legs what we are in fact doing is dividing the spatial region that the object Mable occupies into six subregions. Ordinary spatiotemporal parthood is therefore given by regions of substantival space. The overlap at relation seems quite clearly to require some notion that properties are attributed to regions of spacetime, such that we can say that spacetime regions and by extension spacetime itself is the ultimate bearer of properties. But whatever the bearing at relation is; it is not mereological. The view is therefore very much like of

Schaffer **(2009a, 131-148)**. His view of the relation of properties to spacetime is one where objects are distributed at regions of spacetime. It is also strikingly similar to this in that it agrees that spacetime regions can satisfy unrestricted composition and decomposition, as we saw in the case of Mable being arbitrarily divided into six spatiotemporal parts, we see this where Schaffer says of spacetime regions that,

"….(i) for any plurality of spacetime regions, there is a region that fuses them. Gerrymandered and discontinuous regions are regions all the same. Also (ii) for any extended spacetime region, there are sub-regions that fission it. Arbitrary Undetached regions are regions all the same. Given unrestricted composition and decomposition for spacetime regions….and the monisitic identification of material objects with spacetime regions, unrestricted composition and decomposition for material objects follows immediately." **(Schaffer 2009a, 135)**

Substantival mereological bundle theory is of course not like Schaffer's view in so far as material objects are identified with fusions of properties and not regions of spacetime, Schaffer's view being what is today referred to as supersubstantivalism[153]. But the similarity lies in the conception that spacetime can be arbitrarily decomposed into regions and sub-regions. The key point is that the ternary relation 'ontological overlap at' that the substantival mereological bundle theory employs requires the postulation of the substance of spacetime that is not included in the ontological category of property. The substantival mereological bundle theory is therefore clearly a polycategorial ontology since it postulates two ontological categories where neither is a sub category of the other ; the ontological category that includes properties and objects as fusions of properties and; the

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[153] Under supersubstantivalism material objects are identified with the spacetime regions at which they are exactly located. See Schaffer **(2009a)** and Parsons **(2007, 225-228)**.

ontological category of the spacetime substance , that includes regions and subregions of that spacetime substance at which properties and objects as fusions of properties are located-at.

There are in my view two serious downsides to the view: firstly, that the view makes an account of instantiation of properties much more mysterious; taking us back to in effect a form of substance-attribute constituent ontology that leaves the relation between the two ontological categories mysterious. The second is that it requires, in fact it entails, some version of spacetime substantivalism. In the next section 5.4 we will consider why such a requirement is an inherent disadvantage given empirical considerations from physical science. In this section we will consider the implications for instantiation. That the instantiation relation is returned to being mysterious is quite clear if we see that we are no longer asking what it is about an object such that it has certain properties but are rather are now asking what is it about a certain region of spacetime such that objects (and therefore properties since objects are nothing but fusions of properties) are located at that region. That this is the case is clear if we consider some object x to instantiate some property F. Under the substantival mereological bundle theory x instantiates F at some region r *iff* at r F overlaps some fusion of properties that is either identical to x or[154] exhausts F in terms of its ontological composition **(LaFrance 2015,209-211)** . By introducing into the property mereology, a ternary relation that gives ontological parthood at regions, advocates of this position

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[154] Whether we take the fusion of properties to be identical to *x* will depend on whether property mereology is extensional. It will only be extensional if we give some strong supplementation for the property mereology. LaFrance **(2015,209-211)** will be utilising some strong principle of supplementation given that he takes objects to be identical to fusions of properties.

(LaFrance 2015) effectively reintroduce problems around instantiation through the back door.

Consider the Problem of Character that the non-substantival bundle theory accounted for,

The Problem of Character (PC): *Take some one object x with property F and ask of it: What is it about this object x in virtue of which it is F. By example we can ask of some red object what it is about this object in virtue of which it is red.*

Given that Paul's **(2002, 2007, 2012a, 2013)** version is a monocategorial ontology, in so far as it postulates only one ontological category to which both properties and objects belong, it was able to answer PC straightforwardly. For an object to have a property is just for that property to be a proper ontological part of that object, all objects being nothing but fusions of properties. And amongst the category of property can be included the regional and locational properties that objects are taken to have; such properties also being ontological proper parts of objects. The substantival mereological bundle theory also takes objects to be fusions of properties but as we saw, by introducing the ternary relation of ontological-parthood-at relation it has to introduce spacetime regions. An account of instantiation cannot therefore be exhausted by the category property, with the relations objects bear to regions not being a mereological relation. Because of this the substantival mereological bundle theory only answers PC in a superficial way; turning the problem of accounting for how objects relate to properties to a problem of how objects as fusions of properties relate to regions of substantival spacetime.

We therefore have a new problem of a similar form to PC,

The Problem of Regional Character (PRC): *Take some space(time) region r at which a fusion of properties F* is located and ask of it: What is it about this region r in virtue of which F* is located at it.*

Advocates of the substantival mereological bundle theory may respond that while PRC is an issue of need of an answer , the problem is not as severe as PC in so far as the relation that obtains between a fusion of properties (an object) and some region of spacetime is much more familiar. The relation in question is simply the relation that obtains between any object and the region of space(time) which it occupies at any one moment. While I concede that at least *prima facie* PRC involves a less mysterious relation than PC, like PC it still requires an answer to be given as to how properties relate to individual substances. In this case how properties relate to regions of the substance of spacetime. The non-substantival version of the mereological bundle theory faces no such problem. Also, the substantival version of the mereological bundle theory seems to invoke a form of spatiotemporal substantivalism that requires views about spacetime that may be in contradiction with empirical considerations about the nature of spacetime in physical theory.

5.4 Physics and the metaphysics of ontological parts

5.4.1 Natural Properties, Metaphysics and Physics

So far in this chapter I have avoided the complication, for the sake of explanatory simplicity, of noting that like all constituent ontologies the mereological bundle theory places an ontological premium on those properties typically quantified over in the physical sciences. The reason this premium, or ontological primacy, is placed on these properties is that such properties are to be conceived of as giving us the fundamental structure of the world. Those entities said to be fundamental can be understood as those entities which are metaphysically prior. If we say of x, that x is metaphysically prior to y what we mean to say is that y cannot exist without x; y must either derive[155]or depend for its existence in some way on x. Like all constituent ontologies the mereological bundle theory takes natural properties to be metaphysically prior. If there are in fact perfectly natural properties, then such properties would hit ontological bedrock and would be those simple properties that would function as ontological parts from which all else would be built. But whether or not[156] there may be properly simple unstructured natural properties, known in the literature as perfectly natural properties, need not delay us here. All we need to note is that the mereological bundle theory

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[155] As previously seen supervenience may not do the job here of capturing the sense of fundamentality given that it may be a symmetrical relation.
[156] As we saw in sections 2.6.3 and 2.6.4 it may be the case that two senses of natural property could be employed; the graded or non-graded approaches. What is critical is that there is a sense in both that it is the natural properties, given to us in the natural sciences, that are in some sense are prior to all other properties.

places a premium on the natural properties and it is physical theory that picks out the natural properties. There is therefore a tight relation between the empirical considerations of current physical science , which picks out the more fundamental natural properties, and which properties we can take to feature as ontological parts, where those ontological parts give us the fundamental constituents from which we build the world in the property mereology.

In earlier work Paul **(2002,2006)** is clear ; she would prefer to endorse a *"relatively sparse approach to properties: not just any predicate defines a property, and there are no negative properties, merely negative predicates".* For instance, if we can truthfully say of an object *x* that it is 'not-F' then *not F* is not included in the fusion denoted by the object term **(2006, 630)** since there are no negative properties to which negative predicates refer. In later work **(2012a, 2017)** this preference becomes much more explicit. A property mereology should take the properties given by physical science to be those properties which are utilised to fundamentally construct the world. There is therefore a tight relationship[157] between metaphysics and the empirical considerations of the physical sciences. However, what that relation amounts to needs to be understood before we proceed to the particular constraints on metaphysics which it may impose.

Metaphysics is not science and is not governed by science. However, if one takes the view that a metaphysical account of the world is an attempt to give the best total account of the world then any such

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[157] In section 3.1 I considered a number of issues pertaining to the relationship between metaphysics and science generally, there I offered defences of metaphysics from various attacks **(Ladyman and Ross 2007; Hofweber 2009)**. In what follows here I will articulate briefly what I think the relationship should amount to; namely that metaphysics should factor in empirical considerations in pursuit of inference to the best metaphysical explanation.

attempt must be informed by the physical sciences, and indeed all of the natural sciences. That is to say when one assesses any metaphysical world view one must attempt to ensure that such a view does not involve claims that have been empirically refuted by the physical sciences. This is, of course, a delicate business simply in virtue of the fact that it would be a very tenuous claim to assert that current physical science gives us, as it were, the total scientific picture of the world. At best current physics could be viewed as the best attempt, not final attempt, to give a complete physical model of the world. Arguing that some metaphysical model of the world is correct will do well if it factors[158] in considerations from the most up to date and advanced models provided by physical theory backed up by experiment.

Any metaphysical theory should be seen as an attempt explore the space of metaphysical possibility, building up a model of the way the world fundamentally could be, without that model necessarily being true of the way the world actually is. That this is unique to metaphysics, and that we should take its method to be a fallacious *a priori* method would be a *non sequitur* is so far as mathematical physical science has a track record itself of producing internally consistent models of the world that have later been taken to not correctly map onto the actual way the world is. As I noted before in section 3.1 the history of physics is strewn with examples of mathematical models, constructed largely in an *a priori* manner, not being consistent with the findings of empirical physical sciences. But

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[158] Given this and in keeping with Paul's **(2012b)** view that metaphysics, like science, deals in inference to the best explanation; what we can call inference the best metaphysical explanation.

this does not mean that any mathematical theory that attempts to model the world for physics employs a fallacious *a priori* method. Rather it simply means that the particular mathematic theory does not correctly map onto the world; even if in its own terms it is perfectly internally consistent and is valuable in so far as it works out the limits of mathematical possibility. My own view is that metaphysical models also function like this. Metaphysical inquiry is valuable independently of the empirical sciences in so far as it maps out metaphysical possibility, even in cases where it is in conflict with empirical considerations from physics. If you take mathematical theorizing independent of whether it maps the physical world to be valuable in its own right then, equally, working out the space of metaphysical possibility independent of empirical considerations is worthwhile in its own right also. However, this is not to say that metaphysics bears no relation to the empirical considerations of natural science. This is because if we intend metaphysics to give us a true picture of the fundamental structure of the way the world actually is then we need to factor in the relevant empirical facts obtained from physical theories. That is to say if we want to give a truly systematic metaphysics, and not just engage in exploring the space of metaphysical possibility, then we need to factor in current physical science.

The project of the property mereology, to determine the nature of what fundamentally makes up the world in terms of ontological parts and composition, is a solidly metaphysical enterprise. It offers an exploration of the space of metaphysical possibility. But it also attempts to give a systematic metaphysics since it offers an account of the way the world is fundamentally constituted. Given this, it must be

informed and even constrained by the relevant empirical physical facts if it is to be considered an instance of metaphysical inference to the best explanation , with the *explanadum* being the totality of all the facts about the world, including the critical and purportedly fundamental facts given to us by physical science. Given this the property mereology as an attempt at giving a metaphysical mapping of the world; it is an attempt at a systematic metaphysics. It is constrained by, but also extends past physical science to engage with the nature of parts of the world that science ignores or presupposes **(Paul 2012a, 222)** since it employs concepts, like the basic mereological axioms and definitions given by A_1-A_4 and D_1-D_5 , that for practical purposes in the science are unnoticed ignored or simply assumed as obviously true. The distinctive nature and methodology of the metaphysical as opposed to science comes from, "the *facts that the style of theorizing involved uses inference to the best explanation to draw conclusions for a mix of (defeasible) ordinary judgements , a priori suppositions, and empirical results from natural science and psychology."***(2012a, 222)** It is in light of this that we should view the mereological bundle theory as modelling the true nature of the world **(Paul 2012a, 2012b)**. It is in light of these considerations that any such metaphysical model of the world should take into account the latest empirical considerations about the nature of spacetime.

5.4.2 Against Spatiotemporalism

One way to start to build a metaphysical model of the world is to start with the view that among the fundamental constituents of the world is spacetime and its spatiotemporal regions. The category of the

spatiotemporal is therefore a fundamental ontological category. Following Paul **(2012a, 224-231)** let's call views that take there to be a fundamental ontological category of the substance of spacetime 'Spatiotemporalism'. A prime example[159]of this is the substantival mereological bundle theory that takes ontological parthood to be a ternary relation and was therefore seen to require the substance of spacetime to account for the ontological-parthood-at relation. The key point being that spacetime and its regions must feature as an irreducible category of entity in the world. The principle problem with this is that if we intend to produce a systematic metaphysics, one that hopes to map a particular metaphysical theory onto the way the world actually is, then any commitment that a metaphysical theory may have to spatiotemporalism may prove to be a disadvantage. The reason it may prove disadvantageous in production of a systematic metaphysics is that empirical considerations from physical science suggest that ordinary spacetime structure may either be emergent or even merely phenomenal and given this any assertion of spatiotemporalism ,taking spacetime to be fundamental, is at severe risk of refutation by current physics. In the case of the substantival mereological bundle theory, its reliance on regions of spacetime to account for the ontological-parthood-at relation puts it at risk of refutation by the physics, that is if it intends to be more than just a modelling of metaphysical possibility and become a systematic metaphysical theory. Putting the particulars of the substantival mereological bundle theory to one side lets be more precise about

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[159] Another example of spatiotemporalism includes various versions of supersubstantivalism that takes spacetime to be the only kind of substance with regions and sub regions identified as objects. For an advocate of this position see Schaffer **(2009a)** and Parsons **(2007, 225-228)**.For related discussions of how supersubstantivalism applies to persistence see Sider **(2001, 110-119).**

spatiotemporalism and its three underlying suppositions: the geometrical intuition, qualitative regionalism and the locality constraint.

5.4.2.1 The Geometrical Intuition

The geometrical intuition is the natural supposition that the world is built from smaller spatiotemporal bits of ordinary space in a geometric manner , that is to say that the world is very much like one grand Lego set that fits together in a geometrically appropriate way. That is to say in an analogous way to the manner in which Lego bricks are put together to compose larger lego wholes. Objects, by occupying spacetime and regions of spacetime, can be said to have certain spatiotemporal parts. As we saw with the example of the division of Mable the dog into six arbitrary spatiotemporal parts: her head, her thorax and her four legs. If we think of Mable like a lego set, then to build Mable involves arranging her spatiotemporal parts into the correct geometric arrangement such that we have the whole object Mable. The geometrical intuition reinforces the assumption that the material world is composed fundamentally from microscopic spatiotemporal parts individuated by their locations in the substance of spacetime. These parts are taken to be spatiotemporal regions that may or may not include material objects as contents, with the smallest possible spatiotemporal parts being taken to be the fundamental units of reality. Spatiotemporal parthood is then the relation that fuses these units to make the larger one which we take to be the ordinary objects that populate the material world; or as it were, to fuse to give us the ordinary sized dry goods that we take to populate our manifest image

of the world. It is this sense of such units being the proper spatiotemporal parts of ordinary objects that accounts for these units being more fundamental than the ordinary sized dry objects.

5.4.2.2 Qualitative regionalism and the locality constraint

However, to be able to pick out regions of spacetime via the geometrical intuition as being occupied by certain spatiotemporal parts we need to see that regions can be qualitatively rich, that is to say that spatiotemporal parts are more than just lego pieces with certain spatiotemporal dimensions. What allows us to non-arbitrarily pick out regions as being distinctly occupied by certain types of objects is that in addition to being chunks of spacetime, spatiotemporal parts may have specific characters in virtue of instantiating various properties. This of course may give an answer to the Problem of Character (PC) ; as we saw with how PC reoccurs for the substantival mereological bundle theory with the Problem of Regional Character[160] (PRC). However, for the sake of the exposition of spatiotemporalism let's not focus on providing an answer to PRC but rather focus on understanding the sense in which spatiotemporal parts are understood as being 'propertied'. Using the lego analogy the idea is that each lego piece is the bearer of the properties in that region; with the properties of that piece allowing us to pick out what regional size and shape we take that piece to have. For example, it is the properties of Mable's head that allow us to pick out the region which Mable's head occupies.

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[160] For the Problem of Regional Character (PRC) see section 5.3.3.2 of this thesis.

The geometrical intuition and qualitative regionalism give us the basics of a traditional spatiotemporal view. Paul **(2012a, 227-228)** summarises it well,

"On this view, the material world is a kind of glued-together jigsaw puzzle constructed using spatiotemporal composition as the glue. The effect of this method of building is that properties of larger spatiotemporal regions are built by spatiotemporally fusing together smaller, qualitatively rich spatiotemporal regions. In other words, on the spatiotemporal view, properties of larger regions are constructed via the spatiotemporal fusion of their qualitatively rich spatiotemporal parts, so the qualitative character of a larger spatiotemporal region supervenes on the spatiotemporal fusion of its smaller spatiotemporal parts. It's worth noting that the way I've described it the view assumes that nothing else is added to make the whole apart from the smallest spatiotemporal parts and the compositional relations: that is, at no point is any other (nonsupervenient) ontological thing added into the world. The mereological way of capturing this assumption defines the whole as supervenient solely on its (geometrically arranged) spatiotemporal parts. Finally, spacetime is taken to be a fundamental category".

Together the geometrical intuition and qualitative regionalism give us the basis for spatiotemporalism. However, under Humean influences[161] this basic spatiotemporalism can be carried further with a locality constraint **(2012a, 228-230)** such that all the properties that are had by the smallest regions of spacetime are intrinsic to that piece at any one time. That is to say the properties of these smallest regions do not depend ontologically on any of the other regions or the properties had by those other regions. This mean that if we accept a locality constraint on the qualities of spatiotemporal regions, it follows that the instantiation of properties at particular regions are fully defined and restricted to that region. That then amounts to the claim that the character of each region is bounded within that region. The

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[161] That each individual matter of fact is independent from every other individual matter of fact with no necessary connections between them.

regions can therefore be understood to have boundaries in terms of their properties. Using the lego piece analogy again, each lego piece is basically a hunk of spacetime that instantiates some properties within a region. A perfect statement of the geometric intuition, qualitative regionalism and the locality constraint is given by Lewis[162] **(1986b, ix-x)**,

"…….all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another. (But it is no part of this thesis that these local matters are mental.) We have geometry: a system of external relations of spatiotemporal distance between points. Maybe points of spacetime itself, maybe point-sized bits of matter or aether, maybe both. And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else supervenes on that". **(Lewis 1986b, ix-x)**

The metaphysical model of spatiotemporalism is therefore something along these lines. The fundamental objects that compose the world are spatiotemporally located , qualitatively rich spatiotemporal points or the smallest spatiotemporal regions where instantiated properties are bounded by the regions that instantiate them. These regions can be fused together to give the larger , qualitatively rich regions that we identify with the ordinary sized dry goods that populate our world of experience. Spatiotemporalism is not a new view. Ancient Greek atomism understands the fundamental entities to be atoms and void, where the world is built from geometrically bringing together various atoms in void to compose the world. Atoms could be viewed to be the qualitatively rich spatiotemporal parts while the void can be

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[162] This was quoted previously in section 1.4.4 of this thesis but it is worth stating it again here in this different context as there it was related to the Humean supervenience thesis of natural laws.

understood to be empty regions of spacetime. From Greek Atomism then descended a venerable line of views of the world that can rightly be headed under spatiotemporalism. The same set of suppositions that underlie spatiotemporalism in its modern guise best seen in Lewis **(1986b)**, that is the geometric intuition, qualitative regionalism sometimes combined with the locality constraint seem to also underlie the more epistemologically cautious corpuscularism of Locke. In speaking about the solidity of material objects, the impenetrability of those objects and the relation to space Locke, in his *An Essay concerning Human Understanding* states,

"This is the Idea belongs to Body, whereby we conceive it to fill space. The Idea of which filling of space, is, That where we imagine any space taken up by a solid Substance, we conceive it so to posses it, that it excludes all other solid Substances; and, will for ever hinder any two other Bodies, that move towards one another in a straight Line, from coming to touch one another, unless it removes from between them in a Line, not parallel to that which they move in. This Idea of it the bodies, which we ordinarily handle, sufficiently furnish this." **(Locke 2.5.2; Phemister 2008, 67)**

Detailed exegesis of the historical texts aside all that should be noted is that Spatiotemporalism has a venerable history. However, in light of advances in modern physical theory and experiment if we wish to give a systematic metaphysics there may be much empirical reason for rejecting it and the suppositions that underlie it.

5.4.2.3 Empirical considerations against Spatiotemporalism

What are the empirical considerations from current physical theory against Spatiotemporalism? In addition, why must a systematic metaphysics be constrained methodologically by such considerations?

Starting with the last question regarding a methodology for systematic metaphysics. If we want our metaphysics to be more than just a mere internally coherent model of the world and have actual applicability to the world, thereby being an attempt at a systematic metaphysics, then modern physical theory and its experimental findings should constrain and set limits on our metaphysical models which we take to be applicable models of the world. It's not that physics gives us our metaphysics by telling us everything. There is a distinctive and worthwhile task of metaphysical modelling. It uses inference to the best explanation from a mixed set of defeasible ordinary judgements which are wholly metaphysical, but it also can use defeasible *a priori* suppositions from mathematical physical theory along with empirically determined facts from experimental work in the natural sciences. It is one part of metaphysical modelling where we have to attend to natural science, and that means where possible avoiding ontological commitments in our metaphysical models that may be theoretically and empirically refuted by the sciences. Given the scales and balances of metaphysical inference to the best explanation, that is involved in any systematic metaphysics, it is optimal that any metaphysical model taken to be a true fundamental theory of the world should not be committed to or entail any controversial views in physics.

This leads us to the first question above; what are the empirical considerations from current physical theory against spatiotemporalism? The problem for spatiotemporalism is that it is ontological committed to substantival spacetime and regions as an irreducible ontological category and as such is not consistent with, at least some, interpretations of quantum physics. If some interpretations

of quantum mechanics are true, then it follows that spatiotemporalism is false. This is the case because qualitatively rich regions of spacetime are not properly understood as fundamental constituents of the world. Consider for instance those interpretations of quantum theory that take configuration space for the wave functions of particles[163] to be the fundamental space. Wallace and Timpson **(2010, 704)** state the problem for spatiotemporalism clearly,

"….the problem in quantum mechanics is that the quantum state does not trivially have a suitable spacetime representation; in particular , it is not representable as any ordinary sort of spacetime field. But a natural move is available : wave function realism……If wave-function realism is correct (and if it alone, and not some hidden variables, is the physical basis for observed reality), the world is really 3N-dimensional at its most fundamental level , and our 3-dimensional world is in some sense emergent from it."

Quite what emergence means here need not delay us, whatever it may mean it does entail that spacetime, and therefore regions of spacetime, are not fundamental. If for instance the configuration space version of quantum mechanical treatments of spacetime are true, it follows that the substance of spacetime is not a fundamental ontological category. The geometrical intuition as one of the underlying suppositions of spatiotemporalism is knocked out of the water; the world does not fit together in a straightforward way as determined by Euclidean geometrical considerations. To see why take some object that we take to populate the world of ordinary sized dry goods. For instance, the bird feeder stand in my garden. In ordinary spatial terms the stand is 150cm high. This spatial extension in height can be captured by mapping two particles of the stand, one at 150cm at the top of the stand and one at 0cm at the bottom of the stand. We can then map the

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[163] The view here has in recent philosophy of physics come to be known as wave function realism. For an endorsement of wave function realism see Albert **(1996, 2013)** and Ney **(2013)**.

height extension of the stand in the *y-* dimension with the bottom particle mapped at 0cm on the y-dimension and the top particle on 150cm on the y-dimension. The height extension of the stand in the y-dimension of ordinary three-dimensional space is captured by the representation of particles being located at these two distinct spatial points (regions) along the single y-dimension. However, as Ney **(2013, 169)** points out, in configuration space the system of the phenomenon in question, the height of the stand, is not represented by two particles in one dimension but rather by one particle in a six-dimensional space. This one single particle is taken to have location in a six-dimensional space, where the location of that particle is partly defined by two different values assigned to two of the six different dimensions of the configuration space. As Ney **(2013, 169-172)** states,

"None of the ….dimensions of the configuration space correspond to our ordinary dimension of height, nor to any of the other two dimensions of our manifest image."

Unlike in the three-dimensional representation with two particles picking out the height of the stand, this representation of the height of the stand in configuration space does not correspond to anything even approximating to our ordinary notion of height in the y-dimension. If this quantum mechanical description of the world is in fact true, then under such a true description spatiotemporalism should be jettisoned. Such a jettisoning is required because spatiotemporalism introduces inflexibility into any metaphysical model it is part of, such that if you want to transform it into a systematic metaphysics it may not accord with all of the facts. Consider again the geometrical intuition of the spatiotemporalist: that we build the world and all of its material objects by geometrically fitting together, like lego pieces, spatiotemporal parts that are smallish propertied regions. However, if

the configuration space theorist is correct and material entities are better understood as single points of the high dimensional configuration space, then it follows that there is no geometrical fitting together of discrete regions of qualitatively rich units of spacetime. Our metaphysical model which we want to utilise in a systematic metaphysics of the world must therefore be flexible enough to accommodate current physical theory that does not accord well with our manifest image of the world.

With this now in mind a seeming problem rears its head for how we are understanding the concreteness of constituent ontologies[164] where the notion of spatiotemporal location was central to understanding how properties can be understood to be ontological parts or constituents of objects. To see this, consider CPCO:

The Concreteness Principle of Constituent Ontologies (CPCO) : A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative spatiotemporal location(tropes) or has derivative spatiotemporal location(s) (universals).

CPCO clearly requires that a property can only be taken as an ontological part or constituent of an object if that property has some form of spatiotemporal location. It was critical in explaining, for instance, how abundant properties and properties understood to be sets of objects cannot be taken to be ontological parts or constituents of objects. However, should we reject CPCO in light of the empirical considerations against spatiotemporalism? I would argue not. The premium that it placed is to capture the sense in which we can say of

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[164] In section 2.4.2 on the concreteness of constituent ontologies.

properties that they have location in space and time; it was never stated that the sense of location in space and time has to be construed in line with the geometrical intuition, some version of qualitative regionalism or a locality constraint. It therefore does not entail what we have termed here spatiotemporalism, although many if not most particular variants of the constituent ontology do endorse some version of spatiotemporalism. But given the issues around spatiotemporalism CPCO should be disambiguated and made more general to simply refer to 'location' in its most general sense.

Hence, we can reformulate the principle as,

The General Concreteness Principle of Constituent Ontologies (GCPCO) : A property can only be construed as an ontological part or a constituent of an object *iff* that property has either non-derivative location (tropes) or has derivative location(s) (universals).

But without a notion of spacetime, at least as a fundamental ontological category, can we maintain a sense of location sufficient for parthood at all? This is a difficult question and one that will require further work but at least *prima facie* the answer is yes. For instance, consider the example above of the height of the bird feeder stand understood in the configuration space interpretation of quantum theory. There instead of the height being represented by two particles along a single y-dimension, the height is represented by a single particle taken to have location in six dimensions, with the location of the particle being partly defined by two different values assigned to two of the six different dimensions of the configuration space. Here we can retain location albeit in a form that no longer conforms to the geometric intuition. What we require is therefore a more general notion of location that is flexible enough to allow for conceptions of

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the world given by physical theory and the empirical considerations generated from it about the nature of space. This can perhaps be done if the fundamental category of the space of the world is the space, stage or arena where , to use David Alberts **(1996, 282-283)** phrase, *the world unfolds*. As Paul **(2012a, 237)** calls it perhaps the more fundamental category for the space of the world, at least of concrete[165] material objects, is the category of an existence space that is an arena or stage where the world unfolds. With that notion space is general enough that is could be the 3-Dimensional space of the geometrical intuition, the 6-dimensional configuration space or an n-dimensional space. And this is the sort of flexibility that would be required if we want our metaphysical model that maps metaphysical possibility to be taken as a systematic metaphysics that has to be constrained by physical theory. Location at least in some sense can be preserved to retain CPCO, it just may not be spatiotemporal location of the geometrical intuition.

5.4.3 Property Monism: Balancing empirical considerations with Metaphysics

The mereological bundle theory, can, if required do away with a reliance on spatiotemporalism. It can do this because according to the theory the world is nothing but a vast array of properties where the things, we typically take to be objects are in fact nothing over and above fusions of properties. Objects, as fusions of properties may have

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[165] Not the world of properly abstract entities, if there are any, like numbers, sets and propositions.

location in virtue of being fused with whatever location properties that there are that define the actual space of the world . The actual character of that space can be left undefined and given this it may not be the character of the 3-dimensional space supposed by spatiotemporalism. It may be the case that the structure of space is itself generated by the fusing of various more fundamental qualitative properties that define the space that may be determined by physical theory. It is in this general sense that mereological bundle theory, at least in its non-substantival form, can be said to be consistent and accommodating of various views of the nature of spacetime given to us by current, and future, physical theory.

As Paul **(2012a,243-244)** rightly notes mereological bundle theory in its non substantival form can do this for two reasons: firstly it is a monocategorial ontology, that is to say it rejects that there is a fundamental distinction between objects and properties, secondly it can reject spatiotemporalism and its suppositions, particularly the geometrical intuition. We have covered the first reason in depth, the mereological bundle theory gives us a one-category ontology of properties with objects simply being fusions of properties. It is a form of what I call property monism. The second reason, how it rejects spatiotemporalism needs to be considered. The rejection of spatiotemporalism is based on the rejection of spatiotemporal mereology; the mereology of classical extensional mereology and replaces it with a fundamental property mereology as given by A_1-A_4 and D_1-D_5. By rejecting spatiotemporal mereology and accepting a property mereology (as the master mereology) whereby the world is built up from properties as proper ontological parts, the mereological bundle theory can reject the geometrical intuition that the

fundamental entities in the world are spatiotemporally localized , qualitatively rich units or regions (the lego blocks) that build larger regions, based on geometrical principles that view the world as being contained in a 3-dimensional space. Instead of the world being built up from things that are like smaller lego pieces into bigger lego composites, the world is built up from the qualitatively more fundamental to the qualitatively less fundamental. This accords well with a theory of natural properties, particularly the graded view of natural properties, where the qualitatively more fundamental natural properties are taken to give the derivation, subvenience or dependence base for the increasingly less than natural properties.

With spatiotemporalism jettisoned, the property mereology and its notions of ontological proper parthood, ontological overlap and ontological fusion becomes a much more flexible approach able to cater for the constraints that may be imposed for a systematic metaphysics by the empirical considerations of current and future physical theory. It is properties that are fused together that are the fundamental constituents of the world, not the discrete spatiotemporal parts that are only suitable for the sort of building analogous to lego building. Since the mereological bundle theory can, if necessary, not include spatiotemporal location properties (perhaps replacing them with locational properties that are emergent upon structures built up from the fusion of more fundamental properties) it can cater for a wider range of possibilities for the character of the fundamental entities. As Paul **(2012a, 245)** puts it,

"This means that a property mereology could accommodate the possibility of spacetime and spatiotemporal properties playing a role at the fundamental level as the actual occupants of the fundamental categories (although the compositions would still be in terms of properties) , could accommodate the

higher-level emergence of the spatiotemporal or could even accommodate spacetime as merely phenomenal."

In other word it could accommodate the spacetime of spatiotemporalism, the emergent spacetime of the configuration space or even cater for a world where spacetime is nothing but the result of our own mental interaction with the world (that spacetime is merely phenomenal). To take the example of the configuration space the mereological bundle theory can take the wavefunction at a point of configuration space as the fusion of the amplitude and phase properties , as well as other properties of that system, with the structuring relational properties described by the Schrodinger equation and by the collapse postulate **(2012a, 246).** The point is as long as it is the case that a physical theory is formulated in terms of properties , whether purely qualitative or quantitative, the property mereology can be utilised to give a metaphysical model of how the fundamental entities (being properties) are ontologically fused to build the world. To conclude it is because the mereological bundle theory is a monocategorial ontology of properties (and property fusions) and rejects spatiotemporalism that the theory has the flexibility as a metaphysical model to be taken as a systematic metaphysics that can take the empirical considerations and constraints of physics into account, particularly concerning issues around the nature of spacetime.

5.5 The Problem of Indiscernible Fusions

5.5.1 Individuating and the bundle theory

The single biggest metaphysical problem that faces all versions of the bundle theory, and more specifically those bundle theories that explicitly endorse a monocategorial ontology of properties, is the problem of individuating qualitative indiscernibles. Since what I take to be the best version of the mereological bundle theory is a monocategorial ontology, and has good reason to endorse such a view as seen above when taking into account empirical considerations about the nature of spacetime , it follows that some form of response is compulsory to this most traditional of problems for bundle theories. Given that mereological bundle theories utilises the notion of ontological fusion to give us those entities that we take to be objects in ordinary discourse, I call this classic problem under a mereological bundle theory the Problem of Indiscernible Fusions.

Before proceeding onto how the problem recurs for the mereological versions of the bundle theory lets first consider the problem in its more original form **(Black 1952, 153- 164)**. The reason for the bundle theory in the first place is to avoid metaphysically suspect entities[166] like

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[166] As seen in section 4.3 I considered some deficiencies of factualism. The need to postulate *haecceities* as primitive identity properties or bare particular suffered from

substrata, bare particulars and *haecceities*. Given concerns seen in the last section around spatiotemporalism and empirical considerations from physical theory concerning the nature of spacetime a theory needs to be given that does not require the individuation of objects in terms of their being located at bounded spacetime regions. In short, the monocategoricalism that bundle theoretic accounts of objects can give seems at the very least an advantage of ontological parsimony. Given that the problem of individuating qualitative indiscernibles is not as severe[167] for trope theoretic versions of the bundle theory and that all known versions of the mereological bundle theory endorse some version of properties being universals when I refer to properties in this section I refer to properties being some kind of immanent universal , taken to being present at each of their instances. If you combine a theory of properties as universals, a monocategorial account of the world as being nothing but properties and the view that objects are constituted only by the properties which they instantiate then , so the objection goes, such a view commits itself to a false version of the Principle of the Identity of Indiscernibles. As Rodriquez-Pereyra **(2004, 72)** argues the fundamental claim of the traditional bundle theory is,

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traditional concerns of parsimony and Bailey's **(2012,31-41)** new problem for bare particulars.

[167] The problem does not arise in a severe form for trope theoretic versions of the bundle theory since tropes are not numerically identical; two tropes of a property primitively exactly resemble eachother, they are not bound together by identity. Trope bring with them their own already built in identity and any two object qualitatively indiscernible objects constituted wholly of exactly resembling will inherit their numerical distinction from the tropes that constitute them.

Traditional Bundle Theory **(TBT)**: Necessarily, for any particular object x and any entity y, y constitutes x *iff* y is a universal and x instantiates y.

The classic objection is that TBT entails or is committed to the following version of the identity of indiscernibles that is false,

Principle of the Identity of Indiscernible **(PII)** : Necessarily, for all particular objects x and y and every universal z, if z is instantiated by x *iff* z is instantiated by y, then x is numerically identical to y.

PII in effect is the claim that if two objects are qualitatively indiscernible, have all their property universals in common, then those two objects are in fact one and the same numerically identical object. But PII would be false if it were possible for there to be cases where two distinct objects having exactly the same property universals in common were nonetheless numerically distinct. A claim to the falsity of PII along these lines is given by Max Black's **(1952, 156)** famous counterexample of a world consisting of two spheres that have every property in common, where those properties are understood to be universals. Both spheres have exactly the same diameter, temperature, colour shape *etcetera* and are two miles apart. But nonetheless at this world the two spheres remain numerically distinct. At this point it could be claimed that worlds like Blacks **(1952, 156)** two sphere world are, in fact, not possible. There is no world of this sort corresponding to the description given by Black. Could it not be the case that it is a mere leap of intuition that that there really can be worlds where there are numerically distinct spheres that have exactly the same properties? Is it not really the case that where Black thinks he has two spheres he actually only has one sphere? If that is the case, then Black is simply making an error by thinking that if something is

prima facie conceivable then it is possible. This response is off the mark. There are world's like Black's because we cannot deny that there are worlds where there are two particular spheres that are only infinitesimally distinct. As Rodriguez- Pereyra (**2004,74)** puts it speaking of a world with two only infinitesimally distinct spheres,

" That world contains two particular spheres, a and b. But if a has a temperature T and a different particular b of the same kind as a has a temperature T* infinitesimally different from T, then it is possible for a to have T*. Thus, if the world with the almost indiscernible spheres is possible, so is another world in which the spheres are completely indiscernible".

That other world would be Black's world of entirely qualitatively indiscernible spheres. It seems that worlds like the one described by Black are possible if there are worlds with objects that are only infinitesimally qualitatively distinct.   In recent work, Rodriguez-Pereyra **(2017, 3005-3020)** now casts doubt on the argument that if infinitesimally distinct objects, what he calls almost indiscernibles, are possible then it follows that it is possible that there are entirely indiscernible objects. He argues now that the conditional premise (if almost indiscernibles (infinitesimally distinct objects) are possible, then indiscernible objects are possible) in this argument is dubious. Either this premise lacks support, in which case the argument does not establish the possibility of almost indiscernible objects or almost indiscernible objects are best dispensed with, in which case the argument from almost indiscernibles is not needed to give us the possibility of indiscernible objects. However, even if the argument from the possibility of almost indiscernibles or infinitesimally distinct objects to the possibility of indiscernible objects does not work the problem of individuating qualitative indiscernibles remains important for the bundle theory. It is a problem for the bundle theory

that has a historical pedigree and has therefore formed a philosophical cottage industry with a swathe of attempted answers and explanations from a bundle theoretic perspective. There is, in the very least, a heuristic sense that objects, no matter how similar, must be distinguished. This requires at least some answer or explanation to account for this appearance. This should be attempted even if it turns out qualitatively indiscernible objects are not possible. Given this any version of the bundle theory should have an answer or explanation for the problem; the mereological bundle theory being no different.

5.5.2 Indiscernible fusions

As in all properly monocategorial versions of the bundle theory the problem of individuating qualitative indiscernibles recurs for the mereological bundle theory. However, because the form it takes here has notable differences, I recast it as the problem of indiscernible fusions. To see this difference in form, consider again TBT as given above.

Traditional Bundle Theory **(TBT)**: Necessarily, for any particular object x and any entity y, y constitutes x *iff* y is a universal and x instantiates y.

TBT gives the sense in which the instantiation of a property universal in more traditional variants of the bundle theory is explained by the constitution of objects by their properties. It is in this way that the bundle theory is a paradigmatic example of a constituent ontology. The mereological bundle theory improves on this by giving constituency in terms of ontological parthood. The major advantage

of this was that it replaced less well understood concepts, those concepts that explain the constituency relation between an object and its properties being related by compresence, co-location, consubstantiation or concurrence, with the far better understood concept of proper parthood employed in mereology. The relation of proper parthood is converted into a property mereology that gives what I call ontological parthood. With the axioms and definitions of the property mereology

A_1-A_4 and D_1-D_5 we are able to take objects to be identical to or nothing over and above fusions of properties. We can now give a general translation of TBT into the terms of a property mereology,

Mereological Bundle Theory **(MBT)**: Necessarily[168], for any fusion of properties x and any entity y, y is a proper ontological part of x *iff y* is a property universal and x is taken to instantiate y.

However, is the mereological bundle theory **(MBT)** committed to or entail PII?

Principle of the Identity of Indiscernible **(PII)** : Necessarily, for all particular objects x and y and every universal z, if z is instantiated by x *iff z* is instantiated by y, then x is numerically identical to y.

This will depend on which version of the supplementation principle we adopt for the property mereology. It will depend on whether a strong supplementation **(A$_{4SS}$)** is offered that makes the property

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[168] I add the modal operator 'necessarily' tentatively in MBT because I do not want to commit in this work to the view that at all worlds the mereological bundle theory is true. Given the extent of metaphysical possibility it could be argued that there are worlds where the mereological bundle theory **(MBT)** is false. I do happen to think that we should argue that the mereological bundle theory is true at all worlds, but this is a discussion and argument for future work. To see reasons why, in the context of more traditional bundle theories, we should only apply the mereological bundle theory to the actual world see Casullo **(1984, 527-541)**. I therefore only use the modal operator here to ensure that we can test the idea that MBT is committed to or entails PII.

mereology fully extensional such that we have identity or a weak supplementation **(A₄ws)** that shows us only that fusions of properties are nothing over and above the properties that ontologically overlap the fusion. In earlier work Paul **(2006, 635)** thinks that even if a strong version of supplementation for a property mereology holds, the mereological bundle theory is not committed to or entails PII. This is clear where she states,

*"….my bundle theory allows for the possibility of actual-world cases of qualitatively indiscernible objects at different locations because such objects can be individuated by their location properties, by properties of their spatiotemporal parts , or primitively. Primitive individuation does not require the acceptance of primitive thisnesses or haecceities , but unless it is the property parts (instead of whole fusion) that are primitively individuated, it does require the rejection of a mereological supplementation principle , qualitative extensionality, according to which objects (excluding objects that are qualitatively simple) with the very same proper qualitative parts are identical. Somewhat controversially, I think qualitive extensionality holds. Acceptance of qualitative extensionality is not acceptance of what is standardly taken to be the "principle of the identity of qualitive indiscernibles". "***(2006, 635)**

However, a systemic review of her work, in particular her later works show some understandable vacillation. Paul in later work **(2017, 251)** on the mereological bundle theory very clearly gives a weak supplementation interpretation of A₄ that only asserts that a property mereology gives objects as being nothing over and above some fusion of properties. The exact statement[169] of Paul's **(2017, 251)** version of weak supplementation closely mirrors the version of weak supplementation I give at A₄ws .

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[169] Paul's **(2017)** version of A₄ precisely reads as:
A₄. For all *x, y*, and *z*, if *x* is a proper qualitative part of *y, y* has a proper qualitative part *z* qualitatively disjoint from *x* (This is weak supplementation: if an individual has a proper qualitative part, it has at least one other proper qualitative part). **(2017, 251)**

Given her rejection of spatiotemporalism she now cannot allow in the possibility that an object as a fusion of properties can be individuated from other fusions by location properties or properties of the spatiotemporal parts of objects (never mind primitive thisnesses or haecceities!). Because of this rejection, I think rightly, of spatiotemporalism she can longer accept a strong supplementation of the property mereology that gives identity. Therefore, she can no longer claim that a property mereology with strong supplementation does not commit or entail acceptance of PII, or as she puts it, "the principle of the identity of qualitative indiscernibles. **(Paul 2006, 635)**.

Let's now consider exactly why strong supplementation commits MBT to PII but weak supplementation does not. Take the two principles of strong and weak supplementation that I gave in section 5.2.2.2.

A$_{4SS}$. For any x and y, if x and y share exactly the same proper ontological parts, then x is identical to y. (Strong Supplementation)

Or,

A$_{4WS}$. For all x and y, if x is a proper ontological part of y, there is a z such that z is a proper ontological part of y, and z is ontologically disjoint from x. (Weak Supplementation)

Let's say we want to accept that the property mereology is fully extensional sufficient for identity. Why is it the case that only A$_{4SS}$ will give us identity? To give a proof of this let $P_1,….P_n$ be properties and let objects a and b be the ontological fusions of the Ps. Take it that both a and b have exactly the same ontological parts. Now take one of the Ps , P_2, where P_2 is a proper ontological part of a *iff* P_2 is a proper ontological part of b. Now suppose that a is not identical to b. If this is the case, then we end in a *reducio*. To see this, consider D$_1$,

D₁. For all x and y, x is an ontological part of y iff x is a proper ontological part of y or x is identical to y. (An objects improper ontological part is identical to that object)

Given D₁, either a is a proper ontological part of b or a is not a (proper or improper) ontological part b. Consider two cases derived from the disjunction given in D₁ **(Shiver 2014, 905-906)**. Let's see how both contradict our acceptance that the property mereology is fully extensional, and hence are contra-hypothesis. In the first case we take it that a is a proper ontological part of b and in the second case we take it that a is not a (proper or improper) ontological part of b.

In the first case, a is a proper ontological part of b. Then by weak supplementation given by A₄ws , b has a proper ontological part P₂ that a does not have. But if that is the case this is contra-hypothesis, that is if we want the fusion of a to be identical to the fusion of b (objects being identified with fusions of properties).

In the second case, a is not a (proper or improper) ontological part of b. However, consider D₃:

D₃. For all x and y, x is ontologically disjoint from y iff x and y have no ontological part in common.

By D₃ a and b are ontologically disjoint and have no ontological parts in common. If this is the case then by strong supplementation given by A₄ss, b has some (at least one) proper ontological part that a does not have. And in the second case, as in the first case, this means that the fusion of properties a cannot be identical with the fusion of properties b, again contra-hypothesis. Both cases result in absurdity and therefore by *reducio* a must be identical to b.

This shows that we must supplement the property mereology of MBT with A₄ss to get extensionality. That is if we want to show that we can

derive identity[170] from a property mereology we cannot use A$_{4WS}$. However, if we prefer to weakly supplement, as I think if preferable, we can still hold onto the looser sense that objects are nothing over and above the fusions of properties that ontologically compose them. Most importantly, on the question of whether MBT commits us to or entails PII it shows that it is only by strong supplementation in **A$_{4SS}$** that we can derive identity.

A$_{4SS}$. For any x and y, if x and y share exactly the same proper ontological parts, then x is identical to y.

A$_{4SS}$ allows us to assert that if any two property fusions (denoted by object terms) have all the same proper ontological parts in common, then those two fusions are not two distinct fusions but are in fact numerically one and the same fusion. And if this does not entail PII it at least commits us to something very much like PII namely what I call the Principle of the Identity of Fusional Indiscernibles, bearing in mind that objects are identical to property fusions if we accept A$_{4SS}$ and that properties are universals.

Principle of the Identity of Fusional Indiscernibles (PIFI): Necessarily, for all particular property fusions x and y, if for all properties P, x is P iff y is P, then x is identical to y.

Given the above we should accept that at least on the face of it the problem of individuating qualitative indiscernibles recurs for the mereological bundle theory just as it does for traditional bundle theories. However, unlike in the more traditional forms where TBT is

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[170] Shiver **(2014, 905)** argues that if Paul **(2002,2006)** wants to have the resources to use a property mereology to solve problems of material constitution she is going to have to give a strong supplementation to her property mereology.

taken to be committed to or entail PII we have seen that at the very least, if we accept strong supplementation, that MBT,

Mereological Bundle Theory **(MBT)**: Necessarily[171], for any fusion of properties *x* and any entity *y*, *y* is a proper ontological part of *x iff y* is a property universal and *x* is taken to instantiate *y*.

is committed to or entails a principle PIFI,

Principle of the Identity of Fusional Indiscernibles (PIFI): Necessarily, for all particular property fusions *x* and *y*, if for all properties *P*, *x* is *P iff y* is *P*, then *x* is identical to *y*.

which is strikingly similar to PII. The key point being that this problem appears to be generated only under strong supplementation as given by A$_{4SS}$.

5.5.3 Supplementation and explanations for Indiscernible Fusions

In what follows I will argue that only on A$_{4WS}$ (weak supplementation) can the mereological bundle theory in its monocategorial form provide an explanation to the problem of indiscernible fusions and circumvent the problem of individuating qualitative indiscernibles. First, I will consider how under strong supplementation the mereological bundle theory (MBT) can attempt to draw on the resources of the property mereology to avoid PIFI. However, I will

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[171] See footnote 168 for concern on use of the modal operator in the MBT.

argue that even with this it cannot escape the problem of individuating qualitative indiscernibles. The attempted solution will centre on the claim that when properties are understood to be universals under the property mereology it is not the case that properties are wholly present wherever they overlap some property fusion (object). With this is in place it then appears there can be qualitatively indiscernible fusions such that MBT does not entail or commit us to PIFI. The perk of this is that in light of the rejection of both primitive thisnesses and spatiotemporalism this solution does not have to draw on either *haecceities*, spatiotemporal location properties or spacetime regions. However, once you consider what A_{4ss} commits us to , namely that it makes the property mereology fully extensional, it will still follow that qualitatively indiscernible fusions are numerically identical as per PIFI. Unless we can draw on *haecceities*, fundamental spatiotemporal properties or properties of spatiotemporal parts or some other unique individuating fundamental property, no property mereology that is strongly supplemented can account for examples of numerically distinct but qualitatively indiscernible objects. What this shows us, is that at least tentatively we may have reason to endorse weak supplementation of the property mereology given by A_1-A_4 and D_1-D_5.

We saw in the last section that if we use A_{4ws} as the version of A_4 in the axioms and definitions of the property mereology then PIFI does not follow from MBT. If PIFI or some other version of PII does not follow from MBT then the problem of indiscernible fusions does not occur. Therefore, advocates of weak supplementation under A_{4ws} can avoid the problem of indiscernible fusions since for them MBT does not commit them to or entail PIFI. Barring some equivalent of spatiotemporal location properties which give individuation, say for

instance existence space locational properties, at least in so far as the problem of indiscernible fusions goes the mereological bundle theorist is better placed to endorse[172] weak supplementation, as given by A4$_{WS}$, than strong supplementation as given by A4$_{SS}$. There may be independent reasons to query this weak supplementation, but in so far as the problem of indiscernible fusions goes, I cannot yet envision a solution that involves strong supplementation without adding properties that primitively individuate.

Let's consider in depth why under strong supplementation the mereological bundle theory cannot account for the problem of indiscernible fusions. Consider the statements of strong supplementation (A4$_{SS}$) I give in the disjunctive interpretation of A4 in A$_1$-A$_4$ and D$_1$-D$_5$

A4$_{SS}$. For any x and y, if x and y share exactly the same proper ontological parts, then x is identical to y. (Strong Supplementation)

With A4$_{SS}$ it is clear that MBT,

Mereological Bundle Theory **(MBT)**: Necessarily[173], for any fusion of properties x and any entity y, y is a proper ontological part of x *iff* y is a property universal and x is taken to instantiate y.

is committed to or entails PIFI,

Principle of the Identity of Fusional Indiscernibles (PIFI): Necessarily, for all particular property fusions x and y, if for all properties P, x is P *iff* y is P, then x is identical to y.

With PIFI being the property mereological version of PII,

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[172] Another reason to endorse weak supplementation is if there are in fact fundamental asymmetrical relational properties. This was seen in section 5.2.2.2 where I previously compared A4$_{SS}$ and A4$_{WS}$.

[173] See footnote 141 for concern on use of the modal operator in the MBT.

Principle of the Identity of Indiscernible **(PII)** : Necessarily, for all particular objects *x* and *y* and every universal *z*, if *z* is instantiated by *x iff z* is instantiated by *y*, then *x* is numerically identical to *y*.

One potential solution to the problem may be to draw on what is included in the scope of quantification over properties in PIFI and also in PII. Do we mean all properties, pure and impure properties where impure properties include properties that are defined solely in terms of the individuation of particular things, such as particular fusions? If PIFI refers to all of the properties involved in a fusion, including properties such as x *being identical to x,* then one avenue for response would be to say that the numerical distinction of qualitatively indiscernible fusion is given by primitive identity properties of numerically distinct but qualitatively indiscernible fusions. In each particular fusion there includes some impure property that gives the numerical identity of that and only that fusion, thereby allowing qualitatively indiscernible fusions like the two spheres of Black's world to be distinguished.

However, this solution should not be open to the property mereology, although in earlier work Paul **(2002,2006)** endorses the view the primitive individuating properties could be quantified over in the property mereology. There is a good reason to think they should not. Notice that an impure property such as *x being identical to x* , would not on the property mereology be the type of ontological part that we want to do the job of explaining the problem of character, namely how objects are taken to instantiate their properties, with instantiation being understood as proper ontological parthood. An impure property like *x being identical to x* would be an improper ontological part as given by,

D₁. For all x and y, x is an ontological part of y *iff* x is a proper ontological part of y or x is identical to y. (An objects improper ontological part is identical to that object)

Therefore, on the property mereology an impure property like *x being identical to x* would be an improper ontological part of x, not the required proper ontological part that was sort to explain instantiation. *Haecceities*, therefore, cannot be an option in a solution to PIFI for the mereological bundle theory since they would be improper ontological parts. Only proper ontological parts capture the sense of parthood we need to understand how properties are related to the objects that instantiate them.

Are there any other particular types of property that could assist the mereological bundle theory in a solution to PIFI outside of *haecceities*? No. The reason for this is that the only other conceivable options are some kind of fundamental spatiotemporal locational properties, included in fusions of properties, that would distinguish otherwise qualitatively indiscernible property fusions. While this is an option in the building of a metaphysical model that can assist to solve particular metaphysical problems like PIFI, if we want that model to give a systematic metaphysics that is respectful of physical theory around the nature of spacetime then we should attempt to not fall back on solutions that invoke the fundamentality of spacetime. This was seen previously in the rejection of spatiotemporalism[174].

I can conceive of only one possible line of thought that may give a solution to the problem of indiscernible fusions under strong supplementation, independent of postulating *haecceities*, fundamental spatiotemporal location properties and properties of spatiotemporal

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[174] See section 5.4.2.3 for the rejection of spatiotemporalism.

parts. This solution draws on how the mereological bundle theory, one that takes properties to be something like immanent universals, employs the notion of a property's presence at fusions of which it is a proper ontological part. Both PIFI and PII are only rendered problematic for a theory of properties if properties are taken to be wholly present at their instantiations. Since instantiation is accounted for in terms of the ontological overlap of some property with objects, where objects are understood under A$_{4SS}$ as numerically identical with some fusion of properties, it follows that the mereological bundle theory cannot account for distinct but qualitatively indiscernible fusions. This is because if we maintain that a property universal is wholly present wherever it is instantiated, then by the analysis of instantiation given in terms of ontological parthood a property is wholly present wherever it ontologically overlaps as a proper part of a fusion.

However, as we saw in section 5.2.3.2 that focused on resemblance, universals and tropes, the mereological bundle theory is not committed to a conception whereby universals are wholly present at their instances. The problem with the concept of whole presence in this context is that it is the whole presence of property universals in monocategorial ontologies, where everything is taken to be nothing but bundles or fusions of property universals, that gives worlds where there can be no numerically distinct qualitatively indiscernible objects. Wherever a universal is, it is there in its totality, all of it. Whole presence simply requires this. Therefore, if two objects are wholly constituted of sets of compresent universals or in this case fusions of universals, then those objects must be numerically identical.

Fortunately, the mereological bundle theory is not committed to the view of the whole presence of property universals.

Why this is the case is stated at section 5.2.3.2, however I will give it here for sake of the current argument. On the mereological bundle theory for any property F and an object understood as a fusion of properties x, if F is a proper ontological part of x there is some part of F that is disjoint from x. There is some distinct fusion from x, namely y, which F also ontologically overlaps and is a proper ontological part of. But where F overlaps x, it, namely the part of F that overlaps x, is numerically distinct from the part of F that overlaps y. On the property mereology if F is a universal in so far as it is present at each of its instances, F cannot be wholly present at each of its instances because each overlapping part of F (the F-part that ontologically overlaps x and is a proper ontological part of x and the F-part that ontologically overlaps y and is a proper ontological part of y) are numerically distinct although they are both parts of F. Parts of universals like F are not identical to other parts of the same universal F so long as they are fused (as in all cases they are) to distinct fusions of properties. Just like in trope theory, property instances, are numerically distinct entities. However unlike in trope theory they are not bound together as a property by the relation of primitive exact resemblance but rather are bound together by parthood. They are parts of one and the same universal. It is in this sense that the universals in MBT behave somewhat like tropes; they are necessarily unique is so far as they are parts of wholes that are particular universals. This is a view that I think must be endorsed by the mereology bundle theory whether or not one chooses to supplement

strongly or weakly[175] with A$_{4SS}$ or A$_{4WS}$. The claim that could then be made here is that since each part of F where it overlaps with some fusion of properties is unique , it follows wherever we have fusions of properties those fusions are necessarily unique such that even in cases where there are two qualitatively indiscernible fusions of properties we can maintain that there are two numerical distinct fusions of properties. We can, so the solution under strong supplementation goes , allow for possible examples of numerically distinct objects that are nonetheless qualitatively indiscernible, where objects under MBT,

Mereological Bundle Theory **(MBT)**: Necessarily, for any fusion of properties x and any entity y, y is a proper ontological part of x *iff* y is a property universal and x is taken to instantiate y.

are understood to be fusions of properties. Then because of the uniqueness of property instances given by the mereological bundle theory MBT does not entail or is not committed to PIFI

Principle of the Identity of Fusional Indiscernibles (PIFI): Necessarily, for all particular property fusions x and y, if for all properties P, x is P *iff* y is P, then x is identical to y.

The notion of the presence of universals that the mereological bundle theory gives is ingenious because it avoids the dubious notion of the whole presence of universals at numerically distinct objects. However, it nonetheless is no help in solving the problem of indiscernible

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[175] It can be done and still account for the problem of resemblance as I explain in section 5.2.3.2 by taking properties to not be wholly present at each of their instance as in most versions of immanent universals or bound together by primitive exact resemblance as with tropes. Rather properties are primitive units of character such that at each part of that property where it fuses with other properties it imbues that fusion of properties with its unique character.

fusions for a strongly supplemented property mereology given by A$_{4SS}$,

A$_{4SS}$. For any x and y, if x and y share exactly the same proper ontological parts, then x is identical to y. (Strong Supplementation)

The problem clearly is that under A$_{4SS}$ property fusions that share exactly the same proper ontological parts are numerically identical. It is the supplementation of the property mereology with A$_{4SS}$ that makes it the case that MBT entails PIFI. It is the case under a strongly supplemented property mereology that parts of properties , (such as the part of F that ontological overlaps x and is a proper ontological part of x and the part of F that ontologically overlaps y and is a proper part of y) are only numerically distinct *iff* they overlap numerically distinct objects as fusions of properties. Given A$_{4SS}$ in cases where objects as property fusions have exactly the same proper ontological parts those objects as property fusions are just numerically one and the same fusion, and because of this any of the ontological parts that ontologically compose them are the numerically identical parts of the universal. Unlike in trope theory the parts of the universals involved have no primitive necessary uniqueness in cases where you have qualitative indiscernibility; they are in cases of objects that are qualitatively indiscernible just one and the same set of property instances. Because of the strong supplementation of A$_{4SS}$ to give extensionality of the property mereology, in cases of indiscernible fusions you are just picking out one and the same fusion of properties. It is therefore the case that for all particular property fusions x and y, if for all properties P, x is P *iff* y is P, then x is identical to y. Even with the property mereological theories novel account of the presence of

universals a strongly supplemented property mereology cannot allude the problem of indiscernible fusions.

While not decisively proving that the property mereology should be weakly supplemented rather than strongly supplemented it does add to the case. Unless we decide it possible to allow in properties that can primitively individuate qualitatively indiscernible fusions, we should not give a property mereology that is fully extensional. A weakly supplemented property mereology can account for and avoid the problem of indiscernible fusions. This, along with the need to potentially allow fundamental asymmetric relations[176] into the calculus of a property mereology, adds to the cumulative case for a weak supplementation of the property mereology as given by A_{4WS}.

5.6 Concluding Remarks

The mereological bundle theory offers the best variant of the constituent ontology. As we saw in section 5.2 it is able to replace the less familiar relations of the traditional bundle theory with the more familiar relation of parts to wholes, the wholes being fusions of properties and the proper parts being properties. It is then these fusions of properties that are then taken to be wholly constitutive of objects. It is able to this by employing a property mereology given by the axioms and definitions A_1-A_4 and D_1-D5. Using the notion of proper ontological parthood, the mereological bundle theory is able to account for the two problems set out in chapter 1 for any theory of properties and how they relate to objects, the Problem of Character

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[176] This was seen in section 5.2.2.2 where I previously compared $A4_{SS}$ and $A4_{WS}$.

and the Problem of Resemblance. To the Problem of Character, the property mereology is able to account for how a property is related to any object that is taken to instantiate it, and therefore imbue that object with it's *kath hauto* character. Properties are taken to ontologically overlap objects, where objects are taken as nothing over and above fusions of properties. Properties are proper ontological parts of fusions of properties, fusions that are wholly constitutive of what objects are. Instantiation of properties is therefore analysed as proper ontological parthood. To the problem of resemblance, the mereological bundle theory that I argue for is able to offer a novel account of the presence of universals without recourse to the notion of universals being wholly present wherever their instances are. The property mereology is also able to account for why , as Paul **(2002, 2006)** puts it, tropes and immanent universals are *"different sides of the same coin"* **(2002,583)**, with property instances being understood as distinct ontological parts of universals where they overlap distinct fusions of properties.

In section 5.3 I argued that if one accepts a monocategorial version of the mereological bundle theory, where the only ontological category is that of property, then one must adopt a fictionalism about the ordinary spatiotemporal parts of objects. The primary reason for this is that if one takes the property mereology to be the fundamental mereology, as for instance Paul **(2012a)** does, then one cannot take there ,in reality, to be ordinary spatiotemporal parts. There are properties that are the *kath hauto* sources of character , and then there are fusions of those properties which we take to be wholly constitutive of objects. After showing this, I then consider an alternative, and relatively uncovered, version of the mereological bundle theory. I call

this the substantival mereological bundle theory in that it postulates the substance of spacetime in addition to the ontological category of properties and their fusions. Such a view is able to be realist about spatiotemporal parts, identifying spatiotemporal parts as regions of spacetime that are occupied by fusions of properties. By postulating the existence of the substance of spacetime this version accepts a polycategorial ontology. There is the ontological category of property, which includes properties and objects as fusions of properties and then there is the separate ontological category of the substance of spacetime. I argued that this version of the mereological bundle theory is weaker than the monocategorial version on two fronts. Firstly, it offers a superficial answer to the Problem of Character ; turning the problem from a problem of how properties are related to objects to how properties are related to regions of the substance of spacetime. Secondly, it is committed to the fundamental existence of the substance of spacetime. This is a disadvantage given that many current theories of the nature of spacetime in physics do not take spacetime to be fundamental. The reasons for this are seen in section 5.4.

In section 5.4 I argued that since the mereological bundle puts a premium on natural properties, as all constituent ontologies typically do, that a premium is then placed on the empirical considerations of physical science. I argued that spatiotemporalism should be jettisoned. Spatiotemporalism is the conjunction of the geometrical intuition , qualitative regionalism and the locality constraint. It takes the world to be fundamentally made up of spatiotemporal parts being put together in a manner analogous to a lego set. However , given an attempt to give a systematic metaphysis that is sufficiently flexible to

take into account considerations from physics on the nature of spacetime this view is jettisoned since it presupposed there being fundamental spacetime that is 3- dimensional in nature. The property mereology is shown to be flexible enough to cater for different interpretations on the nature of spacetime.

In section 5.5 I argued that like all bundle theories the mereological bundle theory is confronted with its own versions of the Problem of Qualitatively Indiscernible objects given the possibility of worlds like Black's **(1952)** world where there are two completely indiscernible spheres. It suffers from what I call the Problem of Indiscernible Fusions. Although it may be the case that worlds like Black's are not possible, the problem is one that the mereological bundle theory should still at least confront heuristically given the importance of the original problem in the history of bundle theories. I argued that the mereological bundle theory can provide an answer so long as it only provides weak supplementation of the property mereology not sufficient for extensionality. I considered a possible way out for the mereological bundle theorist who strongly supplements to give extensionality. This considers the possibility that since property universals on the mereological bundle theory are not wholly present at their instances (at fusions), that therefore the Problem of Indiscernible Fusions can be avoided. I argue however that even with this novel conception of the non- whole presence of property universals the strongly supplemented property mereology still cannot answer the Problem of Indiscernible Fusions. Given this I suggest that we have an additional reason to only weakly supplement the property mereology of the mereological bundle theory.

<u>Conclusion</u>

The aim of this thesis was to accomplish three related tasks at different levels of generality in a theory of properties and objects. The first and most general task is seen in chapter 1 where I argued that there are two parallel problems that require an answer in any theory of properties and objects. Those are the Problem of Resemblance and the Problem of Character. In chapter 1 it was argued that while the Problem of Character is more fundamental , in so far as the Problem of Resemblance presupposes it, nonetheless any theory that looks to account for properties, objects and the relation between them should always keep both in mind in the formulation of solutions. In effect they are both compulsory questions of the metaphysics room. Chapter 1 was therefore a problem setting chapter, that is to say it set out and defended the force of the problems. Chapters 2 and 3 then operated at the next level of generality by setting out and defending one of the two general approaches that focuses on answering the Problem of Character, namely, the constituent approach that takes properties to not exist separate from the objects which instantiate them but rather exist 'within' or 'inhering' in those objects.

In Chapter 2 I set out to provide the general framework of the constituent ontology approach, with a primary focus on the Problem of Character. I argued that the constituent ontology is best understood as the view that properties are in some sense ontological parts or constituents of the objects which instantiate them. A central place was given to the locality of properties, that is to say that for properties to be ontological parts or constituents properties must be understood to somehow be located entities, quite unlike transcendent universals or

sets. It was through this sense of properties being located that then shows that views that take properties to be either classes of objects or transcendent universals cannot be understood to be constituent ontologies since such entities should not be taken to be located. To give the framework of the constituent ontology I articulated and defended four key features of the constituent ontology: realism, the view that properties are fundamental irreducible entities in the world. Concreteness, the view that properties are located entities that are ontological parts or constituent of the world. Immanence, the closely related notion that properties are immanent in the world and rely for their existence on being instantiated. Finally, that the constituent ontology should only quantify over the natural properties, those properties that account for the objective resemblances in the world by cutting nature at its joints. These features of realism, concreteness, immanence and naturalness of the constituent ontology are what allow us to pick it out as a unique approach to answering the Problem of Character.

The constituent ontology has often not been set out fully as it has been taken to be an ill motivated general approach to answering how properties are related to the objects that instantiate them. Therefore, in chapter 3 I argued that the constituent ontology is not ill motivated from the start and is a coherent and valuable general approach to answering both the Problem of Character and the Problem of Resemblance. I argued against two *reducios* which assert that the constituent ontology implies a form of substance dualism and then that it implies the existence of impossible objects. I then argued against the charge from van Inwagen **(2011; 2015)** that the constituent ontology as a whole is not only a false doctrine , but a totally

incoherent doctrine. From there I moved on to argue that the most difficult problem for the constituent ontology is accounting for quantitative properties, that is to say properties that are represented in scientific discourse as numerical measures. I offered some ways in which the constituent ontology could show that quantitative properties can be ontological parts or constituents of objects.

After motivating and defending the general framework of the constituent ontology I then moved on to the greatest level of specificity of the aims of the thesis. The provision of some versions of the constituent ontology, one of which I take to be the best version available ,namely, the mereological bundle theory which I set out in Chapter 5. In chapter 4 I consider the constituent element of the disjunction of the constituent ontology , that disjunction being that properties are either ontological parts or constituent of objects. There I considered what I call the factualist non- mereological account of how properties and objects are related , focusing on Armstrong's **(1997a)** ontology of states of affairs. I considered attempts by both Armstrong **(2004a)** and Baxter **(2001a; 2013)** to account for the non-mereological 'binding tie' between properties and objects as one of partial identity. I argued that both accounts , in an attempt to account for the particularity of objects, have to resort to bare particulars or *haecceities*. I argue that resort to these entities rails against ontological parsimony but also results in Bailey's **(2012)** new problem for bare particulars.

In Chapter 5 I articulated , explored and defended the mereological bundle theory. It is in my view not only the best version of the constituent ontology, but also one that has substantial explanatory power to burn generally . This theory provides us with an account of

how properties are related to the objects that instantiate them by properties being proper ontological parts of fusions of properties. It therefore answers the Problem of Character in terms of ontological parthood. Objects, via the property mereology are taken to be nothing over and above fusions of properties, with the ontological category of property being the only single ontological category there is. I also argued that the mereological bundle theory offers a novel solution to the Problem of Resemblance that accounts for properties being had by multiple objects without recourse to either whole presence or a relation of primitive exact resemblance. Further to this the mereological bundle theory can be taken to be a systematic metaphysics that has the flexibility to account for the empirical considerations of physical science concerning the nature of spacetime; it does not have to be committed to any one account of what the nature of spacetime amounts to. Like all versions of the bundle theory the mereological bundle theory faces its own version of the Problem of Indiscernible Objects which I argue can be taken as the Problem of Indiscernible Fusions. I argued that so long as the property mereology is weakly supplemented it can avoid its own version of this traditional problem for bundle theories.

With an understanding of the Problem of Character and the Problem of Resemblance in place the constituent ontology can be seen as a valuable and coherent general approach to giving an answer to these problems. I have argued that it is not one that should be rejected out of hand. In addition, I have argued that there is a variant of the constituent ontology, the mereological bundle theory, that offers a powerful theory of exactly how properties and objects are related by proper ontological parthood. I take the mereological bundle theory to

offer the best systematic metaphysics of properties and objects. If I am correct, then the world is nothing but a world of properties and fusions of those properties.

(99980 words)

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